INTELLECTUAL OUTPUT 1

ENTREPRENEURIAL CASES

MAY, 2022

SMART SOC Education of Future ICT Experts Based on SMART Society Needs

Co-funded by the Erasmus+ Programme of the European Union

Version 3.2 (30 June 2022)

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INTRODUCTION

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Welcome to the SmartSoc project intellectual output 1 – Entrepreneurial cases: "entrepreneurship in ICT" and "entrepreneurship with ICT".

The main project ideas are to (1) create and implement intensive interdisciplinary study programme in the field of ICT-based entrepreneurship considering transnational and intercultural context, and (2) to enforce ICT students' teams to deal with economic, societal, and environmental challenges defined by the crucial documents of the EU and the UN related to the Sustainability Development Goals, research and innovation programmes and smart specialisation strategies.

The SmartSoc project could be characterised by the collaboration of students from different European HEI on a common task related to (a) recognizing needs of society, and (b) providing solutions by using ICT. The student teams elaborate the specific entrepreneurial cases from Smart Society domain. Following principles are very important during the SmartSoc project: (i) project-based learning, (ii) student teamwork, and (iii) blended mobility.

The SmartSoc project in a nutshell:

- Full name: Education of Future ICT Experts Based on Smart Society Needs
- ID: 2019-1-SK01-KA203-060789
- Duration – from 1 September 2019 to 31 August 2022
- Project budget – 364,736€
- 13 partners
    - 12 HEI
    - 1 NPO
- 9 countries
- Project coordinator – the University of Žilina, Slovakia
- Web: https://www.smartsoc.uniza.sk
- FB: https://www.facebook.com/smartsocproject - @smartsocproject

The project intellectual outputs are "products" of very important SmartSoc project activities – events related to the learning, teaching, and training.

These activities are organised once a year – the spring (summer) semester of the HEI that participates in the project. These activities are organised every year in a blended mobility format – 10 weeks of collaboration online, to elaborate business plans based on the entrepreneurial cases' assignments + 2 weeks of the workshop, to complete the business plans and to learn about the latest trends in ICT, entrepreneurship, business, marketing, intercultural communication and sustainability – in accordance with the EU initiatives in research, innovations and smart specialisations, and the UN agenda for the Sustainability Development Goals. The blended mobility is organised as an elective course for all participating students. It is recognized by all participating HEI and the students receive 4 ECTS after the successful presentation of the team's business plan.

This intellectual output – the Intellectual Output 1 – was started at the SmartSoc project beginning – in September 2019. Its final version was released in May 2022. This document and related Entrepreneurial cases are the open educational resources.

This document contains all entrepreneurial cases prepared by the teachers of the participating HEIs. The relevant parts of the business plan created by students' team are added as an example of expected result. Additionally, the recording of the students' presentations is free accessible on the SmartSoc project YouTube channel.

Intellectual Output 1 was officially introduced as a part of multiplier events in 2022 in Slovakia, Croatia, and Spain.

The additional information, the work schedule of the teams on these entrepreneurial cases is published with free access on the SmartSoc project Moodle platform (https://moodle.uniza.sk/public/course/view.php?id=29).

The videos of the final business plans' presentations are shared on the SmartSoc YouTube channel (https://www.youtube.com/channel/UC0SsORwOMyxxjHgVMGmgG3A).

SMARTSOC PARTNERS

- 12 UNIVERSITIES
- 1 INSTITUTE
- 9 COUNTRIES

UNIVERSITY OF ZILINA

FACULTY OF MANAGEMENT SCIENCE AND INFORMATICS

PROJECT COORDINATOR
ZILINA, SLOVAKIA
Number of students: 7,852
Number of ICT students: 1,457

ICT ORIENTED STUDY PROGRAMS

Bachelor's degrees
Informatics
Computer Engineering
Information and Network Technologies
Informatics and Management

Master's degrees
Information Systems
Computer Engineering
Intelligent Information Systems
Applied Network Engineering
Biomedical Informatics

Doctoral degrees
Applied Informatics

DESCRIPTION

The University of Zilina was established as the Railway College on 1st September 1953 by the separation from the Czech Technical University in Prague. It has gone through numerous changes during its history. Finally, in 1996, it was renamed from the University of Transport and Communications to the University of Zilina. The Faculty of Management Science and Informatics was established in 1990. Study programs provided by faculty are oriented to three main fields – Informatics, Computer Engineering and Management. In research, the faculty primarily specializes in the designing of integrated interactive information systems for decision making support, including economic connections and technical background. There are the problems of control and optimization for transport of subjects, transfer of information, processing of information and design of integrated interactive information systems. The Faculty is interested in control and information systems with application for medicine, management, and intelligent transport systems.

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SMART SPECIALIZATION, ICT & INTERCULTURAL ENVIRONMENT

at University of Zilina

How do we follow the Smart Specialization of our country (region)?

The Smart Specialization Strategy for the Slovak Republic (the RIS3 SK document) valid for 2014-2020 identifies four key areas of economic specialization. One of these key areas are Information and communication technologies and services. The document also lists 'prospective areas of specialization'. The first of them is automation, robotics, and digital technology. There are five priority areas defined in the draft for 2021-2027. One of these priorities is Digital transformation of Slovakia. The faculty members participate in different projects developed with its industry partners that follows basic requirements and ideas defined by the RIS3 SK.

How do we promote internationalization and intercultural environment?

The cooperation with foreign HEI is crucial for the faculty. The faculty has signed bilateral cooperation agreements with about 50 partners within the Erasmus Programme. Additionally, it cooperates with partners from Taiwan, Brazil, Mexico, and Korea. The foreign students are integrated with the Slovak students in the regular courses and traditional cultural and social events. In addition to traditional mobilities lasting one semester, the faculty offers its students a stay abroad by participating in shorter workshops (e.g. summer schools).

How do we act according to the Sustainability Development Goals defined by Agenda 2030?

The faculty contributes by means of the offered study programmes and its research to the four of Sustainability Development Goals. In the frame of "4. Quality Education" goal, it regularly upgrades and increases the number its study programmes to be able to create more places for the ICT students. The faculty would like to develop new lifelong learning. The faculty regularly organizes Girl's day event. An increasing number of girls studying the ICT oriented study programmes is the result of this activity organized to follow "5. Gender equality" goal. The faculty has signed the agreements on cooperation with its industry partners. Access to information and communication technologies is essential for a knowledge-based economy and facilitates the access, transfer and dissemination of knowledge and innovation that support productivity growth. It is important to fulfil the "9. Industry, innovation and infrastructure" goal. Intelligent transport systems are one of main research area of the faculty. Results of this research area enable to react on the challenges of "11. Sustainable cities and communities' goal.

Co-funded by the Erasmus+ Programme of the European Union

UNIVERSITY OF DEBRECEN

PROJECT PARTNER
DEBRECEN, HUNGARY
Number of students: 28,500
Number of ICT students: 2,263

ICT ORIENTED
STUDY PROGRAMS

Bachelor's degrees
Computer Science
Computer Science Engineering
Business Informatics
Master's degrees
Computer Science
Computer Science Informatics
Business Informatics
Teacher of Informatics
Doctoral degrees
Informatics

DESCRIPTION

The University of Debrecen, the oldest institution of higher education in the country operated continuously in the same city, is one of the research universities of national excellence in Hungary offering the widest spectrum of educational programs in 14 faculties and 24 doctoral schools. The roots of higher education in the city reach all the way back to the 16th century and the foundation of the Reformed College of Debrecen in 1538. The current form was established with the integration of several universities operating in the city on January 1, 2000. The Faculty of Informatics has its roots in the Institute of Mathematics of the Kossuth Lajos University of Arts and Sciences and was founded in its present form in 2004.
The faculty with its five departments and one off-site department fulfils an important role with regard to higher education and scientific research in the region.

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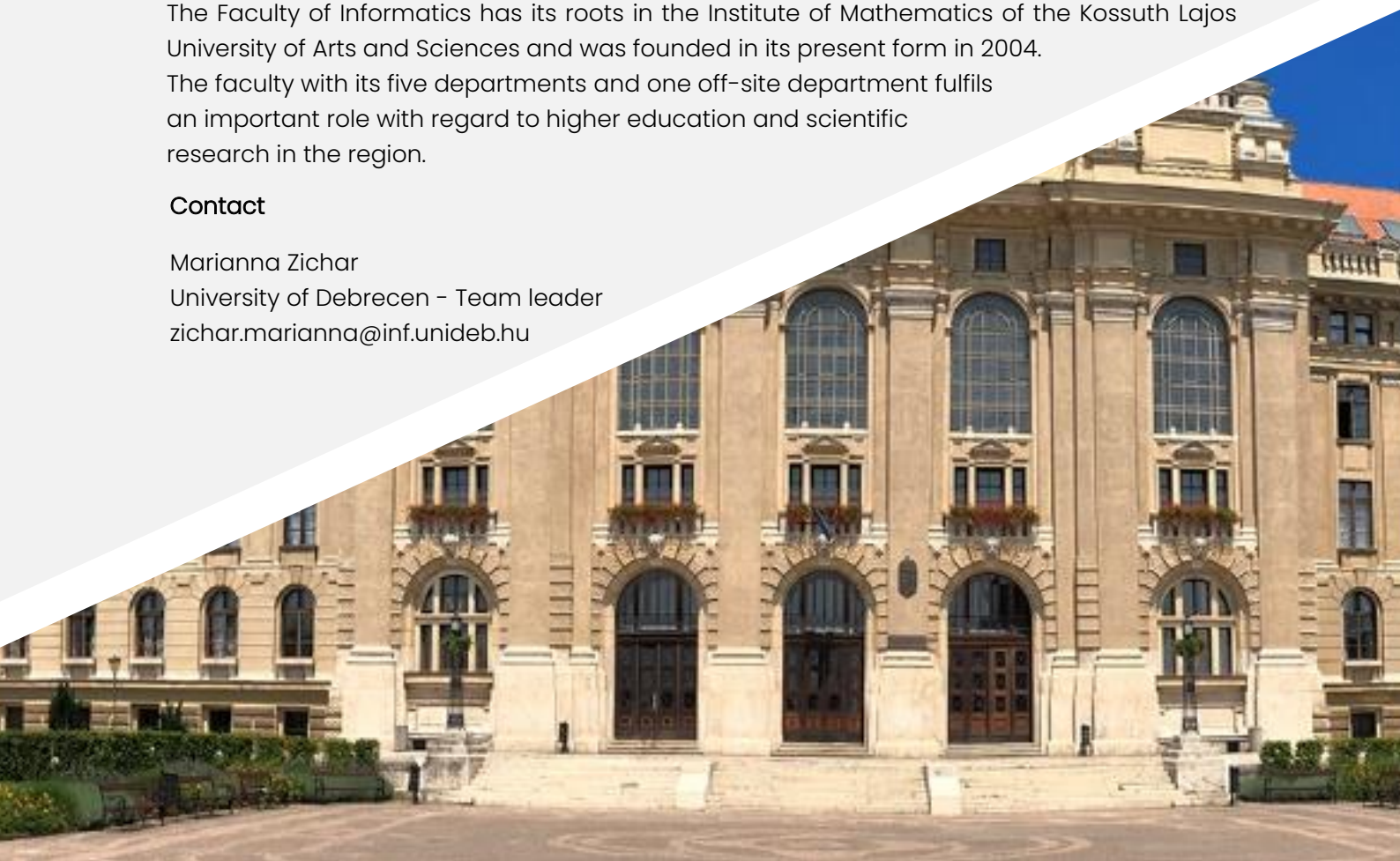

SMART SPECIALIZATION, ICT & INTERCULTURAL ENVIRONMENT

at University of Debrecen

How do we follow the Smart Specialization of our country (region)?

As part of the Hungarian Smart Specialization Strategy, the intellectual products of the university can appear in the economy with the help of clusters and can thus create jobs. The achievements of research and innovation can be integrated by the knowledge-intensive businesses of the region which can attract new investors. This can result in growth in the future number of clients of RDI activities bringing additional income to the university. It is a priority for the upcoming strategic planning period to place the technologies and innovative solutions into a market environment, to organize and provide the missing elements of the innovation chain.

How do we promote internationalization and intercultural environment?

The faculty runs all but one of its degree programs for international students in English too. This provides a great opportunity to host exchange students visiting the faculty in the frame of different cooperation. The faculty has signed bilateral agreements with about 35 partners within the Erasmus Programme but takes part in the Campus Mundi national program as well that supports students to study and make internship all over the world. We have a double-degree agreement with a Finnish university and numerous other programs (CEEPUS, ISEP, Fulbright, bilateral agreements) are also available for faculty and students to gain experience abroad.

How do we act according to the Sustainability Development Goals defined by Agenda 2030?

The faculty pays attention to keep our degree programs up-do-date meeting the demands of our industrial partners. Special courses are offered for students having less prior knowledge or showing talent in some fields (Goal4 Quality Education). International Girls in ICT Day has been organized for years to make ICT studies more attractive for girls (Goal5. Gender equality). The faculty cooperates with industrial partners in different ways: they meet the students twice a year in the frame of Days of professions, equip computer labs, run off-site departments giving lectures for the students (Goal 9. Industry, innovation and infrastructure) and collaborate with us in different projects (Goal11 Sustainable cities and communities).

Co-funded by the Erasmus+ Programme of the European Union

TECHNICAL UNIVERSITY OF VALENCIA

PROJECT PARTNER
VALENCIA, SPAIN
Number of students: 28,835
Number of ICT students: 1,154

ICT ORIENTED
STUDY PROGRAMS

Bachelor's degrees
Telecommunications Technology
and Services Engineering
Digital and Multimedia Technology
Master's degrees
Telecommunications Engineering
Telecommunications Technologies, Systems and Networks

DESCRIPTION

UPV is a public Higher Education Institution actively involved in international cooperation and mobility projects. UPV hosts nearly 30,000 students and employs over 4,000 people (teaching, research, and administrative staff). It is the first technological university in Spain according to international rankings (e.g. Shanghai Ranking of World Universities) and offers 39 undergraduate programs, over 80 official master's degrees and 30 doctorate programs. Even though UPV focuses mainly on engineering and technical studies, it also hosts a Faculty of Fine Arts and a Faculty of Business Administration and Management. Specifically, Telecommunications School (ETSIT) at UPV has participated in several European projects, as TEMPUS, etc, and it has not only the National and European accreditations, but also, the prestigious ABET accreditation for the Master and Bachelor programs.

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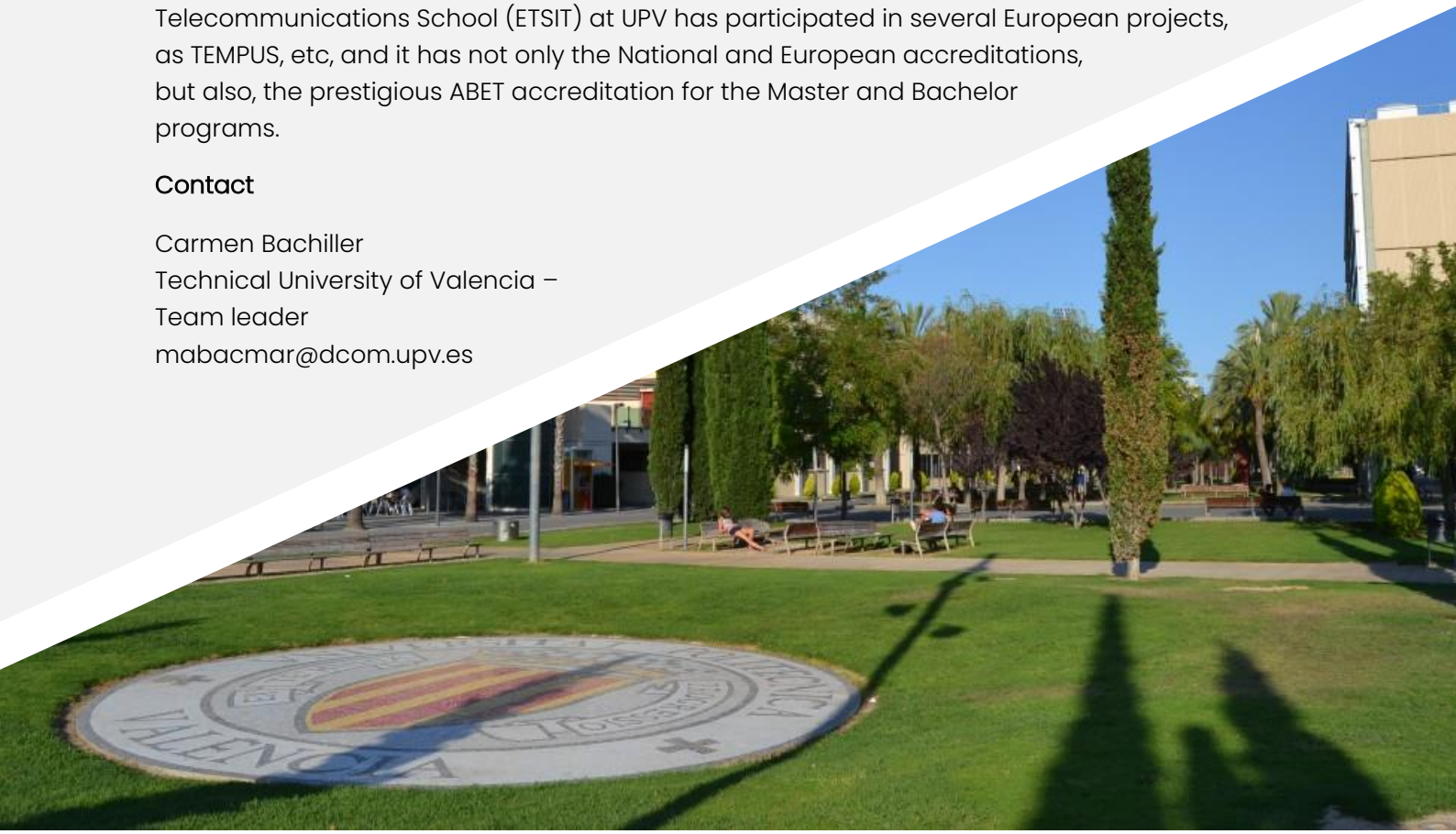

SMART SPECIALIZATION, ICT & INTERCULTURAL ENVIRONMENT

at Technical University of Valencia

How do we follow the Smart Specialization of our country (region)?

Valencia Region defines its Smart Specialization by the RIS3 Research and Innovation Smart Specialization Strategy, where the priority research areas of the region are stated. These areas are: manufacturing (specially related to automotive), healthcare, sustainable tourism and biotechnology. The Technical University of Valencia (UPV), participates in the European project "Thinking Smart", which seeks to improve the contribution of the universities to Smart Specialization Strategies, (RIS3). The project wants to establish the mechanisms of implementation of these strategies in the institutional policies of the universities. For this reason, the 8 participating partners are designing a set of tools that helps to achieve a set of objectives: the project will determine which are the priority research sectors, how to connect the R + D + i of universities with the socio-economic environment or which areas have the greatest potential in the training of students. In this sense, it has been identified in the manufacturing sector that research in nanophotonic or nanotechnologies should be promoted. For this reason, one of the measures that is being carried out from the Valencian RIS3 is to generate instruments for universities to investigate this area.

How do we act according to the Sustainability Development Goals defined by Agenda 2030?

The University addresses the Sustainable Development Goals through the Vice rectorate of Social Responsibility and Cooperation, with specific actions for each goal. In the report "The SDG in Spanish universities: a UPV proposal to measure their degree of compliance" there is a detailed description of the actions undertaken and how they are measured.

How do we promote internationalization and intercultural environment?

UPV takes part in different actions: Erasmus+, Creative Europe, Horizon2020, etc. and in several international networks such as Magalhaes, Santander Group, CARPE, ENHANCE. It receives every year over 1,800 exchange students and sends over 1,400 UPV students abroad. UPV has ranked amongst the top 5 European Universities in student exchange figures under the Erasmus+ Program. ETSIT has coordinated the Intensive Program SUSCOMTEC 2012, 2013 and 2014, and it is member of the Steering Committee of the ERAMUS+ KA2 projects INNOSOC, TEAMSOC21 and SMARTSOC. ETSIT hosted in 2017 and 2019 the Workshops of the INNOSOC and TEAMSOC21 projects.

Co-funded by the Erasmus+ Programme of the European Union

UNIVERSITY OF ZAGREB

FACULTY OF ELECTRICAL ENGINEERING AND COMPUTING

PROJECT PARTNER
ZAGREB, CROATIA
Number of students: 72,480
Number of ICT students: 5,000

ICT ORIENTED
STUDY PROGRAMS

Bachelor's degrees
Electrical Engineering
and Information Technology
Computing
Master's degrees
Electrical Engineering
and Information Technology
Information and Communication Technology
Computing
Doctoral degrees
Electrical Engineering and Computing

DESCRIPTION

The University of Zagreb (1669) is the oldest and biggest university in Southeastern Europe and in 2019 it celebrated 350 years. As a comprehensive public Central European university, the University of Zagreb offers education and research in all scientific fields (arts, biomedicine, biotechnology, engineering, humanities, natural sciences and social sciences) and a broad spectrum of courses at all study levels, from undergraduate to postgraduate. With 29 Faculties, 3 Art Academies and the University Centre for Croatian Studies it is the flagship educational institution in the country. The mission of the University is based on scientific and artistic research and aims at sustainable development, artistic creativity, and professional work as well as organization and high performance of university studies and, exceptionally, occupational studies.

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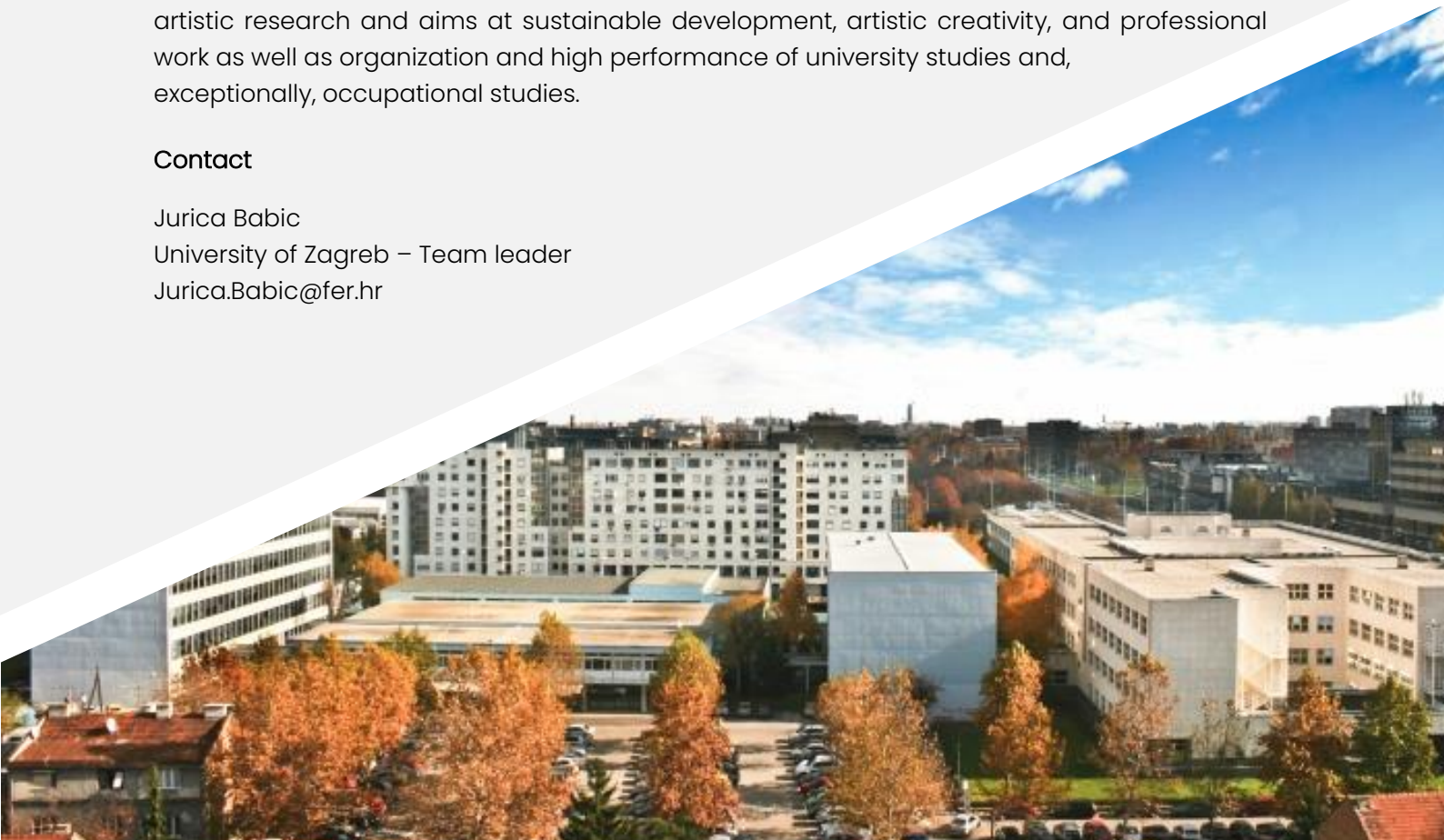

SMART SPECIALIZATION, ICT & INTERCULTURAL ENVIRONMENT

at University of Zagreb

How do we follow the Smart Specialization of our country (region)?

The Smart Specialization Strategy for the Republic of Croatia (2016 - 2020) lists numerous activities that promote the development and innovation potential in Croatia. The main objective is to transform the Croatian economy and increase its competitiveness by focusing knowledge resources for research, development and innovation and responding to global trends and challenges. The Faculty of Electrical Engineering and Computing participates in numerous projects. Some of the prominent areas of activity are improvements of energy efficiency, electric vehicle infrastructure, environmental sustainability through robotic technologies and autonomous systems, and many more.

How do we act according to the Sustainability Development Goals defined by Agenda 2030?

The Sustainable Development Goals (SDGs) are comprehensive in their 17 targets to address the key challenges of today in their interlinked economic, social, environmental, and political-security dimensions. It should be noted that the Faculty of Electrical Engineering and Computing operates in a certain way in accordance with almost all SDGs. Various research groups at the Faculty are engaged in scientific work with the aim of improving existing technological achievements in many research fields and act according to the listed SDGs. In addition, continuous improvement of courses that are in trend will attempt to increase the quality of the faculty's programmes in line with the goal "4. Quality education".

How do we promote internationalization and intercultural environment?

In 2010, the University began systematic preparations for conducting certain courses from existing study programs in foreign languages, mostly English, in order to enable students, especially visiting students, to achieve at least 30 ECTS credits within a semester by listening to the content in a foreign language. Through international and cooperation of all constituents and members of the University, faculties and academies, efforts are made to ensure the best conditions, mechanisms and procedures that will encourage and support the implementation of internationalization activities. Faculty of Electrical Engineering and Computing (FER): As part of the International University Graduate Study Programmes in Electrical Engineering and Computing (FER-IN) project, three new graduate study programmes in English were developed. The FER-IN project has responded to the interest of the greater international community of undergraduate students who wish to realise their graduate study at the FER by enabling the development of three international university graduate study programmes in the field of engineering: Electrical Engineering and Information Technology, Information and Communication Technology, and Computing.

Co-funded by the Erasmus+ Programme of the European Union

UNIVERSITY OF JYVASKYLA

FACULTY OF INFORMATION TECHNOLOGY

PROJECT PARTNER
JYVASKYLA, FINLAND
Number of students: 14,700
Number of ICT students: 2,600

ICT ORIENTED
STUDY PROGRAMS

Bachelor's degrees
Information Systems
Information Technology
Educational Technology

Master's degrees
Information Systems
Information Technology
Cyber Security
Cognitive Science
Security and Strategic Analysis
Educational Technology
Cognitive Computing and Collaborative Intelligence

Doctoral degrees
Information Technology

DESCRIPTION

The University of Jyvaskyla carries the legacy of education in Finnish language. Initially established in 1863 as the first teacher education seminar working in Finnish language, it transformed to College of Educational Science in 1934 and got the official status as a multi-disciplinary university in 1966. Currently JYU is a strong research-oriented university focusing in learning, wellbeing and basic natural phenomena and strives to reshape the competences to build a sustainable society. The faculty of Information Technology was formed in 1998 to cover both mathematically inclined and organizationally oriented teams promoting information technology. Currently the Faculty provides study programs for MSc(econ), MSc and from 2021 also MSc(eng) in areas like Information Systems, Cognitive Science, Cybersecurity, and Information technology.

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SMART SPECIALIZATION, ICT & INTERCULTURAL ENVIRONMENT

at University of Jyvaskyla

How do we follow the Smart Specialization of our country (region)?

The Smart Specialization Strategy of Central Finland highlights five key areas. Out of these especially Digital Economy and Knowledge Based Economy build directly on the competences promoted by the Faculty of Information Technology, but also Bioeconomy and Well-being Related Economy rely heavily on development of digital services and applications.

How do we promote internationalization and intercultural environment?

The faculty runs two master's programs in English for international students and receives also around 50 exchange students yearly (in normal conditions). Much of the learning content is offered in English on MSc level. About 20% of the head count and one half of the PhD graduates have international background. This enables international encounters on daily basis but also calls for communicating all essential information also in English.

How do we act according to the Sustainability Development Goals defined by Agenda 2030?

Sustainability is in the core of University's vision. The faculty develops actively the technology for monitoring the environment and supports actions that promote resource wisdom in all activities. The Faculty also promotes comprehensive security and strategic intelligence that will stabilize the societies and help making informed decisions.

Co-funded by the Erasmus+ Programme of the European Union

SZECHENYI ISTVAN UNIVERSITY

PROJECT PARTNER
GYOR, HUNGARY
Number of students: 12,189
Number of ICT students: 1,500

ICT ORIENTED STUDY PROGRAMS

Bachelor's degrees
Computer Economics
Computer Engineering
Electrical Engineering
Master's degrees
Computer Science Engineer
Business Informatics
Electrical Engineering
Doctoral degrees
Informatics
Transport Sciences

DESCRIPTION

Szechenyi Istvan University is located in Gyor. It is halfway between the capital of Hungary, Austria, and Slovakia, on the river Danube. The main campus is situated on the banks of the Danube River and only minutes on foot from the downtown. As evidence of the university's strong commitment to internationalization, from September 2019, twenty-four English-taught programmes at all Academic levels are on offer. The Bachelor level international programmes include Vehicle Engineering, Logistics Engineering, Civil Engineering, Agricultural Engineering, Food Engineering, Business Administration & Management, and a BA in International Relations. At Masters level, there are programmes in Vehicle Engineering, Civil Engineering, Architecture, Supply Chain Management and Computer Science Engineering, Marketing, International Economics & Business, and a choice of MA degrees in Music Performance. Three of four Doctoral Schools also propose English-taught programs as follows: Doctoral Programme in Plant, Animal and Food Sciences, in Civil Engineering Transportation & Vehicle Engineering and Informatics Sciences and a Business and Management Sciences. In addition to full degrees, we are launching two others new international postgraduate programmes in the field of Law and Governance run by the Faculty of Law and Political Sciences.

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SMART SPECIALIZATION, ICT & INTERCULTURAL ENVIRONMENT

at Szechenyi Istvan University

How do we follow the Smart Specialization of our country (region)?

Smart specialization of our county: industry working with/in special materials, advanced materials, modern materials technologies, building industry (building materials technologies), textile industry, wood and furniture industry, logistics, automotive. The Department of Telecommunications takes part in training students who will work or currently work in the region's special materials, advanced materials, modern materials technologies, logistics and automotive companies. The Department of Telecommunications is in close contact with companies and factories producing antennas, electronics, car parts, security electronics.

How do we promote internationalization and intercultural environment?

We have an International Affairs Office, with 10 colleagues, whose task is to manage the ~100 Erasmus students in our University. Our Telecommunication Department takes part lecturing foreign students, encourages international lectures, for example colleagues giving lectures and doing researches in Japan, Germany, France. Our Department took part in the ITU Telecom World 2019, some of the colleagues gave presentations.

How do we act according to the Sustainability Development Goals defined by Agenda 2030?

Times Higher Education (THE) has drawn up a ranking which evaluates the world's higher education institutions based on the UN's 17 Sustainable Development Goals. Szechenyi Istvan University is one of a total of six Hungarian universities which have been added to the latest list, including the University of Szeged, the University of Debrecen, the University of Pecs, Eotvos Lorand University and Semmelweis University. For example: Goal 5. Gender Equality: The Colleague Dr. Szilvia Nagy PhD takes part in directing the "girl's day".

Co-funded by the Erasmus+ Programme of the European Union

JOSIP JURAJ STROSSMAYER UNIVERSITY OF OSIJEK

THE FACULTY OF ELECTRICAL ENGINEERING IN OSIJEK

PROJECT PARTNER
OSIJEK, CROATIA
Number of students: 1,638
Number of ICT students: 938

ICT ORIENTED STUDY PROGRAMS

Bachelor's degrees
Computer Engineering
Electrical Engineering and Information Technology
Master's degrees
Electrical Engineering
Computer Engineering
Automotive Computing and Communications
Doctoral degrees
Communications and Informatics
Computer Engineering

DESCRIPTION

Josip Juraj Strossmayer University of Osijek (UNIOS) was established in 1975. Today it has around 18000 students at three cycles and ca. 1500 members of academic staff. Main strategic objectives are focused on development and assurance of high quality research and teaching, internationalization and promotion of student and staff mobility, promotion of international ties with partner institutions, involvement in European trends (ERA, EHEA), contribution to social, cultural and economic life of the region and further infrastructure development. With 12 faculties, 4 departments and one Academy of Arts and Culture, the University offers studies according to the Bologna principles in all scientific fields. There are university undergraduate studies, university graduate studies, integrated undergraduate and graduate studies and postgraduate professional studies within the lifelong learning program, as well as postgraduate doctoral studies offered by UNIOS. One of UNIOS main priorities is development of international cooperation.

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SMART SPECIALIZATION, ICT & INTERCULTURAL ENVIRONMENT

at Josip Juraj Strossmayer University of Osijek

How do we follow the Smart Specialization of our country (region)?

Croatian government is committed for Croatia to become an inspiring exemplar of smart, sustainable and inclusive growth as advocated by the Europe 2020. Targeted investments in thematic and subthematic priority areas of S3 have become one of the strategic priorities of the national politics. Therefore, innovation has become the overarching priority for the Croatia and the concept of "smart specialisation" a vital part of innovative policy. ICT sector in Croatia represents one of the key factors of the economic and social development. Therefore, ICT was selected as S3 cross-cutting theme with the aim to further develop particular areas of application that can support development of all five identified Thematic Priority Areas.

How do we promote internationalization and intercultural environment?

FERIT has been cooperating with other faculties, colleges, scientific and research institutions in both Croatia and abroad. Cooperation has been realised with incoming and outgoing student, academic and non-academic staff mobility as well as scientific, research and professional activities. In order to attract foreign students, FERIT has started to offer graduate university study programme in Automotive Computing and Communications in English as well. In collaboration with the Faculty of Agriculture in Osijek, the Faculty has been implementing project entitled "ICT in Agricultural Sciences".

How do we act according to the Sustainability Development Goals defined by Agenda 2030?

The Faculty contributes by means of the offered study programmes and its research orientation to the four of Sustainability Development Goals. In the frame of "4. Quality Education" goal, it regularly upgrades and increases the number its study programmes to be able to create more places for the ICT students. The FERIT regularly organizes "Girls in ICT days" event. Increasing number of girls studying the ICT oriented study programmes is result of this activity organized to follow "5. Gender equality" goal.

The faculty has signed the agreements on cooperation with its industry partners. The Faculty successfully cooperates with the most important electrical engineering and ICT companies. Furthermore, in collaboration with the economy, professional and development projects, studies and elaborations are carried out. It is important to fulfil the "9. Industry, innovation and infrastructure" goal. Intelligent transport systems are one of main research area of the faculty. Results of this research area enable to react on the challenges of "11. Sustainable cities and communities" goal.

Co-funded by the Erasmus+ Programme of the European Union

UNIVERSITY OF ORADEA

PROJECT PARTNER
ORADEA, ROMANIA
Number of students: 20,836
Number of ICT students: 4,500

ICT ORIENTED STUDY PROGRAMS

Bachelor's degrees
Informatics
Computer Engineering,
Telecommunication Networks and Software
Automatics and Applied Informatics
Information and Network Technologies
Mechatronics and Robotics
Informatics and Management

Master's degrees
Management of Information
Technology Management and Communication in Engineering
Audio-Video Technologies and Telecommunication Systems
Advanced Automatics
Mechatronics and Robotics

Doctoral degrees
Electrical Engineering

DESCRIPTION

The mission of the UO is to provide education and research to a high standard of quality in a national and international context of social, professional, and last but not least, intellectual development of the individual, and at the same time to contribute to social and cultural development of the Oradea. These missions are shaped by objectives such as attracting students from all over the world, positioning the university among the best educational institutions in the country and in Europe and conveying a wider community to the significance and importance of academic education and scientific research in general and the one conducted within the university, in particular. Academic education is provided to the students at the highest level within 15 faculties through a wide range of bachelor, master, doctorate and postgraduate programs. At every faculty the instructive and educational activity is enriched by scientific research. Along with professional performance and moral behaviour, scientific research becomes the priority criteria for academic evaluation of academic staff.

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SMART SPECIALIZATION, ICT & INTERCULTURAL ENVIRONMENT

at University of Oradea

How do we follow the Smart Specialization of our country (region)?

Smart specialization has been actively promoted in Romania as an important tool for the Europe 2020 Strategy. The academic staff of the University of Oradea use and implement several parts of the strategy as a key solution for avoiding dissipation of the research funds and for focusing the research, innovation, human and financial resources on those innovative sectors which are highly performing, socio-economically important or attractive for investors. All these projects and initiatives are implemented and developed in partnerships with actors coming for the private sector.

How do we promote internationalization and intercultural environment?

The University of Oradea has permanently developed bilateral relations with other higher education centers, both in the European Union and with those from EU partner countries. Currently the university manages more than 300 bilateral partnerships with HEI and other institutions at global level. Collaboration and projects between partner institutions have been promoted through various EU financial instruments. Increasing the international visibility of institution, diversifying activities at international level, as well as developing partnerships at European level are some of the main objectives of the university.

How do we act according to the Sustainability Development Goals defined by Agenda 2030?

The appearance of the field of International Relations and European Studies at the University of Oradea, 20 years ago, started from several premises, among which we can find tradition and the internationalization process of the University of Oradea. Even though the faculty is working in a different framework of the academic life, the field of Social Sciences, the faculty management permanently focused to fulfill the general objectives of different strategies at national and EU level. The sustainability development goals of the Agenda 2030 are no exception in this regard.

The faculty is permanently upgrading its curricula in order to insert more ICT disciplines in the framework of social sciences, offering an alternative for an interdisciplinary education. The academic staff and the students are benefiting from the raising number of local, regional, national and international partnerships with other HEI and actors from the private sector. All these created in the frame of different European programmes.

Co-funded by the Erasmus+ Programme of the European Union

IMT ATLANTIQUE
BRETAGNE PAYS DE LA LOIRE

IMT Atlantique
Bretagne-Pays de la Loire
École Mines-Télécom

PROJECT PARTNER
NANTES, FRANCE
Number of students: 1,800
Number of ICT students: 1,200

ICT ORIENTED STUDY PROGRAMS

Bachelor's degrees
Healthcare Engineering
Industrial Engineering Organizations
Computer Science and Networks
Electrical Engineering

Master's degrees
Architecture and Engineering for the Internet of Things
Communication System and Network Engineering
Data Science

Doctoral degrees
Engineering Sciences
Mathematics and Information
Communication Sciences and Technologies

DESCRIPTION

IMT Atlantique is the result of a merger between Mines Nantes and Télécom Bretagne in 2017. It is a leading general engineering school and is internationally recognized for its research (present in four themes of the Shanghai ranking). It is part of the Institut Mines-Télécom and comes under the aegis of the Ministry of industry and digital technology. With 3 campuses, each with its own incubator, in Brest, Nantes and Rennes, and a site in Toulouse, IMT Atlantique aims to combine digital technology, energy and the environment to transform society and industry through training, research and innovation. IMT Atlantique is responsible for engineering courses based on cutting-edge research carried out in 6 joint research units: GEPEA, IRISA, LATIM, LABSTICC, LS2N and SUBATECH. Partners include CNRS, INRIA, INSERM, universities and engineering schools. The school builds on its research excellence in its flagship areas (energy and digital technology, cybersecurity, the environment and digital technology, industry of the future, nuclear, health and the digital sector, risk and risk interactions) and by linking scientific fields to meet tomorrow's challenges:
digital transition, environmental transition, industrial transition,
energy transition, health of the future and basic research.

Contact

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SMART SPECIALIZATION, ICT & INTERCULTURAL ENVIRONMENT

at IMT Atlantique Bretagne Pays de la Loire

How do we follow the Smart Specialization of our country (region)?

Smart Specialization Strategy for Brittany (S3, 2021-2027) defines 5 key areas, amongst which: maritime economy for blue growth, secure and responsible digital economy, Health and wellness economics. IMT Atlantique participates in these objectives through its curriculum, its research projects. The IRIS team, for example and its work on Cyber Security. IMT departments work with industrial partners on IA and maritime research.

How do we promote internationalization and intercultural environment?

IMT Atlantique is committed to fostering the internationalization of its teams and students by developing cross-border research and teaching collaboration. As a central element of the 2018-2023 strategic plan, internationalization is key in all of the structures, components and decision-making processes at the school. On our campuses, there are around 40% international students from more than 70 different countries. Students from different backgrounds come together in classes, projects, student societies and dorms, thus promoting an enriching cultural and linguistic experience for everyone. French students have to spend one semester abroad with the choice of numerous international partnerships (more than 190 universities). IMT Atlantique has "the Bienvenue in France Label", level 4.

How do we act according to the Sustainability Development Goals defined by Agenda 2030?

The Sustainable Development and Social Responsibility Division is associated with the office of the executive director of the school. Its principal role is to motivate, support and facilitate transformations with respect to the appropriation of environmental and social issues by school staff and students; ensuring the consistency of our practices in terms of governance, social policy and also the environmental management of our campuses; the development of our education and research programmes in response to environmental and societal issues; taking sustainable development and social responsibility into account in the higher education and research sectors in as a whole, and within the Institut Mines-Télécom in particular; involvement in societal transformation in our regions. Considering the frame 5 « Gender equality », IMT Atlantique has signed the Charter on Equality between Men and Women from the Ministry of Higher Education and Research and the Ministry of Women's Rights.

The role of the Gender Equality Mission at IMT Atlantique is to carry out initiatives aimed at achieving a better balance of treatment between the female and male staff and faculty at the school, as well as the students in class and on campus.

Co-funded by the Erasmus+ Programme of the European Union

TECHNICAL UNIVERSITY OF KOSICE

FACULTY OF ELECTRICAL ENGINEERING AND INFORMATICS

TECHNICKÁ UNIVERZITA V KOŠICIACH

PROJECT PARTNER
KOSICE, SLOVAKIA
Number of students: 8,560
Number of ICT students: 2,221

ICT ORIENTED STUDY PROGRAMS

Bachelor's degrees
Informatics
Business Informatics
Computer Networks,
Computer Modelling
Cybersecurity
Intelligent Systems

Master's degrees
Informatics
Business Informatics
Computer Networks
Computer Modelling
Cybersecurity
Intelligent Systems

Doctoral degrees
Informatics
Business Informatics
Intelligent Systems
Computer Networks
Computer Modelling

DESCRIPTION

The Technical University of Kosice was founded on 8th July 1952, when the Czechoslovak Government issued Directive No.30/1952 Statutes setting up three faculties, namely the Faculties of Heavy Engineering, Mining and Metallurgy. These were joined in 1969 by the Faculty of Electrical Engineering and in 1978 by the Faculty of Civil Engineering. The important event of the renaming of the College into the Technical University of Kosice occurred on 13th February 1991.

The Faculty of Electrical Engineering and Informatics (FEI TU) has been formed based on the Governmental Decree No.79/1969, Coll., of July 21, 1969 as a faculty originally titled "Faculty of Electrical Engineering of the TU of Kosice". Ever since its formation with electrical engineering, those scientific and study branches that presently stand for the group of informatics-related sciences, gradually became significantly entrenched. From 15th April 1994 onwards, the faculty has borne the name of Faculty of Electrical Engineering and Informatics of the TU of Kosice. The principal mission of FEI TU of Kosice is seen in providing education on the basis of creative research especially in such fields as electrical engineering and informatics. Presently faculty consist from 11 separate departments. Wide spectrum of research and pedagogic activities are maps to three main directions: Informatics and Cybernetics, Electronics and Telecommunications, Electric Power and Heavy-Current Engineering.

Contact

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SMART SPECIALIZATION, ICT & INTERCULTURAL ENVIRONMENT

at Technical University of Kosice

How do we follow the Smart Specialization of our country (region)?

The Smart Specialization Strategy for the Slovak Republic (the RIS3 SK document) valid for 2014-2020 identifies four key areas of economic specialization. One of these key areas are Information and communication technologies and services. The document also lists 'prospective areas of specialization'. The first of them is automation, robotics and digital technology. There are five priority areas defined in the draft for 2021-2027. One of these priorities is Digital transformation of Slovakia. The faculty members participate in different projects developed with its industry partners that follows basic requirements and ideas defined by the RIS3 SK.

How do we promote internationalization and intercultural environment?

The faculty also offers studies in English. There is great interest in studying Informatics from many countries around the world. In the current year, students from India, Greece, Kazakhstan, Moldova, Norway, Libya, Brazil, Ukraine, Italy, Yemen, Afghanistan, and Pakistan are studying in our faculty. The faculty has signed 66 bilateral agreements with universities throughout the EU and annually offers studies in English. Among the foreign students are also those who have been successful in obtaining a scholarship from the National Scholarship Program. The faculty also has several partners outside the EU, e.g. Mississippi State University in the USA or Waseda University of Tokyo.

How do we act according to the Sustainability Development Goals defined by Agenda 2030?

The main goal of the Faculty is to fulfill one of Sustainability Development Goals "4. Quality Education", using modern teaching methods and the so-called live projects in cooperation with industrial partners. During their studies, students can be involved in solving research tasks prepared by partners from practice. The teaching process is improved by mutual exchange of knowledge with industrial partners, creation of study plans, subjects, invited lectures, bachelor, bachelor's, master's or doctoral theses, workshops, laboratories, models or equipment, internships, trainings (for employees of companies). The faculty is regularly involved in the IT Girl's Day project. The inclusion of the Business Informatics study program attracts more and more girls who are interested in studying programming and ICT. We are thus fulfilling another of the goals of Agenda 2030 "5. Gender equality ". The excellence of the research at FEI TUKE is underlined by the positively evaluated projects and Current content publications. In addition, FEI TUKE continuously proves its research competences in numerous other outside-funded research projects initiated by the private sector. We thus fulfill another of the goals "9. Objective "Industry, innovation and infrastructure".

Co-funded by the Erasmus+ Programme of the European Union

TECHNICAL UNIVERSITY OF SOFIA

PROJECT PARTNER
SOFIA, BULGARIA
Number of students: 10,000
Number of ICT students: 800

ICT ORIENTED
STUDY PROGRAMS

Bachelor's degrees
Telecommunications
Computer and Software Engineering
Informatics and Software Science

Master's degrees
Telecommunications
Computer and Software Engineering
Graphic and Web Design
Informatics and Software Science

Doctoral degrees
Telecommunications
Computer and Software Engineering

DESCRIPTION

For more than 66 years the Technical University of Sofia has been preparing specialists in the field of engineering. In this period over 100 thousand engineers have graduated from it and have found jobs in their professional fields both in Bulgaria and abroad. The structure of the Technical University of Sofia includes 14 faculties, several departments, one college and other units where students are trained, and scientific research is conducted. The University has a branch in the city of Plovdiv with two faculties and a college and also an affiliated unit in the town of Sliven comprising one faculty and one college. Over 800 highly qualified lecturers train the students in all educational-qualification and academic degrees: Professional Bachelor, Bachelor, Master, and PhD. The educational process provides high quality professional and language training which makes for its international recognition. All degree courses are accredited and continue to be part of the accreditation cycle of the National Evaluation and Accreditation Agency.

Contact

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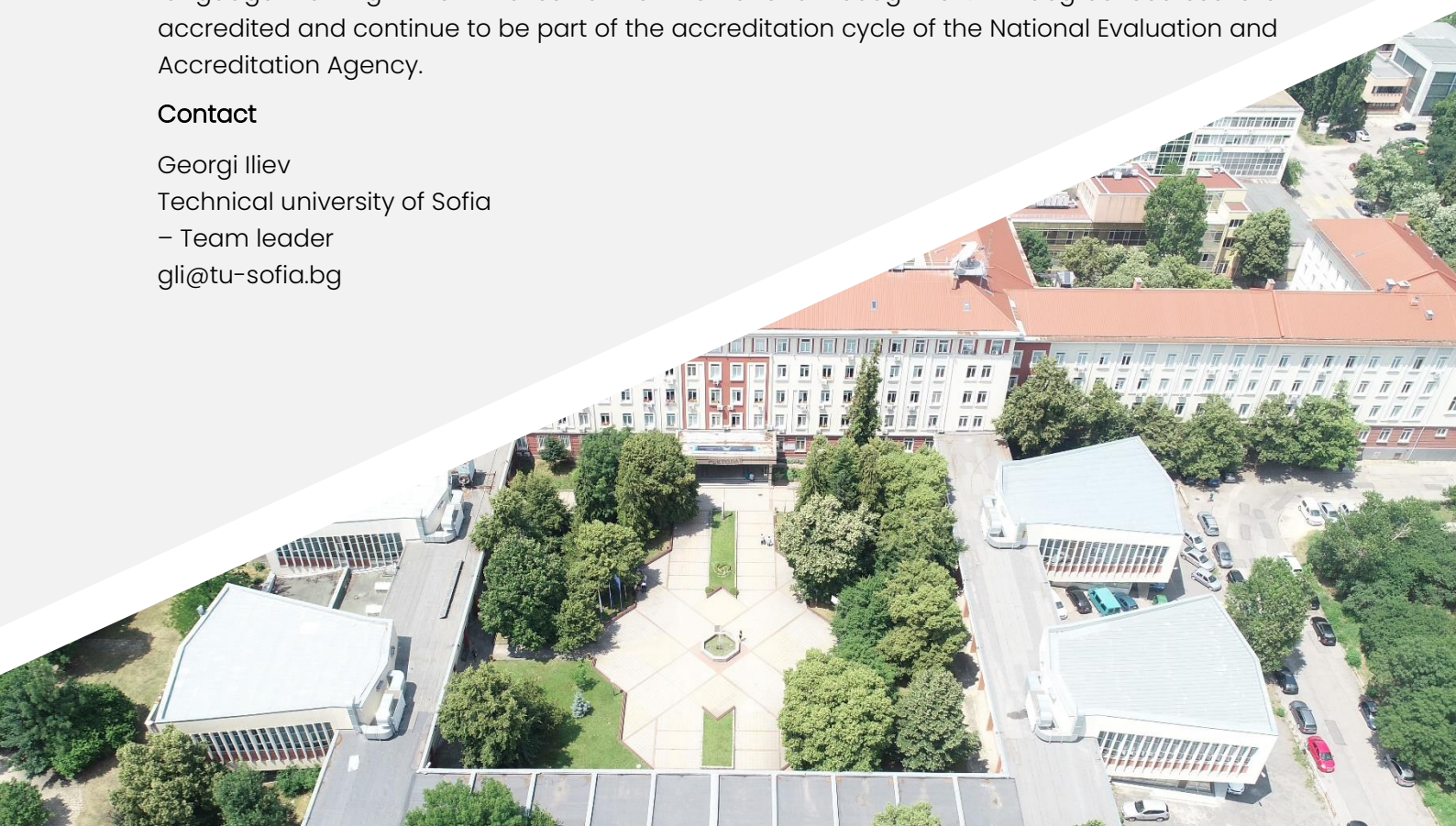

SMART SPECIALIZATION, ICT & INTERCULTURAL ENVIRONMENT

at Technical University of Sofia

How do we follow the Smart Specialization of our country (region)?

The mission of the Technical University of Sofia reflects in a condensed form our social commitment to continuous supply of educational services and high-quality fundamental research and applied products to meet the needs of society for sustainable development and prosperity. It develops and directs the overall activities of the University and is the basis for determining the priority guidelines for its development. The mission of the Technical University of Sofia is to contribute to the economic, social and cultural prosperity of society by training highly qualified specialists with higher education, to conduct expert scientific research and to provide competent scientific expertise in the field of technical, natural and social sciences, which outline it as a leading research and educational centre in the region.

How do we promote internationalization and intercultural environment?

Together with the instruction in Bulgarian language, the University also offers a number of courses in German, English or French, and, apart from the Bulgarian students, more than 1400 foreign students' study at the University as well. The credit transfer system and the opportunities which the Erasmus Programme offers create conditions for students to study in a number of well-known universities which the Technical University of Sofia actively cooperates with.

How do we act according to the Sustainability Development Goals defined by Agenda 2030?

The Faculty of Telecommunications is the leading educational institution in the field of communication technologies in Bulgaria. It offers advanced Bachelor and master's degrees training in Telecommunications. The Curriculum of the bachelor's degree gives the opportunity to study different subjects that provide expertise in radio and wireline communications, audio and video technologies, telecommunication networks and technologies and management of communication systems. Telecommunications is one of the most modern and dynamic areas of engineering and technology nowadays. Area, where a huge investment is allocated and many leading companies in the world are working, with the lowest unemployment and a constant need for qualified specialists. The Faculty of Telecommunications has close relationship with the leading Bulgarian and foreign companies in the field of information and communication technologies that offer internships and scholarships to students, and various additional specialized training.

Co-funded by the Erasmus+ Programme of the European Union

SEINAJOKI UNIVERSITY OF APPLIED SCIENCES

SCHOOL OF BUSINESS AND CULTURE

PROJECT PARTNER
SEINAJOKI, FINLAND
Number of students: 5,000

ICT ORIENTED
STUDY PROGRAMS

Bachelor's degrees
Automation Engineering
Information Technology
Master's degrees
Automation Engineering

DESCRIPTION

Seinajoki University of Applied Sciences (SeAMK) is a multidisciplinary non-profit government dependent higher education institution and a limited company in its organisation form. SeAMK was established in 1992 and has almost 5000 students in its four faculties: School of Business and Culture, School of Food and Agriculture, School of Health Care and Social Work and School of Technology.

SeAMK aims to educate internationally competent professionals for regional, national, and international needs. In RDI (research, development, and innovation) activities SeAMK has a distinctly practical emphasis on serving teaching and supporting regional development, in particular SMEs. The learning and RDI processes are the core processes of SeAMK.

The mission of SeAMK is to increase know-how, competitiveness, and welfare. The vision is to be an international institution of higher education with an entrepreneurial spirit – best university for our students. The strategic goals for the coming years are strengthening the appeal among the students, standing out from other higher education institutes, growth in internationalisation, digital leap in all operations and succeeding together with the region and other cooperation partners. The core values of SeAMK are entrepreneurial mindset, internationalisation, responsibility and SeAMK spirit.

Contact

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SMART SPECIALIZATION, ICT & INTERCULTURAL ENVIRONMENT

at the Seinajoki University of Applied Sciences

How do we follow the Smart Specialization of our country (region)?

The strategy for Smart Specialisation is tightly coupled with the combined regional plan and regional strategic programme of South Ostrobothnia. The goal of Smart Specialisation is to promote the regeneration of business life and to answer future skill requirements in selected thematic business sectors. The strategy for Smart Specialisation encourages the companies of our province to be more international and expansive. The strategy also identifies ways in which services offered to business operations, research and training operations could be even stronger than at present in supporting business life specialisation. At SeAMK, the strategic goals and the thematic sectors of Smart Specialisation are manifested in our everyday activities; in teaching, degree programmes, RDI activities, cooperation partnerships and in our own strategy and values.

How do we promote internationalization and intercultural environment?

One of SeAMK's priorities is well-functional and successful partnerships and networks on all continents. SeAMK has about 200 partner universities in 50 different countries all over the world. Active student and academic mobility, RDI projects and international seminars and workshops are a vital part of SeAMK's international activities. SeAMK aims at increasing the number of degree programmes taught in English and the number of international degree students considerably. It is seen important that teachers and staff are internationally competent and committed and that the competence is utilized in teaching, RDI functions and regional development. Normally we have more than 900 incoming and outgoing mobilities yearly. The emphasis is put on virtual and blended mobility and on the development of Internationalisation at home activities.

How do we act according to the Sustainability Development Goals defined by Agenda 2030?

According to its strategy, SeAMK tries to support and focus on the implementation of environmentally friendly and sustainable practices in its all operations. The aim is to focus on the theme of sustainable development and circular economy both in teaching and RDI activities and to implement as well as teach and research the topic. Goals are set by creating a strategy for sustainability, the aim of which is to diminish the carbon footprint of SeAMK. An international summer school on sustainable development is also planned for 2021. SeAMK's strategic goal of a digital leap in all activities support accomplishment of a more sustainable and accessible world in the future. More environmentally friendly forms of international mobility, such as virtual mobility and blended mobility are already included as part of SeAMK's internationalisation action plan to a greater extent in the coming years. SeAMK is very committed to communicating the more environmentally friendly options in the context of Erasmus+ programme. Responsibility is one of SeAMK's core values, which includes caring about the environment and encouraging students to assume responsibility. SeAMK has a special working group on sustainable development that concentrates on the development and realization of the environmentally friendly practices and procedures.

Co-funded by the Erasmus+ Programme of the European Union

THE EUROPEAN INSTITUTE FOR LABOUR AND INDUSTRIAL RELATIONS

PROJECT PARTNER
ALSBACH, GERMANY

DESCRIPTION

The European Institute for Industrial Relations (EIAB) is a non-profit organization It was founded 1991 as part of the 'Association for the Promotion of the former European University of Employment (UET). Its members are individual coming from academic bodies, companies mainly Small and Medium Sized Companies (SME) Wek part in several European projects focusing on Social Dialogue and Corporate Social Responsibility (CSR) and it offers national projects on sustainability and Digitalization.

The institute works mainly on the field of training for SME and research concerning management concepts mainly for SME. The Institute is part of the SmartSoc Erasmus+ project, accepted as a "Public Law Body".

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SMART SPECIALIZATION, ICT & INTERCULTURAL ENVIRONMENT

at The European Institute for Labour and Industrial Relations

How do we follow the Smart Specialization of our country (region)?

Digitalization has to be considered under the aspect of sustainability. This is why EIAB is following the state digitalization policy of the Land Hessen (where the institute is located) and is involved in the implementation of this strategy on the regional and local level, in particular focusing on the sustainable aspects of digitalization.

How do we promote internationalization and intercultural environment?

As a "European Institute" internationalization plays an important role in our activities. As we are not involved in academic teaching, international and intercultural approaches do basically not play an important role in our work. As far as the Erasmus+ project is concerned our members have advanced international and intercultural experiences which they bring in into the project.

How do we act according to the Sustainability Development Goals defined by Agenda 2030?

The institute members are also active as lecturers and trainers, teaching Sustainable Development aspects in a global sense. Therefore, the Agenda 2030 is a main emphasis in the educational work of EIAB. Members of the institute are teaching also abroad (mainly in Africa).

Co-funded by the Erasmus+ Programme of the European Union

ENTREPRENEURIAL CASE STUDIES 2020

The Steering Committee within SmartSoc Blended Mobility 2020 accepted 7 Entrepreneurial case suggestions from consortium partners. Table 1 shows general information about the Entrepreneurial cases (EC) and their coverage by 9 student teams.

Table 1. SmartSoc 2020 Entrepreneurial case overview

ENTREPRENEURIAL CASE TITLE	NUMBER OF TEAMS	AUTHOR´S HOME INSTITUTION
Tackling a complex urban mobility challenge: a car-free and green city	One	DHBW (EIAB)
Parking space management for urban society	Two	SZE
Sustainability in agriculture: a grain dryer which is both energy and time efficient	One	SeAMK
Scaled application of 3D printing supporting the society	One	UNIDEB
Collaborative mobility	One	UPV
Intelligent led lights for smart city	Two	UNIZA
Home alone and safe relieving the pressure on healthcare systems	One	UNIZG

To support participant´s awareness and knowledge about global challenges and industrial competitiveness defined in pillar 2 of Horizon 2020, the entrepreneurial case studies were mapped to these challenges (Table 2).

Table 2. Mapping of SmartSoc Entrepreneurial cases 2020 onto Horizon 2020 (Societal challenges)

Horizon 2020 – Societal Challenges	SmartSoc Entreprenurial cases 2020
Culture, Creativity and Inclusive Society	Scaled applications of 3D printing supporting the society
Food, Bioeconomy, Natural Resources, Agriculture and Environment	Sustainability in agriculture: a grain dryer which is both energy and time efficient
Climate, Energy and Mobility	Parking space management for urban society
	Intelligent led lights for smart city
	Collaborative mobility
	Tackling a complex urban mobility challenge: A car-free and green city
Health	Home Alone and Safe Relieving the Pressure on Healthcare Systems

As the SmartSoc program is based on Horizon 2020, which tackled global challenges and supported the creation and better dispersing of knowledge and technologies, our international student teams were motivated to discuss sustainable and societal aspects of their teamwork-based entrepreneurial case development. Table 3 shows how cases tackling with SDG´s goals of the 2030 Agenda for Sustainable Development.

Table 3. Mapping of SmartSoc Entrepreneurial cases 2020 onto 2030 Agenda for Sustainable Development

SDG´s GOALS	Entrepreneurial Case 2020
3. Good health and Well - being	Tackling a complex urban mobility challenge: A car-free and green city
	Scaled applications of 3D printing supporting the society
	Collaborative mobility
	Home Alone and Safe Relieving the Pressure on Healthcare Systems
8. Decent Work and Economic Growth	Parking space management for urban society
	Scaled applications of 3D printing supporting the society
9. Industry, Innovation and Infrastructure	Intelligent led lights for smart city
11. Sustainable Cities and Communities	Tackling a complex urban mobility challenge: A car free and green city
	Parking space management for urban society
	Collaborative mobility
	Intelligent led lights for smart city
12. Responsible Consumption and Production	Scaled applications of 3D printing supporting the society
	Sustainability in agriculture: a grain dryer which is both energy and time efficient
13. Climate Action	Parking space management for urban society
	Intelligent led lights for smart city

TACKLING A COMPLEX URBAN MOBILITY CHALLENGE: A CAR-FREE AND GREEN CITY

https://www.smartsoc.uniza.sk/ec-2020-01

AUTHORS

Robert Lahdo
Baden-Wurttemberg Cooperative State University, nominated by EIAB

HORIZON 2020 CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Climate, Energy, Mobility

SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

TASK TO SOLVE - INNOVATION FOSTERED BY ICT

Utilization of the IoT elements and smartphone application to create low cost, sustainable, efficient, and cheap solution, based on already-known components and technologies for the purposes of non-traditional bicycle storage.

SMART PROPOSAL

- An entrepreneurial case should innovate a way of the bicycle (including e-bikes) storage respecting and following the climate/energy/mobility change to the users in an interesting, scalable, and damage preventing way.
- The system will enable the users to store their bicycles and e-bikes. The e-bikes will be possible to charge. The user will have the possibility to use a smartphone application where he/she will find information about the actual state of his/her bike or e-bike (e.g., energy - battery; locked - unlocked, etc.). The smartphone app will provide the information about the free parking places for bikes (to reduce time consumption by looking for the free storage ...).

SMART SPECIALIZATION STRATEGY TOPIC

This topic follows the regional legal document "EFRE-Programme Baden-Württemberg 2014 to 2020", where the following topics were declared as the perspective areas of specialization in the Baden-Württemberg economy:

- e-mobility, alternative driving systems, innovative usage concepts and networked, resource-efficient mobility.
- integration of traffic systems with the help of intelligent control systems, ecological modernization of the state's vehicle fleet.
- cloud computing, open-source software, energy and resource efficiency, sustainable mobility and e-Health.

DESCRIPTION

The bicycle is the most individual and low emission means of transport of all. E-bike in particular enables old people or people who would not cycle due to distance or effort to use the bike. The ideal city of the future is car-free and green. The bicycle or especially e-bikes are unavoidable, no matter if as a shared or owned vehicle.

But e-bikes are at high risk if they are protected with a regular cycle lock or even in a regular accessible parking lot. So, what concept could we provide to store e- bikes safe and charge them, on order to provide even more advantages for the customer?

Think out of the box (e.g., a tree) in order to keep the investment costs low and create a sustainable, efficient and cheap solution. Also implement IoT elements for predictive maintenance and increased user experience.

TECHNICAL ASPECT

- Which mechanical construction would you use? (elevator, automatic storage, ...)
- Which technological implementation do you use for the check-in (app. check-in Terminal)?
- How do you secure the bikes? (damage from the machine, damage to people, damage from environmental events)
- Is the system scalable for future increase of e-bikes?

BUSINESS ASPECT

- What products or solutions exist in the European market?
- How could we guarantee a sustainable customer relation? (e.g. what happens if our storage system is full but a customer wants do deposit his bike – will he come again?)
- Is the business/solution profitable?

SOCIETAL ASPECT

- Does the solution bring more people together in one place?
- Does the solution make cycling more attractive?
- Does a public utility or company profit from the solution and its customers?
- How could be real sustainability impact of the solution be measured?

GREEN MOBILIT (GREMO)

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM ES2020:01

STUDENTS

ISMAEL GIL PONCE *(Technical University of Valencia)*
TOMISLAV FICKO *(University of Zagreb)*
JULIA HANNU *(Seinajoki University of Applied Sciences)*

SUPERVISORS

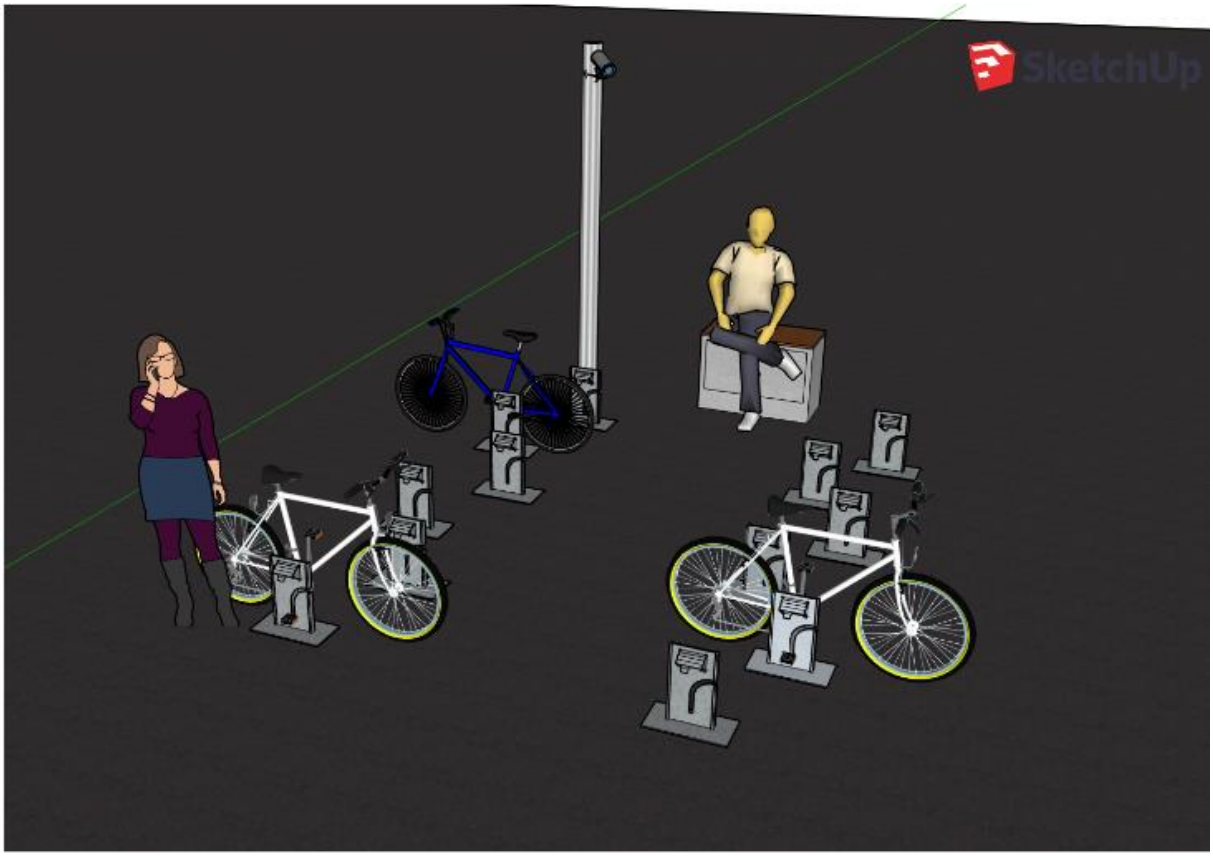
ROBERT LAHDO *(Baden-Wurttemberg Cooperative State University, Germany, nominated by EIAB)*
PETER MARTON (*University of Zilina*)

SmartSoc Workhop 2020 Student presentation (Team 1):
https://youtu.be/Vbx6WSnOTzo

SHORT DESCRIPTION OF PRODUCT /SERVICE

We believe in green mobility. Our goal was to create a recognizable brand based on this philosophy. That's why we called our company Gremo, a compound word derived from Green Mobility. We want to make sure that everyone becomes familiar with our brand and begins to use it in their day-to-day lives. And we believe that this name is a way to achieve it. We envision the future of Valencia as a green, congestion-free city with citizens that want to live a healthy lifestyle. This, in combination with security of their property, is why we are creating Gremo. It will be a service available for anyone who wants to use their bicycles for daily commuting and needs a safe way of storing them while away. At the beginning, our target audience will be the students of the Polytechnic University of Valencia, but we will soon spread to other parts of the city as demand grows. GREMO will offer its customers the ability to store their vehicles in a safe way without the need to carry their own locks. This is beneficial for the customers in two ways. Firstly, they don't need to worry about buying a lock if they don't have one. Secondly, even if they already have a lock, most of them, besides U-Locks, are not very safe options forse curing bicycles. With our service, customers will not have to worry about how safe their existing lock is, but they can rest assured that we are providing them guaranteed safety of their vehicle. Unlike other parking facilities for bicycles, we also provide additional features to make customers' commute easier and more worry-free. We thought about technologies that will be used more and more in the future, which is why we will provide e-bike charging stations integrated into every bike stand. This way, our users will be able to use their bikes without being limited by battery range. Furthermore, real-time charging information will be available via our mobile application, so users are always informed on the state of their vehicle. On top of this, our solution will give our users additional peace of mind, since their bikes will be monitored with video surveillance 24/7. Additionally, using our mobile application and website, users will be able to check the number of free stands at certain locations. With our solution, we will raise the standard of bike security in Valencia to a new level and reduce pollution in the long term by making cycling a more appealing commute option. It will also make commuting a more enjoyable experience since riders have the freedom to choose their route while going through the city. In the end, it will reduce the transportation time to their destinations.

Because bicycles come in different shapes and sizes (e-bikes, small commuter bikes, children's bikes etc.), our solution will need to be able to accommodate all of them. Our bike stands will be compact and secure, which will enable us to use very little space per bike, which will in turn allow us to place more stands at each location. Their compact size will also allow us to expand the number of bike stands in the future. Each stand will hold the bike by the pedal, which securely holds the bike in place since the two wheels are firmly on the ground. This also means that there is no unnecessary rubbing of the bike frame against the stand, so the risk of damage to the bike is minimal. Furthermore, since the wheels are on the ground, and not placed inside the rack, as is the case with spiral bike stands, there is no risk of bending the wheel or disc brake on the bike.



Each stand will have its own QR code that is used for connecting to that lock using our application, and initiating its functionalities (locking and charging).

Our facilities will feature IoT sensors that will be used to monitor the occupancy of each bike stand. Each stand will also feature charging functionality and will be able to show the current charge rate, while a bike is charging. To lock the bike in place, each stand will use an electromagnet that will be holding onto a special part (armature) mounted on the customer's bike. The power for the electromagnets will be supplied from a server box which will be located in the vicinity of the parking spaces. This box will also house the server which will offer remote control functionality for each stand. The armature for the magnets that is mounted on the bike will be installed for each customer by our staff, when the customer sings-up for our service. It will be attached to the bike by special tamper-proof bolts that will not be able to be taken off with common tools.

As for security, along with securing each bicycle, our parking spaces will also be monitored by security cameras from multiple angles. How is the service used? When the user arrives at an unoccupied stand, they can place their bike in the stand by lifting it and putting the pedal into the groove. Next, they scan the QR code on the stand using the mobile application. After the stand is identified, the application will give customers the option to automatically lock the bike, or to lock it and charge their battery (if they have an e-bike and a subscription with the charging functionality). If they are only locking their bike, they can leave it at this point knowing that it is secure. If they chose to charge their e-bike, then the last step is to connect the retractable charging cable to the charging port on their bike. After this is done, their bike starts charging and they can be on their way. When returning to their bike, the user will open the application on their phone and choose the option to unlock the bike. If they have been charging the bike, they first need to choose the option to stop charging and remove the cable from the bike. At this point they will see the charging statistics. After the bike is unlocked, they can remove it from the stand and continue with their day. If a bike is disconnected from the charger, and the action was not initiated in the application, the user gets a message saying that the charging was unexpectedly interrupted. This notification comes in handy if somebody disconnects the bike, either accidentally or on purpose

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

Our target market includes every commuting citizen who wants to lead a healthy and environmentally friendly lifestyle. This includes both regular bicycle riders, and e-bike riders. But in the beginning, we will focus mainly on teenagers and students, since they are more likely to quickly get used to our solution, which is centered around a mobile application. The focus on younger people will also give us a stable community of users in the future. When the adoption rate of our service gets bigger, we will expand our marketing strategy to include a wider audience.

Some similar services are:

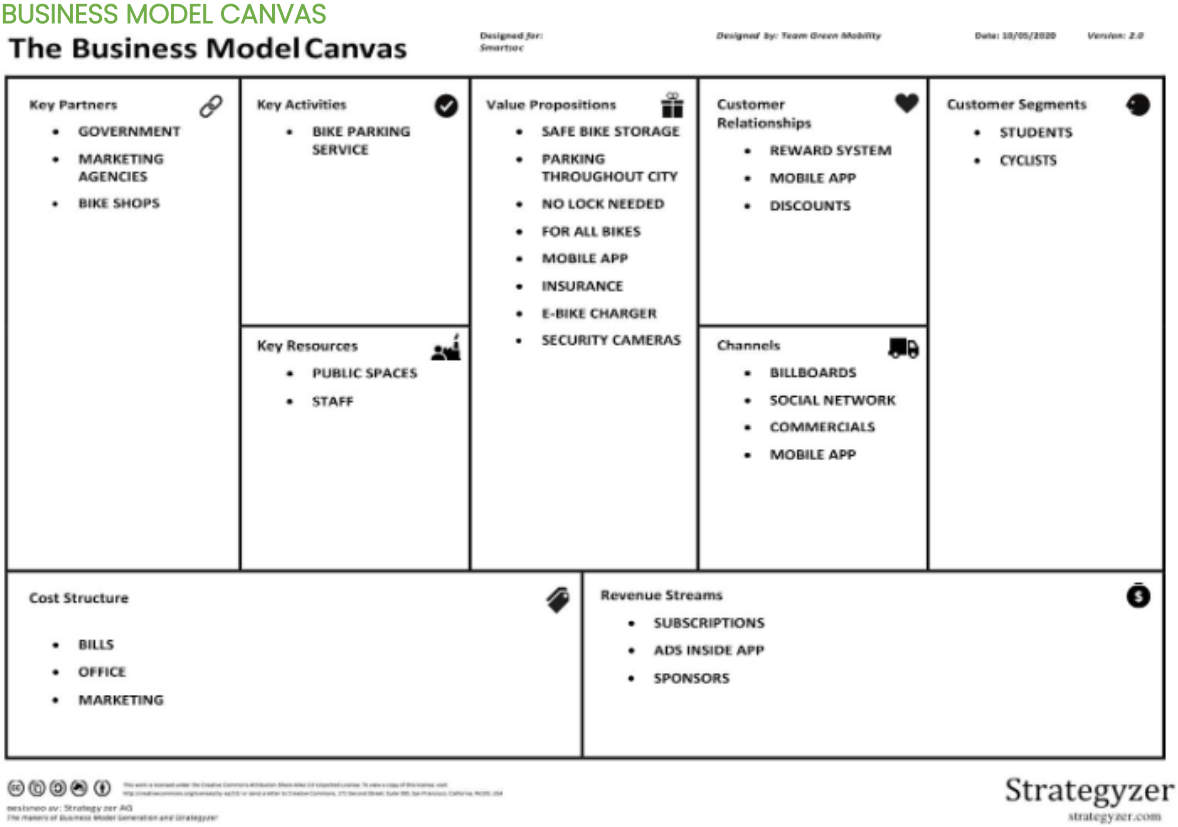
- ValenBisi, Spain - Bike rental service (http://www.valenbisi.es/)
- MiBisi, Spain - Bike rental service (http://www.mibisivalencia.es/)
- Biceberg, Spain - Underground parking facility (http://www.biceberg.es/)
- VelowSpace, Netherlands - Carousel parking facility(https://www.lo-minck.nl/fietsparkeren/)
- ECO Cycle, Japan - Underground / above ground parking facility(https://www.giken.com/en/products/automated-parking-facilities/eco-cycle/)

There is no direct competition that we found in Spain, but there are some remotely similar services available in Valencia. One such service is ValenBisi. Their core service is bike rental, which his why they are different from our business case, but they also offer cost effective transportation via bicycles. The negative thing in their case is that their customers need to have an additional card to use their service, since it cannot be used just via a mobile phone. While we are on the topic of bike rental, our service is in a good position since a lot of people want to use their own bicycles for commuting, since it offers them familiarity and peace of mind. Additionally, we don't need to buy any vehicles ourselves and don't need to pay for the service of the bikes. Another positive thing for us is that the city of Valencia is starting to encourage its citizens to start using bicycles for commuting, which will only increase our potential number of customers in the future.

RISK

RISK	*RISK REDUCTION MEASURE*
Not enough demand	• More advertisements on social networks • More billboards and flyers in popular spots (campus, bus stops etc.) • Promotional offers
No government support	• Change the strategy with which we approach the authorities • Put more emphasis on all the positives of the service, especially on it being a sustainable solution
Competition	• Emphasize our added values: o Mobile apps with real-time functionality o Insurance in case of robbery or vandalism o Automatic locking of bikes o Charging e-bikes supported on every stand
Not granted approval to place stands in public places	• Approach the appropriate authorities in a different way • Emphasis on our small footprint and reduction of city congestion
Introduction of unusual bike designs	• Design new lock style, and integrate into some of our stands in all locations
Not much attention from the public eye	• Think of other ways how we could enhance our marketing • Put more funds into marketing activities
Subscribers start leaving the service	• Survey subscribers to see what are their pain point • Address problems quickly and efficiently • Create occasional promotions (e.g. awards for bringing in new users)
Vandalism of our stands	• Research what parts of our stands are most sensitive and prone to damage • Improve the design • Implement first on damaged stands, and gradually also on working stands in the future
Frequent power outages	• Start negotiations with other power distributors to set up a backup power system
Not enough funding or investor backs out	• Assure stakeholders that the project is going as planned • Find new investors or research new ways of getting investments

BUSINESS MODEL CANVAS



Detailed Market Analysis, Management & team & resources, Start-up team development, Marketing activities, Responsible budgeting/Financial projections, Main risks, and the measurements for their reduction are described in Business Plan, which is available on SmartSoc Project Moodle.

SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Some of the challenges that we will face while creating our service will be around agreements and partnerships with various parties. To implement our service, we will need to reach an agreement with the city to allow us to place bike stands in public areas. This will result in slight changes to the cityscape of the areas where the stands will be located, since the once empty space will now be populated with our bike stands. On the upside, our service will encourage users to take on cycling as the main means of transportation since they won't have to bother anymore with finding suitable parking spaces. It will shorten their commuting times and allow them to explore the city more, since they will not be tied to roads and pre-existing public transport routes. In the future, if enough people switch to commuting by bikes, traffic jams will likely become a thing of the past, and the air quality in the city will improve. Furthermore, the city will be less congested with cars, so citizens will have more space, time and money, since they are lost in considerable amounts when searching for parking spaces for cars. The pandemic of 2020 is a perfect example of a service where our service shines. It limits the contact between citizens by encouraging them to use individual transport instead of mass public transport. It also requires no direct contact with our bike stands, when looking at the parking process itself. It all relies on the mobile application, and everything is handled automatically. While on this topic, it is also worth noting that bikes are a good form of exercise. This was important since, during the pandemic, most of us got a lot less of exercise since every one had to stay indoors. Scalability is also an important benefit of our solution. In the future, we can add many additional parking spaces, and keep the change of the cityscape to a minimum, since as mall amount of space is required per parking space.

PARKING SPACE MANAGEMENT FOR URBAN SOCIETY

https://www.smartsoc.uniza.sk/ec-2020-02

AUTHORS

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SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

HORIZON 2020 CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Climate, Energy, Mobility

TASK TO SOLVE - INNOVATION FOSTERED BY ICT

- The effect of urbanization and new administrative centres cause ⇒ lack of parking lots (used by commuters).
- Night-time storage – daytime storage – high costs – ineffective.

SMART PROPOSAL

- To design a service for determination of parking lot (options) as close as possible to the destination, eliminating time and energy wasting.

SMART SPECIALIZATION STRATEGY TOPIC

- From the SSS of region Gyor-Moson Sopron Country: logistics

DESCRIPTION

In our region, housing projects, mainly 4 storey apartment constructions were typical because of lowered taxes on building materials and businesses. Urbanization rises traffic in the cities. In our county, Gyor-Moson-Sopron the owned car number increased from 140k (2011) to 190k (2018), it is a 35% rising. In Gyor, -the county town of Gyor-Moson-Sopron- 129k (2011) 125k (2018) people are living, it is a decrease with 3,2%. County-s population is 462k, so Gyor has the 27% of the county-s population. The effect of urbanization and being the administrative centre means concentrated traffic and stationary vehicle load. In this case, we will deal with the problem of parking lot usage by commuters (stationary vehicle space).

The problem of seeking for parking lot is one that traditionally the driver has to solve. It consumes time, energy, and proportionally higher mental stress compared to driving with traffic flow. Usual solutions as designated parking lot, and private garage are outdated, and saturated. They inherently mean low space utilization and high cost, because you must buy a garage (night-time storage), or your employer has to deal with maintain designates parking lot (daytime storage), and it is only used by few people. Our target audience is the driver on 1+ levels (Check SAE levels 0-5), our service is based on information gathered from public and non-public databases whose consist everyday usage, and exact position of parking lots. Our service essentially is to determine parking lot (options) as close as possible to the destination, eliminating time and energy wasting.

TECHNICAL ASPECT

- Make a plan for the system to send data through public and private networks. (VANET, 802.1p WAVE, 5G,...).
- Design the plan of the multi-platform application (frontend) to interact with the consumer.
- Do investigation and research about mathematical methods for estimate parking space, parking lot occupancy.
- Make a plan about the (backend) software algorithm, what it is doing to provide the quality of service.
- Do a technical risks list.

BUSINESS ASPECT

- Determine city sizes and types where our services can serve its highest value. What factors are contributing mostly in demand estimation?
- What services we have to use and pay for, in order to start our enterprise effectively?
- How do you get the private data about the car owner's time to spend on his destination?
- How will you protect the mass data gathered?
- Look after EU or governmental subsidies, start-up funding, and their requirement needs.

SOCIETAL ASPECT

- What impact would mean if there was not vehicular automation?
- Make a comparation between traditional "parking lot situation" and the one our case will provide.
- Gather viewpoints for determine what is green, smart city.
- Investigate the societal effects of using shared automated vehicles.
- Make ideas connected with your start-up case and do surveys about them on mass media.

myParkingSpace

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM ES2020:02A

STUDENTS

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FLORIAN ZUNFTMEISTER *(University of Applied Sciences - HfT Leipzig)*

SUPERVISORS

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EVA MALICHOVA (*University of Zilina*)

SmartSoc Workhop 2020 Student presentation (Team 2A):
https://youtu.be/9stCR7_TUUM

SHORT DESCRIPTION OF PRODUCT /SERVICE

- The system offers the user a free parking space.
- The application can be used independently of the terminal device.
- Data on availability are taken from private and public sources.
- The system uses the user's entries to find the nearest parking space and reserves it even a fully automatic request from an autonomously driving vehicle can be processed accordingly.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

An intelligent and sustainable solution is achieved with modern technologies of the IT sectors. The retail industry considers business and social aspects as well.

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

- Core Benefit: Procurement of A Suitable Parking Space
- Generic Product: Traffic Guidance System
- Expected Product: Intelligent Parking Management
- Expanded Product: Intelligent Parking Space Management
- Potential Product: Smart Parking Space Management

COMPETITORS

So far there are only individual providers. A truly intelligent and networked system does not yet exist. Most of the time cities use traffic guidance systems to distribute the vehicles over the city and to make the search a little easier. For example:

- APCOA parking https://www.apcoa.de/en/parking-products/flatrate-parking/
- Siemens https://slideplayer.com/slide/13079985/
- Teksmobile http://www.teksmobile.com.au/blog/smart-parking-nature-trends-and-benefits/

BUSINESS MODEL CANVAS

Business Model Canvas

Designed for:	Designed by:	Date:	Version:
Parking space management for urban society (SmartSoc Project)	ES2020-02A	31.05.2020	3.0

Key Partners
- City
- Existing parking space / garage owner (users)
- Shopping malls
- Restaurants
- Companies
- Transport stations
- Car parks
- Traffic guidance systems (government)

Key Activities
- Monitoring and analyzing the parking places in real time (Mass Data)
- Find the best free parking hours of the leaser (management effective)
- Parking Space be shared based on their time.
- Rent the free parking spaced during unused time to customer
- App & platform Promotion

Key Resources
- Database Management
- Payment Gateway
- Web securities techniques
- User Interface design for fast and easy
- internal specialists and experts
- IT infrastructure

Value Propositions
- It will solve the parking problems especially in the city areas by showing near available parking places.
- It saves time, fuel and energy.
- Notify the nearest parking space.
- System for effective search and placement of parking spaces
- Display of available parking spaces. Navigation to the car park. Booking and reservation of free parking spaces.
- The services can be booked according to customer requirements

Customer Relationships
- Customers register themselves in our system with their information about the parking space
- Information and support via Internet websiteInformation and support via telephone hotline

Channels
- Web application
- Mobile application
- embedded screen on vehicles
- Sozial media
- commercial partnerships

Customer Segments
- Vehicle Users (Car, Bike, Van, Bus, Careban etc.)
- SAE Level 1-5 vehicles and drivers (business / privat)
- Cities
- Car manufacturer

Cost Structure
- Cost for web or application development where all the parking space are on the database
- Database management system required extra cost.
- Payment Gateway also costs little per transaction.
- Cloud cost for the backup storage.
- Management cost
- Advertisement cost
- Marketing cost
- Most costs are incurred in development and support (personnel costs)
- variable costs are very low (software is easy to copy)

Revenue Streams
- Monthly users can place their parking space on rent or share if they are outside of the city. Money gets divided with the company and them on some percentage basis.
- Site or application third party advertisement related to automobiles, restaurants, and shopping maps etc.
- Sublease parking space based on time.
- Contract from city for the smart parking solution.
- Support from the cities
- Registration is free of charge for users
- Income from the brokerage of parking spaces

Detailed Market Analysis, Management & team & resources, Start-up team development, Marketing activities, Responsible budgeting/Financial projections, Main risks, and the measurements for their reduction are described in Business Plan, which is available on SmartSoc Project Moodle.

SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

The solution helps cities to reduce their exposure to many vehicles and their air pollution. It also aims to save space in urban areas. The efficient solution developed will generate significant added value for society.

SwiftPark

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM ES2020:02B

STUDENTS

ALBA VICENTE *(Technical University of Valencia)*
MAROS GORNY *(University of Zilina)*
WILLIAM SIMON *(University of Debrecen)*

SUPERVISORS

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SmartSoc Workhop 2020 Student presentation (Team 2B):
https://youtu.be/-aii5Z6d67c

SHORT DESCRIPTION OF PRODUCT /SERVICE

Parking space management is a serious problem in today's densely populated cities. On one side, it affects drivers looking for a parking spot, making them lose their time, money and sometimes influencing their mood. On the other side, it affects cities in general as the pollution increases because cars are moving around more time than necessary.

Our proposal tries to address this problem by providing a platform in which users can easily see where the free spots are and book them. In the streets, cameras and/or optical sensors will be installed, which will gather information continuously. The information will be transmitted to a central server in which the data processing will be performed. The spots handled by our platform will be identified hierarchically, and a Boolean variable indicating whether it is free or not will be stored in a database and modified in real time. The users will be able to access the database through a user-friendly mobile app, in which they will be able to see their location and nearby free parking spots. reducing the average time spent in the road and decreasing the amount of CO2 expelled to the atmosphere. Drivers will save money because they will spend less fuel and cities will need less measurements to address the pollution problem. It is a win-win proposal.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

This solution consists of a variety of technologies and methodologies:

3. The sensors are the key resources of the system, and they will be placed in the parking spaces to detect whether the place is empty or occupied. There are a lot of different options and types of sensors available, and it is possible to develop a special type of sensors dedicated to our problem.
4. In order for the system to operate properly, a stable and strong network is required so the sensors can send information to users. A decision should be made about the type of communication, and whether to use public or private networks.

5. The software is the main engine of the system. Several options are available as well regarding the platform on which the software will operate. It is recommended to include different platforms from mobile phones to vehicle onboard computers, since it is easier these days to develop hybrid software that works on different platforms, and it increases the availability and accessibility of the product. Furthermore, a user-friendly design will be applied for the application, with different interfaces for different types of users, such as drivers or parking lots owners.
6. Efficient and effective algorithms should be implemented in the system to calculate and estimate the location and availability of parking spaces, using appropriate mathematical models.
7. A plan is needed to specify the methods of managing data and distributing the computational recourses, and whether cloud solutions will be used or everything will be handled locally.

The core team will consist of highly expert software developers and hardware engineers and business analysers that can handle the technical aspects of the system in the best way to deliver the most possible convenient user experience.

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

Core benefit: This product aims primarily at saving time and efforts by managing the parking spaces efficiently and effectively. In addition, it eliminates the consequences of unorganized parking spaces such as pollution, overcrowd, and noise.
this product on the environment and society.

Generic product: A solution that will offer benefits to customers who suffers from the problem of struggling to find a place to park, mainly those who live in overcrowded cities. The need of such solution will be notable in centers that attract large number of visitors.

Expected product: An online platform that help drivers finding a place to park their car close to their destination easily and in short time. It is expected that this solution will be highly desirable and used in capitals and large cities, less used in medium-populated cities, and rarely used in small or quiet cities.

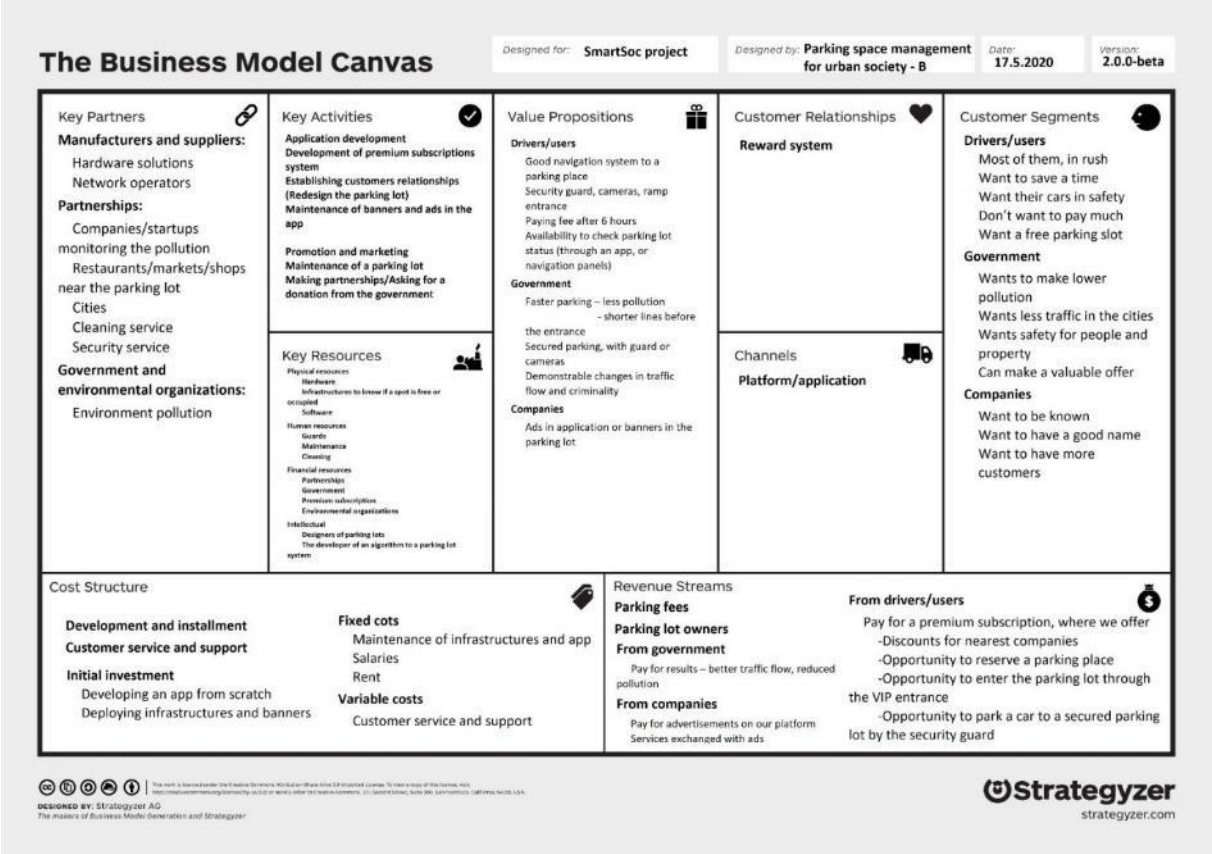
Augmented product: This system will be supported with customer service to help solve errors and issues, and to make it convenient for users. Moreover, it focuses on helping the environment and society by making it healthier and more comfortable, which makes it a more attractive choice.

Potential product: Overall, the solution will target several categories of users. Those who are in high-dense cities will benefit the most, and form the largest market segment. Whereas, those who live in less-dense cities will be targeted through attractive customer service, in addition to promoting the positive effects of this product on the environment and society

Target customers: our target customers can be mainly divided in three groups:

- People having a car and that need to find a parking space in areas where it is usually hard to find one (i.e. workers going to work, inhabitants living in the city centre, etc.)
- Governments/local authorities of cities with severe traffic and/or pollution problems, willing to ease them and find a solution that can help in the short and long terms.
- Private companies willing to implement our system in their private spaces because they for instance have a lot of people and few parking spaces available.

BUSINESS MODEL CANVAS



Detailed Market Analysis, Management & team & resources, Start-up team development, Marketing activities, Responsible budgeting/Financial projections, Main risks, and the measurements for their reduction are described in Business Plan, which is available on SmartSoc Project Moodle.

SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Struggling to find a parking space is a problem that does not only affect individuals and cause them losses in time and efforts, and sometimes money, but also affects the environment and society.

This link refers to a study that shows that the cities contain millions of available parking lots, which means the problem is not with the lack of parking spaces but with the management of these spaces, and that is the issue which is targeted by our product. https://www.citylab.com/transportation/2018/07/parking-has-eaten-american-cities/565715/

This system will provide effective management of the parking spaces through real-time guidance and live data, allowing drivers that are looking for parking to be aware of full and empty spots before taking the time to search. This type of live monitoring will be very beneficial for cities especially during events. Therefore, cities should support this process and desire to improve it, not to mention how this could impact the public perception of those cities as they thrive, and their population increases.

More revenues will be generated for cities that uses this type of effective handling of parking lots. These revenues can be spent on improving the city itself regarding streets or infrastructure, which in turn will motivate the citizens to further contribute in the solution and even pay for it. This study shows a similar scenario in Pasadena of California, where more customers were attracted to the area due to the regulated parking. http://shoup.bol.ucla.edu/SmallChange.pdf

Unorganized parking space management results in lot if cars driving in the streets, trying to find a place to park, which naturally causes traffic crowding and escalates the problem making it even harder to find an empty place. This escalation will result in high amount of harmful gases produced from vehicles which increases the pollution in the atmosphere and damages the environment and living creatures.

Moreover, the number of parking lots itself has an effect on the environment. Large number of parking lot spaces means fewer green spaces and natural areas will be robbed of the means to collect rainwater that replenishes aquifers. In addition, they could create an increase in temperature due to the construction material used in creating them, not to mention the energy consumed for both creating and maintaining them as well. The effective and efficient management of parking lots will lead to a lower demand for more parking spaces, and thus reducing the damage they introduce to the environment.

Furthermore, the time loss and the exhausting efforts spent while driving and waiting for the traffic will much likely lead to long term damage in society. The human's performance in different jobs and professions will be declined, and a lot of people will suffer from stressed mentality that prevent them from focusing on their business and communication with others, resulting in a less productive and interactive society. We can see an example on the following website, about how the smart technology has been applied in Dubai by installing sensors on lampposts, and how such innovative solution could lead to a stress-free enjoyable experience. https://www.smartdubai.ae/

By solving the parking space management issues, our product will also solve consequences of this problem, causing less harmful gas to be produced, and less stress and tiresome for drivers.

Eventually, the system will have a magnificent role in keeping the environment safe and clean, in addition to improving the activities of the society and making it healthier and more developed.

SUSTAINABILITY IN AGRICULTURE: A GRAIN DRYER WHICH IS BOTH ENERGY AND TIME EFFICIENT

https://www.smartsoc.uniza.sk/ec-2020-03

AUTHORS

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HORIZON 2020 CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Food, Bioeconomy, Natural Resources, Agriculture and Environment

SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

TASK TO SOLVE - INNOVATION FOSTERED BY ICT

Drying grain ready for the winter can be time and energy-consuming process. The measuring technology is not precise enough in all conditions and because of this, farmers sometimes dry grains longer than necessary, which increases energy consumption and can be detrimental to the quality of the grain.

SMART PROPOSAL

- to identify more details about sensor technologies, which can be used for farming and smart agriculture.
- to provide more information about how sensor technologies help farmers to develop their work.

SMART SPECIALIZATION STRATEGY TOPIC

The research and development project will take place in seven phases. Within each of the phases, several activities will take place. The phases of the project are of the research and development type. At the beginning of the project, research activities will take place within certain phases where the current situation on the market and industry will be determined. This, is followed by development activities in which the App will be developed.

- Phase 1. Industrial research of theoretical bases for app development
- Phase 2. Defining application development technologies and models
- Phase 3. Modelling of concepts and architecture for new app
- Phase 4. App prototype development
- Phase 5. Release of the application into experimental work
- Phase 6. Promotion and dissemination
- Phase 7. Project and business management

DESCRIPTION

Autumn in Finland is rainy and wet and grain needs to be dried, stored and used throughout the winter. Drying grain ready for the winter can be time and energy-consuming process, particularly in a country such as Finland where autumn tends to be very wet.

Conventional drying methods can also have a negative effect on the quality of grain. These methods are often unable to cope with the variations of the plant and environmental conditions, which can mean that the measurements are inaccurate. The measuring technology is not precise enough in all conditions and because of this, farmers sometimes dry grains longer than necessary, which increases energy consumption and can be detrimental to the quality of the grain.

Brothers and farmers Juha and Jussi Sippola from Isokyrö (Western Finland) and Antti-Teollisuus (SME) decided to set up an Operational Group to deal with this issue and built a pilot grain dryer, which uses an IT-based monitoring system. The dryer can produce high-quality dried rain with less effort from the farmer and uses less energy than conventional dryers. Reliable measurements were taken at each stage lead to more precise control of the drying process. The dryer has integrated moisture measuring equipment which means that the impact of the particular plant properties and the environment on the measurement information can be minimized. The system allows for measurements to be taken during the drying process and adjustments to be made accordingly.

The farmer can, therefore, avoid over-drying, which can lead to lower quality of grain and under-drying, which can mean that the drying process needs to be started again. The refined process enables the farmer to produce high quality dried grain than can be stored and used efficiently throughout the winter.

The precision of the dryer as described above means that it saves energy compared to conventional dryers. But what is more, it is powered using woodchips produced on-farm and so reduces the cost for the farmer and contributes to a circular economy.

The improved accuracy of the dryer also enables reliable automation of the system which saves time for farmers; they do not constantly need to be checking moisture levels. The dryer is also 'smart', it is connected to a remote monitoring system that sends information from the drying process to a cloud so that farmers can check the situation wherever they are.

The financial and temporal savings potential is clear. From measurements, it can be seen that up to 30-50% of energy control can be achieved. The result is simple math, saving time and energy by not having to dry the grain too dry. The savings are relatively high because the last percent drying requires the most time and energy. This means less drying time, less electricity and fuel consumption and more capacity for the job, Sippola says.

TECHNICAL ASPECT

Student teams will need to:

- identify and provide more details about sensor technologies, which can be used for farming and smart agriculture.
- provide more details about grain drying and how it can be developing more efficient.
- provide more information about how sensor technologies help farmers to develop their work from a technical point of view.

BUSINESS ASPECT

Student teams will need to identify:

- potential customer segments for this new type of grain dryer.
- all value propositions to all potential customer segments.
- all value chains, which can be important, when selling the resolution.
- all channels, where grain dryer can be marketed and sold.
- all revenue streams, which can be found in this production.

SOCIETAL ASPECT

Student teams will need to:

- provide more details about how the entrepreneurial case is solving e.g. energy efficiency, water usage, waste management practice, climate pollution, green management, etc.
- provide more details about how the entrepreneurial case is solving time efficiency, work balance and working conditions of farmers.
- identify impacts related to Smart Specialization Strategy (e.g. using the mind map technique).
- identify impacts related to farming societies (e.g. using the mind map technique).

SmartDry

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM ES2020:03

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SmartSoc Workhop 2020 Student presentation (Team 3):
https://youtu.be/3xzuPIwqIhY

SHORT DESCRIPTION OF PRODUCT /SERVICE

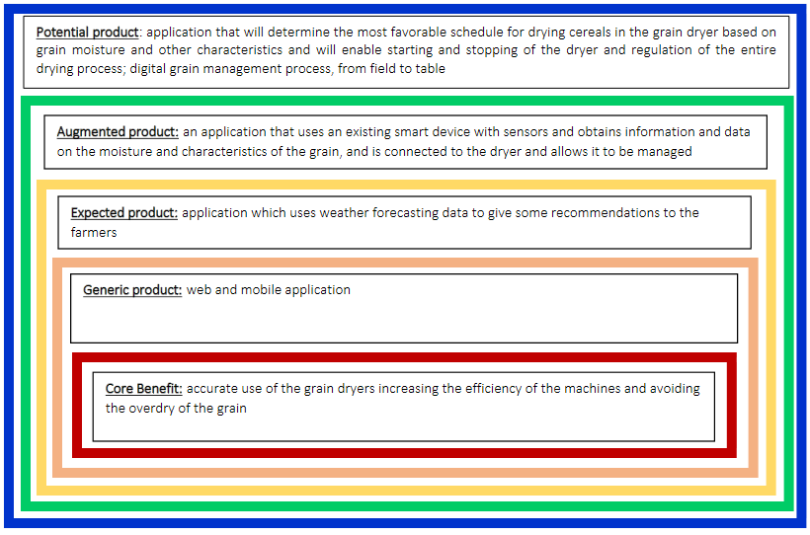
SmartDry represents our team and is associated with the solution we are developing. The name is associated with smart drying, which means what we want to achieve through our solution, and that is the energy and time efficiency of the process of drying cereals in the grain dryer. Our solution should ensure the sustainability of the entire grain supply chain from the field to the table, ie from the farmer who sows the grain until the final processing of the grain.

The problem we are solving with this research and development project is closely related to the agricultural sector and the food production sector and the processing industry. Namely, farmers have been facing major changes lately. On the one hand, global warming is creating major problems through drastic weather changes and extreme weather events that are hitting this sector for the most part. It is almost impossible to plan and expect an agricultural season, as it once was. Farmers are facing extreme and unpredictable seasons, and it is increasingly happening that the agricultural season is very rainy or dry. Cereals as the most important crop in the human food chain, but also as a very important food in animal husbandry, is particularly exposed to these problems since it is grown outdoors. Farmers face a lot of open problems and issues that plague them as growers and grain producers. One of the problems is definitely making decisions about harvesting grain since it is difficult to make a decision if the weather conditions are unpredictable.

Furthermore, the problem is grain moisture and the values of other grain characteristics that affect grain quality. It is almost impossible to produce cereals without having to process them through the drying process. All cereals, given their moisture, need to be dried so that they can be used. This drying process consumes a lot of energy, and traditional drying methods can also be negative for grain quality because the technology they use is not precise and sometimes the grain dries for too long, including the energy waste that the drying process assumes. Also, one of the problems is definitely that this process requires a lot of physical effort, but also very difficult decision-making (how to dry, according to which parameters and conditions, etc.). Furthermore, a major problem in agriculture is that new digital technologies are being adopted rather slowly, and also investments are sometimes limited or completely omitted.

The company was founded with the purpose of launching a research and development project called SmartDry. The goal of the research and development project is to develop an application that will manage the grain drying process. The application will have several functionalities through which it will provide benefits to customers / users. It can be said that our application will monitor cereals from the field to the table, that is, it will monitor its entire process and thus ensure multiple benefits for society. The App SmartDry will enable the determination of the most optimal schedule for drying cereals and will enable the management of the dryer. The App we are developing should be connected to a smart device with sensors, which are already used to assess the moisture and characteristics of cereals. Also, on the other hand, our App should be connected to a grain dryer, which she manages. The goal of our research and development project is to investigate the current state and problems related to grain moisture and grain dryers and to develop an application that will manage the grain dryer. We want to develop an application that will contribute to saving time, money and energy in the process of drying cereals. The application we are developing will collect information on moisture and other characteristics from a smart device with sensors. Based on the received data and information, the application will define the schedule of drying grain in the dryer. The application will define the most favorable drying schedule with respect to grain moisture, for all cereals. Also, the application offers users to define the drying schedule according to certain rules or criteria. Therefore, the user can choose what suits him best. Furthermore, the application will enable the start and stop of the dryer and regulate the drying process. The users of our application are farmers who produce cereals, farmers who are engaged in drying, i.e. they own grain dryers, and large agricultural companies that buy grain.

Our App should enable the digital process of managing grain stocks, from the field to the table. This actually means the following: when the application receives the information in a particular crop of cereals and their characteristics and moisture, it stores the same data and can be forwarded by the farmer to another farmer who dries for him; the farmer who performs drying with the help of the application plans the most favourable drying schedule and manages the dryer; at the end of the drying process, the application delivers information about the grain after processing and the same information can be delivered to the grain purchaser who processes the grain for different purposes (food production, animal feed, etc.)



TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

We are developing an application whose main role is to define the schedule of drying cereals in the grain dryer, given the moisture and other characteristics of cereals. The application allows you to define the drying schedule according to several rules such as FCFS, SPT, minimum grain moisture, maximum grain moisture, or some other rules that the application allows. In addition, the application defines the drying conditions and parameters according to which the process takes place according to a certain schedule. The application works in a way that it is connected with a smart device with sensors and a grain dryer. So, on the one hand, the application collects and stores data on moisture and other characteristics of cereals from a smart device with sensors available to the farmer. On the other hand, the application is connected to the grain dryer and defines the schedule and conditions of drying in the dryer. The rules by which the schedule is defined are different and the user can choose according to which rule he wants to define drying.

However, the application has the ability to define the most favourable schedule with respect to all parameters, and with this schedule the highest energy and time efficiency is achieved. In the application, it is possible to adjust the scheduling, ie the schedule according to several possible rules (criteria). For example, one of the criteria may be moisture, so the cereals that have the highest moisture will have the advantage in drying. In that way, better planning, better organization and execution of work is enabled. All of this has the impact of saving time and reducing costs.

Also, the application allows the regulation of the grain dryer, on and off, and in addition to automatic, allows manual regulation of parameters and conditions. In addition to the above, our application has some other functionalities, which are not insignificant at all. The application recognizes which cereal is in question and which cereal it determines a schedule and takes into account different cereals. Therefore, it is adapted for use and determines the arrangement of all cereals and no additional adjustments are required. The application provides a final assessment and analysis of the value of cereals after drying, which provides insight into the report on the characteristics of cereals after drying, such as moisture, sugar, protein, oil, fiber, minerals, proteins and more. A complete analysis of the grain is possible.

The main functionalities of the App are:

- defining the most favourable drying schedule with regard to moisture and other characteristics of cereals;
- the possibility of creating a schedule according to selected criteria and rules;
- defining drying conditions and parameters according to a certain schedule;
- defining a drying schedule with a combination of different types of cereals;
- defining and insight into the drying plan, planned drying time and energy consumption;
- generating the final report and insight into the characteristics of cereals after drying;
- control of the dryer with the help of the App (start and stop);
- manual adjustment of drying parameters and conditions if necessary, with the help of the App;
- saving collected data and analysing data.

Other functionalities:

- possibility of heating to biomass;
- control of gas emissions without contaminating the quality of dried grain;
- easy adjustment when drying different cereals;
- possibility of upgrading the drying capacity with multiple parallel drying units;
- automatic security and process control system;•artificial intelligence based surveillance system;
- automatic adjustment of grain drying to moisture;
- grain recognition depending on the consistency of the oil;
- control of dryer through applications.

Technological innovations are reshaping the way farming is done. With regard to the stated functionalities of the application, the technological aspect of the application development will be explained. Our application will be developed in the Python programming language. The input to the application is information about the moisture and characteristics of cereals, which the application receives from a smart device with sensors, with which it is connected via IoT technology.

Based on the received data and their analysis, with the help of Machine Learning technology, the processed data will result in a drying schedule that will be achieved with the least amount of energy and time. Also, the parameters and conditions of the drying process will be defined where the Internet of Things technology will be applied, which enables the start of the dryer with the help of the application. Finally, all data is recorded, which is stored in the Cloud, and it is later used to train and discover smart drying algorithms.

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

Table of material resources

MATERIAL RESOURCES	DESCRIPTION
Business space	The business space is owned by one of the team members. A team member made the business space available to SmartDry. The business space will serve as the company's headquarters, where the company's business will take place.
Information and communication technologies	Information and communication equipment includes smart computers, printers, usb and other equipment. Procurement is planned to be financed from team members' savings and loans.
Furniture	Procurement of furniture will include tables, chairs, drawers and cabinets. It will also be procured from loan funds.
Office material	Office supplies include binders, paper, and other office supplies.
Official car	The official car will be procured due to the need to travel and attend meetings. Procurement is planned through leasing and will be financed in installments.

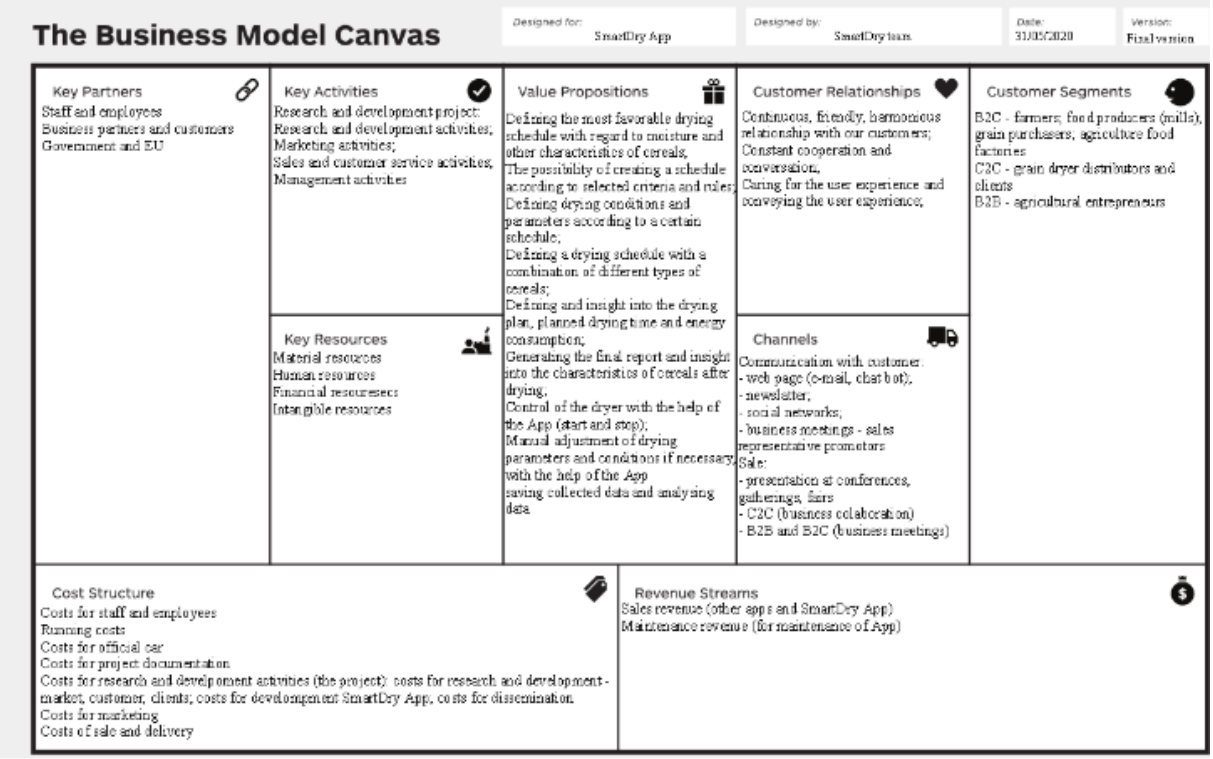
Table of intangible resources

INTANGIBLE RESOURCES	DESCRIPTION
Market research results	Prior to the launch of the project, a market research was done to define a specific problem and to explore the market needs related to grain dryers. The result of the research is data and information obtained on the basis of the conducted research.
Results of conducted interviews	Prior to launching the project, interviews were conducted with farmers to better understand the identified problems and their needs. Based on the above, the SmartDry App development project was launched.
Deliveries on the project	The plan is for our project to be registered and funded by the European Union. As part of the project, deliveries are planned. Some deliveries will be experimental and research in nature, and there is also a plan to develop an App at the end of the project.

RISK

RISK	*RISK REDUCTION MEASURE*
Risk 1 – Financial risk	• finding investors • finding additional sources of funding from the European Union • cost and revenues planning
Risk 2 – Market risk	• market research • finding sales representatives in countries where sales are made • conducting promotion and marketing activities
Risk 3 – Technological risk	• research and analysing of technologies • recruitment of ICT experts • explore and examine examples of good practices in the use of technologies in agriculture
Risk 4 - Management risk	• additional research and business decision analysis • business planning and project management • strategic project planning • continuous meetings each week
Risk 5 – Environment risk	• conducting testing and analysis to prove the benefits of our product • planning all steps in the process of developing and implementing our product • cooperation with partners, farmers, agricultural companies

BUSINESS MODEL CANVAS



Detailed Market Analysis, Management & team & resources, Start-up team development, Marketing activities, Responsible budgeting/Financial projections, Main risks, and the measurements for their reduction are described in Business Plan, which is available on SmartSoc Project Moodle.

SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Our app would have multiple impacts on society and the environment as a whole. A particularly significant impact should be highlighted in agriculture and food production, given that cereal production is directly related to these activities. We could say that grain production is an important item for survival. Namely, cereals are the basis for the production of certain foods for humans, and they are located at the bottom of the food pyramid, and as such represent the basis of the diet. Recommendation is that grain to be part of every meal of child. It is recommended to eat different types of cereals, and preference should be given to whole (integral, peeled) cereals and their products, such as whole breads and other bakery products, pasta, rice, products or dishes containing oats, rye, barley, buckwheat, polenta or unprocessed breakfast cereals. For this reason, it is important that the cereals are processed well, in order to retain all their values and to be stored properly, and this is exactly what our application will help. On the other hand, it should be mentioned that cereals are the most common food in animal nutrition. Corn, barley, wheat, triticale, oats, rye, sorghum, millet and rice are used in animal feed. The nutrient content of cereals varies and the method of processing and storage plays a very important role, where again our application plays an important role. Our app will be used to define the process of grain processing and determine the processing schedule. The application will be connected to a smart device that uses sensors to assess grain moisture and other characteristics, and since such devices are already widely used, our application will use this data for further processing.

Source: https://www.chp.gov.hk/en/static/90017.html

On the other hand, the application will be connected to the grain dryer and based on the characteristics, and moisture of the grain will determine the drying schedule according to the rules, and automatically regulate the drying process. The goal is to achieve time and energy efficiency of agricultural activity through an adequately defined processing process and quality processing of cereals.

32Next will be explained below how our application can help society. The social impact of our product is particularly significant in the agricultural sector. We will first start by explaining why the app is important for small farmers. Farmers whose main activity is farming usually cultivate large areas of land with different cereal crops. When it comes time to harvest, it is necessary to properly process and dispose of cereals. It is at this point that the key application is, which, based on the processed information about the cereals (which it receives from the smart device with sensors), determines the processing schedule (drying) of the cereals. So, given the characteristics and moisture of cereals, defining the schedule in my opinion they will dry, while saving energy and time. As an additional functionality of the application, if it is connected to a smart device, it can be pointed out that based on the information received by the application, it can also define the grain harvesting schedule for the farmer, since the drying schedule is defined. So, once the application defines the drying schedule with respect to grain moisture, according to that schedule the farmer can plan his harvest, which actually allows for precise farming and information and processing exactly on time, and thus business planning on time. In addition to determining the schedule, the application also defines and manages the method of drying cereals such as drying time and temperature and automatically changes all grain dryer settings. Our application will have a significant impact on the business and performance of large agricultural producers and purchasers. Large agricultural corporations have a wide range of activities, from selling their own seeds, monitoring the production cycle, to buying grain. It is clear that this form of business requires good planning, organization and control of business and ultimately decision-making related to the manipulation, price and sale of cereals.

Our application would be very useful because it would facilitate the process of planning the drying of cereals in a large agricultural corporation, where a large amount of cereals of different characteristics and moisture is received daily during the season. In addition to the plan and schedule of drying, the application itself determines the conditions and parameters of processing and allows easy or automatic start of the grain dryer. These functionalities of the application would contribute to saving time and energy, timely decision-making and a more flexible way of doing business in the market. Although our application does not have a direct impact on the contribution to the state, it is certainly important to mention that it has an important role to play in ensuring quality commodity stocks, especially cereals. Timely harvesting, quality and customized processing and storage are very important to ensure quality commodity supplies on the market, ready for processing and use by food manufacturers. Certainly, later processed cereals will be food on the table of citizens, and in order for it to be of good quality, it should retain its values through proper processing and storage.

SCALED APPLICATIONS OF 3D PRINTING SUPPORTING THE SOCIETY

https://www.smartsoc.uniza.sk/ec-2020-04

AUTHORS

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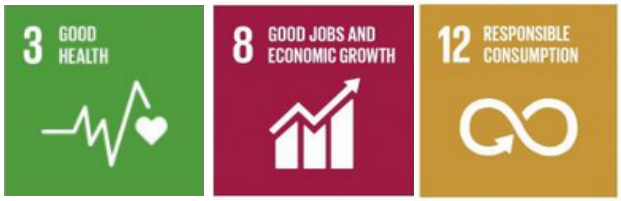
HORIZON 2020 CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Culture, Creativity, and Inclusive Society

SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE



TASK TO SOLVE - INNOVATION FOSTERED BY ICT

There are many household gadgets which are thrown away although they could be fixed by replacing broken or lost parts. These items should be collected and distribute after making them to operate again by using 3D printing.

SMART PROPOSAL

- Identification of fields where 3DP can serve the needs of several social strata.
- To finance this activity special customized objects (lampshade, gear stick cover, souvenirs with personal ornaments) could be created and sold for people who could afford this extra for themselves. At the same time a supporting community could be organized which members help each other (e.g. when a part could be replaced by 3D printing and somebody from the community has a sound sample, he could rent it for the time of scanning which shortens the time of modelling).

SMART SPECIALIZATION STRATEGY TOPIC

One priority of national Smart Specialization Strategy is aimed at promoting the sustainability of the environment through the research, application, and development of modern technologies. 3D printing is one of the emerging technologies that can bring innovative solutions for many issues which overcoming is could be beneficial.

DESCRIPTION

Usages of intelligent technologies are directions of smart specialization which can be applied in all counties in Hungary. Accordingly, the smart specialization directions of a county include the national priorities and the intelligent technologies characteristic of the given county. 3D printing (3DP) is an excellent example for innovative technology which unique characteristics provide additive values for all industries. This is the reason why it can be linked to more sectors and why its application fields should be still explored. In the frame of this case study students should identify fields where 3DP can serve segment of the periphery of society as well as the wealthy stratum. There are many household gadgets which are thrown away although they could be fixed by replacing broken or lost parts.

These items should be collected and distribute after making them to operate again by using 3D printing. To finance this activity special customized objects (lampshade, gear stick cover, souvenirs with personal ornaments) could be created and sold for people who could afford this extra for themselves. At the same time a supporting community could be organized which members help each other (e.g. when a part could be replaced by 3D printing and somebodv from the communitv has a sound

TECHNICAL ASPECT

Student team will get to know the following topics covering the most important technical knowledge they need to put into the practice the above-mentioned activities:

- Working principles of Fused Deposition Modelling (FDM)
- Characteristics of filament types
- FDM printers available at the market
- Types and characteristics of postprocessing

BUSINESS ASPECT

- Students team will need to identify potential customer segments for services they will develop
- Students team will identify what kind of interfaces, channels they can use to reach their potential customers
- Students team will explore how the cost of their services can be determined and what kind of impact of additive manufacturing can have on business competitiveness

SOCIETAL ASPECT

The case study has several societal aspects which will be explored by the student's team:

- How a self-helping community can be built?
- Are there any steps in the workflow where people with disabilities could be involved?
- What kind of impacts do the lifetime prolongation of devices have?
- How 3DP can enhance the environmental awareness of people?
- How can you improve positive influence of your solution on society as a whole?

THE MULTISERVICE 3D PRINT COMPANY

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM ES2020:04

STUDENTS

JENS SCHIEWERLING *(University of Applied Sciences Leipzig)*
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SUPERVISORS

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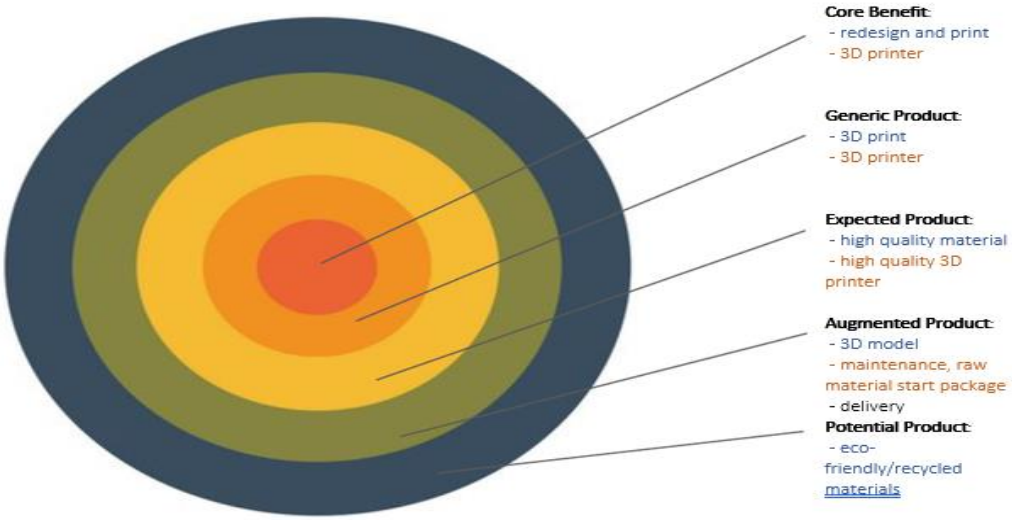
SmartSoc Workhop 2020 Student presentation (Team 4):
https://www.youtube.com/watch?v=oxJJsYZdPrA

SHORT DESCRIPTION OF PRODUCT/SERVICE

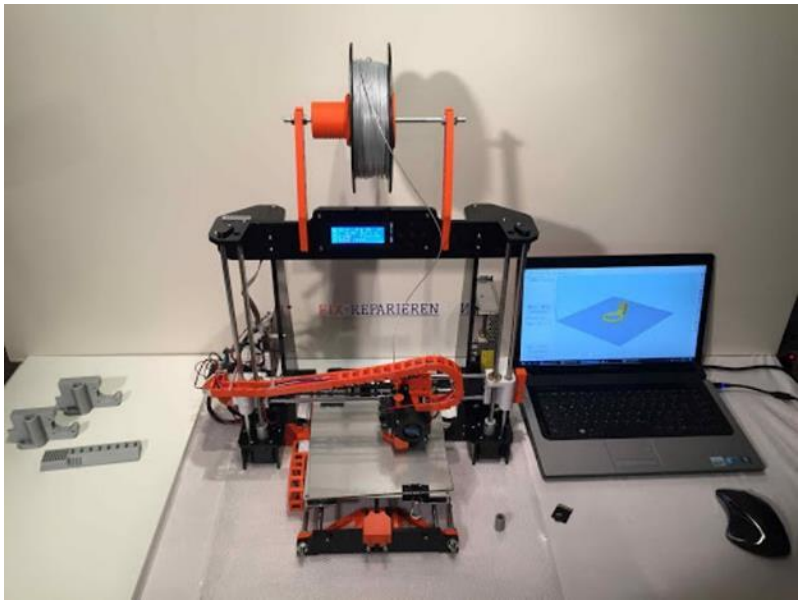
3D printing is still a somewhat new concept, so it is still overpriced and unknown to a lot of people. The goal of this start-up would be to make 3D printing available and affordable to more people.

This start up is also a supplier of 3D-printers because the 3D-printers can be overpriced online, and delivery costs are a big issue. We would also offer 3D-printer maintenance which is a unique selling point.



TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

- 3D printing is a practice of constructing 3D objects from various models. A variety of materials can be used for this, such as polymers, metals and ceramics. Most notable polymers used for 3D printing are ABS plastic, PLA, nylon and so on. We would use PLA which is biodegradable to reduce negative impact on the environment as much as possible.
- Other side of 3D printing is 3D modeling. There are many technologies used for this many of which are being used today for other purposes, not just 3D printing, e.g. CAD models. Having good 3D modelers would be one of the main necessities for this start-up.



BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

Complementary products/services:

- Zortax (3D printer manufacturer): https://zortrax.com/
- 3DFilaPrint (materials): https://shop.3dfilaprint.com/
- Admatec (3D printer manufacturer and materials): https://admateceurope.com/

Competitors (but none of them offer modeling of real objects and printing):

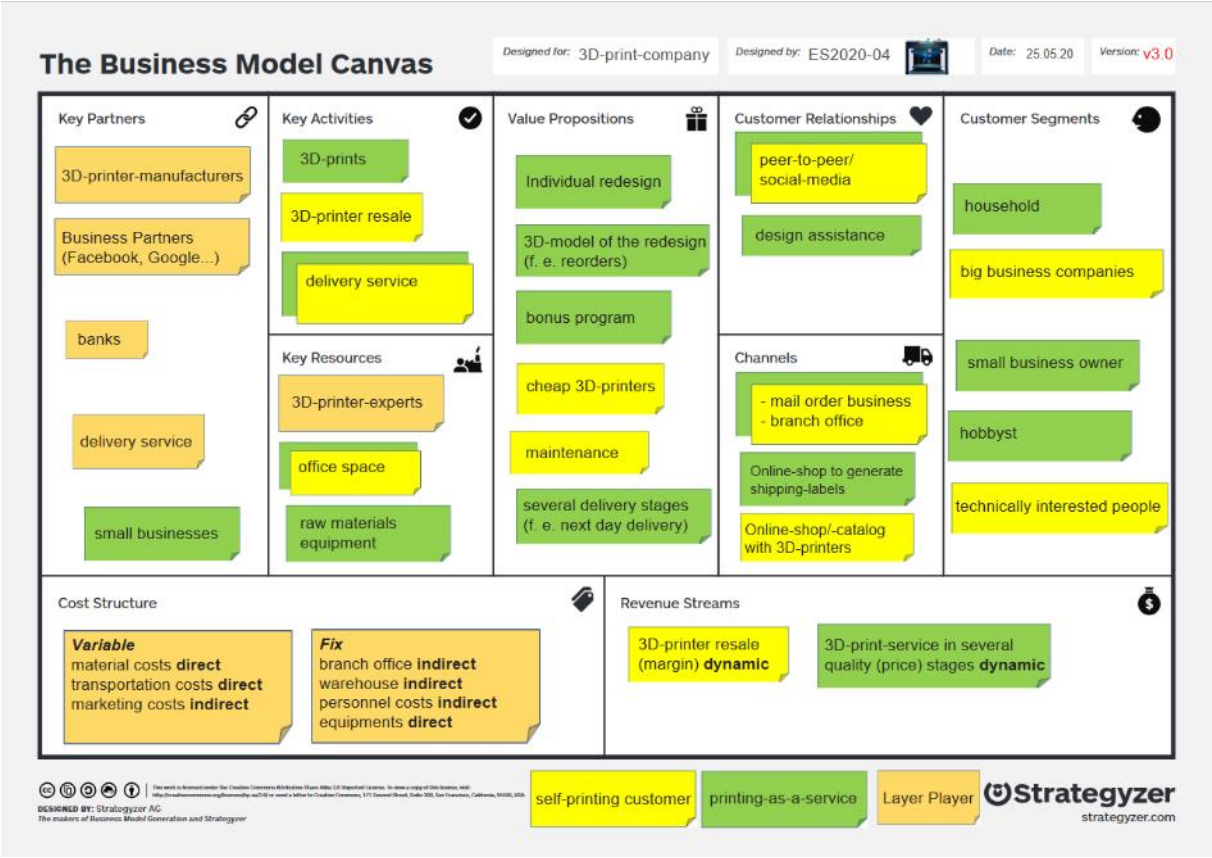
- Conrad: https://conrad.protiq.com/en/
- Sculpteo: https://www.sculpteo.com/en/
- Shapeways: https://www.shapeways.com/
- Craftcloud: https://craftcloud3d.com/

We would differentiate from our competitors by offering them the modelling of their broken parts or anything else and printing of those models. Our service would not be just online, so the customer would be able to come in our office and had an eye-to-eye talk with us where we can discuss all the intricacies of the product. Our business would also offer maintenance for 3D printers.

RISK

RISK	RISK REDUCTION MEASURE
Not selling enough	• Better advertisement • Loyal customer benefits • Change our targeted clients
Competition	• Offering eye-to-eye service

BUSINESS MODEL CANVAS



Detailed Market Analysis, Management & team & resources, Start-up team development, Marketing activities, Responsible budgeting/Financial projections, Main risks, and the measurements for their reduction are described in Business Plan, which is available on SmartSoc Project Moodle.

SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

- The society around this company would benefit greatly because we would offer a cheap and eco-friendly way of replacing any broken parts and making any new parts they would need.
- People would not have to go to a professional who could charge them a lot of money for simple parts, they could come to us and get those parts much quicker and much cheaper.
- All the materials would be eco-friendly so that we reduce the negative environmental impact to a minimum.


2030 AGENDA FOR SUSTAINABLE DEVELOPMENT
CONTRIBUTION OF 3D-PRINTERS
SUSTAINABLE DEVELOPMENT GOALS

COLLABORATIVE MOBILITY

https://www.smartsoc.uniza.sk/ec-2020-05

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HORIZON 2020 CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Climate, Energy, Mobility

SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

TASK TO SOLVE - INNOVATION FOSTERED BY ICT

Mobility in modern cities – introduction of new transport services e.g., electrical solutions such as bikes, scooters, motorcycles, cars.

SMART PROPOSAL

The Case Study will focus on Smart Cities, this subject falls in the framework of the Smart Specialization Strategy of Valencia Region "Quality of Life". This policy includes programs to group the actions in Smart Tourist Destinations, as the city of Valencia is.

SMART SPECIALIZATION STRATEGY TOPIC

This topic follows the regional legal document "RIS3 Strategy Comunidad Valenciana – Final document", where following topics were declared as the perspective areas of specialization in Valencia region economy:

- Tourism and quality of life - No seasonal, health, efficient and quality tourism services.
- Habitat and housing - Innovative products and its environment. Functional products.
- ICT and automotive - Applied advanced manufactured products for ICT for Automotive and Mobility.

DESCRIPTION

Mobility in modern cities is changing very rapidly due to the introduction of new transport services provided by private companies and/or public entities. Most of these services include electrical solutions such as bikes, scooters, motorcycles, and cars that are rented for a short period throughout the day, either daily or just occasionally. On the other hand, citizens are also buying electric vehicles (bikes, scooters, ...) for their own daily transfers, even if they are going to use them for a short period of time. Since electric vehicles are a kind of investment, owners might think about exploiting them in some way. We propose an entrepreneurial case that takes this situation into account and tries to optimize the use of shared and proprietary electric vehicles in the city. Proprietary vehicles might be shared and made profitable through the existing companies or directly between citizens. The proposed solution will also engage the consumers into clean transport, by information of the amount of pollution and energy saving achieved over other traditional (fuel-driven) transport.

TECHNICAL ASPECT

Student team will need to:

- identify and provide more details about specific technologies which can be used within the entrepreneurial case, for example, sensors used in the city to collect traffic information, air pollution.
- identify current systems to inform the citizens about: traffic, air pollution, public transport, infrastructures, other mobility systems.
- describe a collaborative approach that will help to increase citizens' mobility with low polluting impact and low energy impact.
- identify the technical requirements of the resulting system: the input and output information flows of their solution, the developing technologies to be used.
- identify the technological key performance indicators of the proposed solutions in the fields of mobility and energy.

BUSINESS ASPECT

Since the proposed case study focus on a collaborative approach, economic profit is not the main objective. Nevertheless, the case should be treated as a business model. Student team will need to identify:

- potential customer segments for smart products/services they will develop/offer as the result of "solving" the proposed entrepreneurial case.
- the value of their proposition for the potential customers.
- the channels that will be used to arrive to the potential costumers and, consider that the case study is based on a collaborative approach.
- the key resources, key activities and key partnerships required to set up the business model.
- the cost structure and the way to finance it, so that possible sources or revenue streams coming must be investigated.

SOCIETAL ASPECT

Student team will need to:

- provide more details about how the entrepreneurial case is solving mobility problems, climate pollution and green management.
- provide more details about how the case study will impact of quality of life of different sectors of society: youngest, elderly people, reduced mobility people, children, groups in risk of exclusion, etc.
- provide details about how the proposed solution impacts on the related to Smart Specialization Strategy of the region, in particular in Smart Tourist strategy.
- identify the social key performance indicators of the proposed solutions in the fields of mobility and energy.

SaVeRS

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM ES2020:05

STUDENTS

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SmartSoc Workhop 2020 Student presentation (Team 5):
https://www.youtube.com/watch?v=IW5-Q7OId10&t=432s

SHORT DESCRIPTION OF PRODUCT /SERVICE

SaVeRS is a rental service application for shared vehicles. Private owners can share their vehicles for others to use, while the users get the best benefits of private transportation while not needing to purchase your own vehicle. SaVeRS gives an opportunity for those who prefer public transportation, or if it is not an option. SaVeRS will work as a tool between renters and customers and offers information about close by services and sights. It has two modes, Travel and Every day. Travel mode gives out more information and options for the customer, and Everyday mode is designed to be as functional as possible for one's everyday needs. SaVeRS work towards lessening the number of private vehicles, by sharing the ones that already exist and so maximises the usage for one manufactured vehicle. SaVeRS also provides more environmentally friendly vehicle options for one's need.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Technically, our system needs an internet connection. With the help of the Internet, we can rent and track specific vehicles, as well as the administrations of the entire system.

The 5G internet connection is not needed, because the network is under construction in many countries of Europe. The 3G internet connection is enough to record motion and speed data for all vehicles. In the case of cars every vehicle has an OBD connector, which every car owner/renter can put it on our advanced control device.

That is needed to open the doors tracking the vehicles. This "smart box" also has a 5G internet connection because it will be useful in the near future. After a registration in the web or a phone application, the user can select the nearest available cars on the map and then book it for himself. A reservation will be cancelled after 30 minutes if the user has not got in the car. All rentals have one-time and km fee. The user must always park a car fully refuelled or, in the case of electric car, fully charged. So surely everyone pays as much fuel as they used.

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

The customer base for SaVeRS consists of the private renters, so those who will use the application as a middleman to reach their customers, and the people who will use the application to rent a vehicle, both locally and whilst traveling. More detailed target markets, that SaVeRS is hoping to reach are:

- Providers

Well of people in the destinations with vehicles that attract bigger budget customers. People who are willing to share their sportscars, electric cars, motorbikes etc. more "special" vehicles.
Those who would like to rent out their vehicles for everyday use and for smaller budgets. For example, a middle-aged person, who does not have need for one's vehicle during weekend/evenings and would like to get some extra income from that.
People who would rent out different variations of transportation. This target group would be good for especially tourists, as they might be more interested in going sightseeing with bikes or other different solutions.

- Users

People in the destinations that use the application. Those people who don't own their own vehicle and might feel that the public transportations don't provide enough options for their needs, or that it takes too much time. For them it would be good to have the opportunity to rent a vehicle daily or when needed for a short period of time or for a longer period. It's like sharing a car with your neighbour, except one doesn't need to fight over whose is better.
Tourists that come in the cities/areas that use the application. They would not need to prepare transportations themselves, but just rent a simple solution in the destination and maybe try something new as an experience as well. Young people in the destinations. Young people, who might not yet have the funds to get their own vehicle, would get a great opportunity from renting a vehicle when needed, and at the same time getting experience and time to collect money to get a vehicle later that suits them, and possibly would be a bit better quality than their vehicles would have otherwise been. This kind of rental service would bring today's sustainability to the city life. It is understandable that of course using public transportation would be even more beneficial ecologically, but there are always those for who it is not a solution and those who would argue that public transportations is not actually good. So, SaVeRS would be the middle ground for both these groups. When people are being taught to be more environmentally aware and think not only for oneself but for the future, it is best for the people to provide possible tools to work towards that.

COMPETITORS

One of the competitors for SaVeRS is private transportation. This competitor is great in size because it is just as big as the number of private vehicles and users in use. The biggest challenge with them is to get them to join the application and spread the means. Positive thing about private transportation, which is not yet being used for our solutions, is that the vehicles used are often older and not necessarily environmentally friendly, also the vehicles have the tendency to stay unused for longer periods of time, which would drive to owners more towards sharing their vehicles.

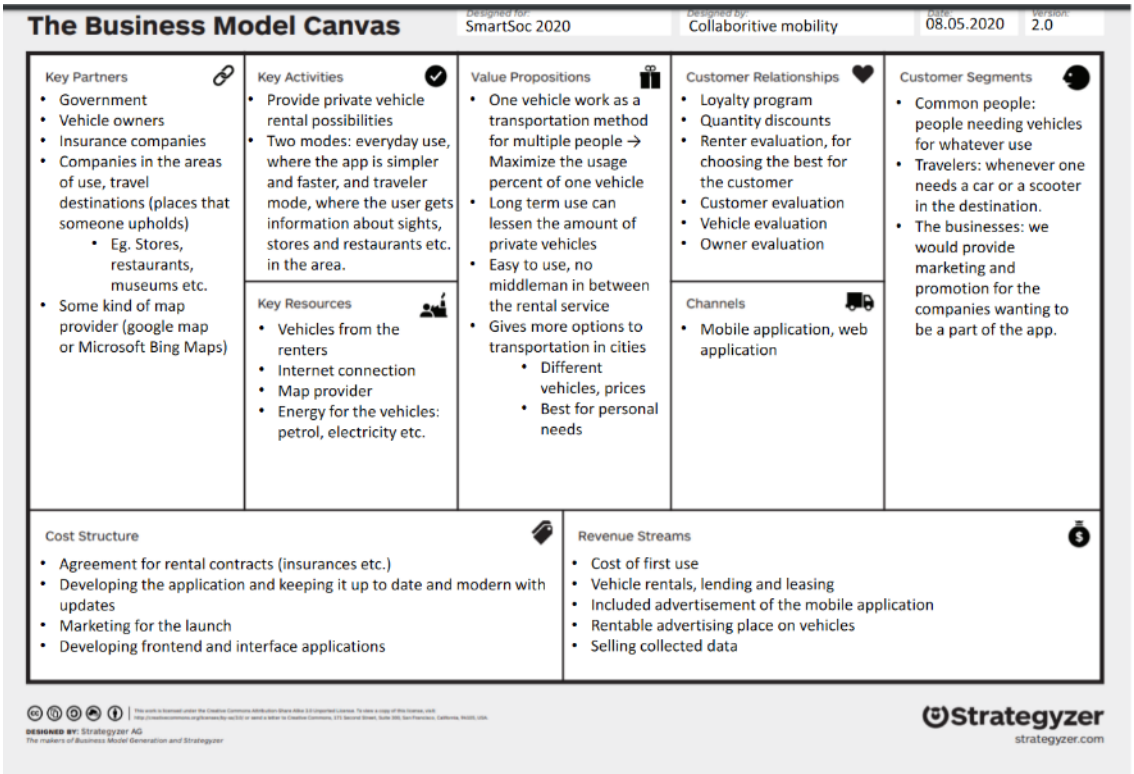
The next competition would be public transportation. Public transportation is said to be more environmentally friendly and greener way of transportation than private vehicles. However, public transportations do not fit everyone's needs and also the vehicles used are not yet the most sustainable. Our rental service would provide the vehicles when needed, so that not needed traffic would be prevented and people would use only as many vehicles. This would maximize the percentage of vehicle use, without the possibility of tens of busses driving through the city with one or no passengers.

Other competition would be similar rental services to SaVeRS such as Turo (https://turo.com/). However, Turo only functions in the US, Canada and UK. Also, what we have more to these other applications is that they are only focused in cars and do not provide other vehicle forms or that other forms are extremely limited. The other rental services also do not seem to be environmentally driven, but clearly try to only get the most profit, which would be profitable for us as we are more customer oriented. Of course, there is also obviously other rental places that provide basically the same services, but they are most often not sharing vehicles from private renters, but renting out their own vehicles, which again would not affect to the environment like we would. Rentals often have a physical place of operations so that they would not reach as many people as we would through an application. Also, customers for them would be just a source of money and they most likely do not have such a great importance in customer relations. One other competition point would be Uber and other smart taxi services and ordinary taxi. There are more and less sustainable options in this category, but what is common to all of them is that the customer is not in charge of the vehicle, but as customer they will always be in the presence of another person, and it might be important to some people to spend a holiday for example with family and use the vehicle as they please. For example, sightseeing would be a bit hard with a driver.

RISK

RISK	*RISK REDUCTION MEASURE*
High rental prices	• Quantity discounts • Loyalty program
Traffic accidents	• Contract with insurers • The cost of first use included insurance
Poorly developed application	• Developed after industry security standards • Additional testing • Constant updates
Lack of customers	• Starting in bigger cities • Expanding the brand • Collaboration partners
Stolen/lost phone or key	• Protect the application by passcode or biometric identifier • Block the account remotely • Block/stop the car remotely

BUSINESS MODEL CANVAS



Detailed Market Analysis, Management & team & resources, Start-up team development, Marketing activities, Responsible budgeting/Financial projections, Main risks, and the measurements for their reduction are described in Business Plan, which is available on SmartSoc Project Moodle.

SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

SaVeRS has multiple ways of impacting environmentally. Most important thing to know is that SaVeRS is planned to have a positive effect long term. Short term it might seem to be just one of the many private transportation possibilities, but in fact it will have a positive effect.

The number of green vehicles. If now a big portion of private vehicles are petrol run automobiles, in the future with the help of our product and peoples interest the amount of green energy run vehicles will grow. People's mindset in today's world is to use and favour sustainable options. With the help of our product, people will not just think of their own personal needs, but in order to get extra money as renters they might want to change their vehicle options to more green options, like electric cars etc.

The motivator of getting more money will also attract renters to share their vehicles with others. Renting their own vehicles will provide them with extra income as well as maximise the usage of a single vehicle. If more and more people use the services and rents a vehicle when needed the number of needed vehicles can go down. That could affect the vehicle industry as the demand for vehicles goes down. And again, the popularity of sustainable options could affect in more of those vehicles being electric, so it would lessen the amount of transport emissions within cities.

Since our idea is not to only rent out automobiles, but we would attach rentals for for example bikes etc. This business would be great in especially holiday destinations and bigger cities, so that people would easily get the opportunity to choose between sustainable and non-sustainable options. The easiness having all opportunities in same place can be affective for more environmentally friendly decisions from the customers, and that way have a positive effect.

INTELLIGENT LED LIGHTS FOR SMART CITY

https://www.smartsoc.uniza.sk/ec-2020-06

AUTHORS

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HORIZON 2020 CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Climate, Energy, Mobility

SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

TASK TO SOLVE - INNOVATION FOSTERED BY ICT

Utilization of simple, cost-effective but already-known LED technology for the purposes of non-traditional information transfer.

SMART PROPOSAL

- An entrepreneurial case should innovate a way of how to transfer information about the climate/energy/mobility change to the users in an interesting, non-invasive, and eye-catching way.
- The system will inform the users about the actual state (e.g., energy consumption of building; air pollution caused by traffic in the streets, etc.) and provide them with the option to improve it (to reduce energy consumption by skipping the afternoon coffee, etc.).

SMART SPECIALIZATION STRATEGY TOPIC

This topic follows the national legal document "Strategy for Smart Specialization of the Slovak Republic (RIS3)" for the years 2014 - 2022, where following topics were declared as the perspective areas of specialization in Slovak economy:

- innovative technologies allowing the data transmission and processing,
- smart technologies (buildings; transportation, etc.),
- energy efficiency and emissions reduction.

DESCRIPTION

The entrepreneurial case is focused on the implementation of special sensory system which will be used as the communication mean for transferring the information about the climate/energy/mobility change in a defined application scenario. The system will inform the users about the actual state (e.g. energy consumption of building; air pollution caused by traffic in the streets, etc.) and provide them with the option to improve it (to reduce energy consumption by skipping the afternoon coffee…).

TECHNICAL ASPECT

- Student teams will need to identify and provide more details about the sensors, which are going to be used in their application scenario (for example the current transformers for measuring the power consumption of particular sockets/rooms in building; CO2, N2O and other sensors for measuring the air pollution, etc.).
- Student teams will need to find and identify the way of how to transfer measured data to some collection point (local server; global cloud, etc.) where other data- processing will be done.
- Student teams will need to implement the user GUI, through which all system setting can be set.
- Student teams will need to choose the propriate LED lights according to the requirements of the application scenario.
- Students should come up with ability to adapt and cope with new technologies.
- Students should have some technical and programming knowledge.
- Students should have good presentation and analytical skills.

BUSINESS ASPECT

Student teams should brainstorm and create a successful business strategy for a start-up to solve the defined problem (energy efficiency, air pollution, etc) and fulfil the idea, that your student team as a business entity needs to offer something that creates new value for the customers. Student teams will first need to identify the application area for their product.

Then the application scenario should be specified, as for example: measuring air pollution/traffic density/… in the city and informing the inhabitants, measuring the power consumption in a building and informing the residents/staff, measuring energy savings during the production process and using this information for advertisement that the factory is becoming eco-friendlier, measuring and advertising the crowdedness of stadium, etc. After such identification, potential customers can be specified. After the clarification of the issues above, other important questions can be solved as mentioned in the "Business Model Canvas".

SOCIETAL ASPECT

Student teams should identify positive or negative impacts of the production and usage of product and answer following questions:

- How to spread information about product's advantages among people?
- How to get feedback about product's impact?
- How can you measure and describe social impacts of your solution?
- How can you improve positive influence of your solution on society as a whole?

SMART LIGHT

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM ES2020:06A

STUDENTS

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SUPERVISORS

MICHAL HODON, EMESE TOKARCIKOVA *(University of Zilina)*

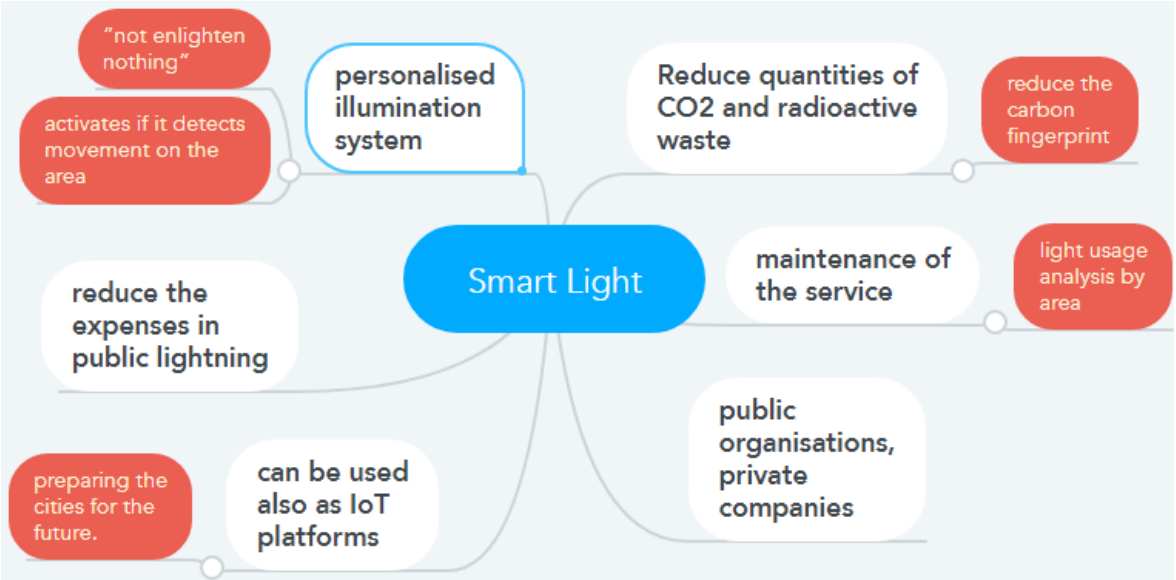
SmartSoc Workhop 2020 Student presentation (Team 6A):
https://www.youtube.com/watch?v=cX1XI1rsPsE

SHORT DESCRIPTION OF PRODUCT /SERVICE

Nowadays, all the cities must spend a significant quantity of money in providing public services to their citizens. One of them is providing public light in the streets. This service might be expensive and sometimes unnecessary due to the lack of people in the streets during some hours of the night. This service also produces essential quantities of CO2 and radioactive waste, which contribute to polluting our environment. Thus, Smart Light Inc. wants to help small cities' governments reduce their expenses in the public light and their carbon fingerprint.

Smart Light Inc. offers a personalized illumination system for those cities. This system is based on "not enlighten nothing" and uses light wisely. We offer an illumination system that only activates if it detects movement in the area (using motion sensors). If the area is quiet, automatically, the lights dim. We offer, apart from installation, maintenance of the service. Also, Smart Light Inc. offers to their customer's analysis of usage of the lights by area, analysing, for example, the most transited areas and when, offering governments some valuable information to organize some aspects, like public security.

Finally, our lamps can also be used as IoT platforms, preparing these cities for the future. All those services can also be offered to private companies and more significant and lower scale, despite our main objective being public organizations. Our products and services are designed for public illumination.



TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Our final product will be sustained into three main bases:

- Dim illumination: A LED system will be installed in the cities, and, according to the movement sensors attached to them, will be able to dim, according to the environment. If there is movement around, meaning there are people, the lights will use the maximum power but, if the environment is quiet, the lights will dim until a minimum level, guaranteeing visibility but reducing the energy consumption. Also, there will be a network that will intercommunicate all the lamps between them, so all the lamps in a region can give the same quantity of enlightenment.
- Data recollection: the level of illumination that every LED bulb is giving will be collected and sent to a database. These data can be used to know which areas are transited and which not during the time those light bulbs are switched on. This data will be first analysed by a software installed in a microchip on every lamp, and then sent to a private server, using a network that will connect all the lamps between them.
- IoT platform: those lamps will be able to deliver internet access by WiFi and Bluetooth to the citizens, using a public network owned by the city. This will be useful for making easier communications between authorities and citizens and prepares the city for the future.

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

WE OFFER: personalized illumination system for modern cities

- Automatic dim system
- Installation and maintenance
- Analysis of usage
- IoT platforms

WHO MIGHT BE INTERESTED:

- Public entities
    - City Hall
    - Autonomic Government
    - Neighbourhood associations
- Private corporations
    - Factories

DIRECT COMPETITORS

- Phillips Lightning
- CityTouch
- Eneltec
- Could work also as a partner
- Schreder
- Industrial environment

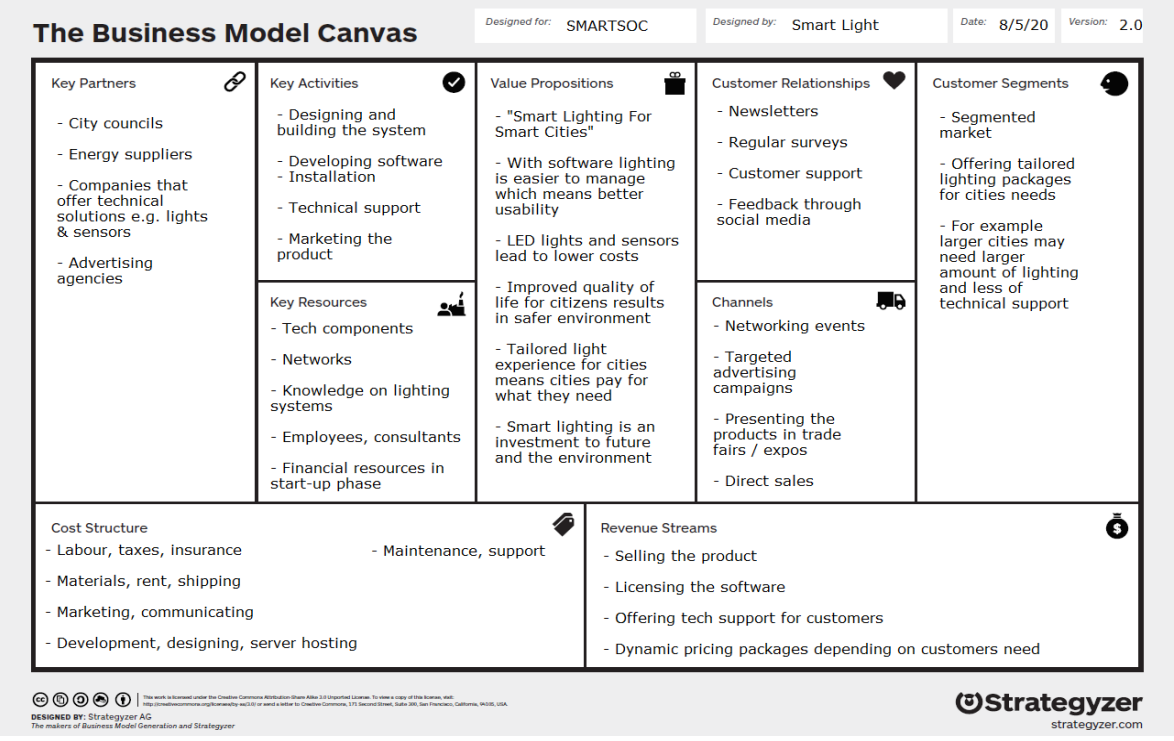
BENEFITS

- Reduction of monetary costs
- Improvement in the environment
- New useful data
- Improvement of a public

RISK

- Not getting enough investment for starting
- Not getting clients
- Bad service
- Bad product

BUSINESS MODEL CANVAS



Detailed Market Analysis, Management & team & resources, Start-up team development, Marketing activities, Responsible budgeting / Financial projections, Main risks, and the measurements for their reduction are described in Business Plan, which is available on SmartSoc Project Moodle.

SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

The main impacts that this product can deliver will be:

- Reduction of the pollution in the area: this service will reduce the quantity of energy needed. This energy is produced in many places by non-renewable sources that pollute the environment region. This will bring the cities a better quality of life, making them environmentally friendly.
- Reduction of light pollution: light pollution might be a problem for sleeping for some people. The expected reduction of this kind of pollution will improve the sleeping habits of the citizens, improving their mental well-being and, consequently, their lifestyles.
- Improvement on resources organization: authorities can get an idea of which zones are more transited during nights, and distribute its resources better, providing a better service to citizens, like more security in unsafe areas, or more helpful staff in other zones. Also, citizens do not feel reduced their safety awareness. Also, the design will be done so the devices used in our system will not increase the probabilities of being destroyed by someone compared to a traditional streetlamp.
- Adaptability in new technologies: the IoT platform and network deployments will make the city able to face the future with all the needed resources, giving early a service that will be important for citizens.

LEDssons

SOLUTION OF THE ENTERPRENEURIAL CASE – TEAM ES2020:06B

STUDENTS

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ANA KUTNJAK *(University of Zagreb)*
OLLI-PEKKA PALOMAKI *(Seinajoki University of Applied Sciences)*

SUPERVISORS

MICHAL HODON, Michal VARMUS *(University of Zilina)*

SmartSoc Workhop 2020 Student presentation (Team 6A):
https://www.youtube.com/watch?v=1li_RhEyL8g

SHORT DESCRIPTION OF PRODUCT /SERVICE

Our idea is system that will allow automatic counting of people who can be in some business subject (store, pharmacy, post office, transport service providers, etc) at the same time.

- Accordingly, the main users of the system will be business subjects which works with end users
- The whole system works as follows: sensors are please at the entrances to the business subjects for measuring and limiting the number of end users in their premises (each business subject, depending on its domain and scope of business, defines the permitted number of simultaneous stay of customers)
- The sensors communicate with the LEDs using the controllers, and due to the restrictions send colour signalling – if there are fewer people in the premises than allowed, the LED will light up in green, allowing end user entrance.
- On the contrary, if the maximum number of people allowed is in the premises, the LED light will turn red.
- In addition, the system connects to the application, so that customers become aware of the queues and schedule their departure to the business subjects.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Automated systems allow us to fight the coronavirus. The aim of this project is to design and implement an automated monitor system of the behaviour of a group of people inside a closed zone using a low-cost Wi-Fi communication system-based Arduino microcontroller. An alarm is activated when the limit number of people is exceeded. Our technology consists of an Arduino mega integrated with ESP8266 Wi- Fi module to register the readings from the infrared sensors on a SD memory card and to actuate the buzzer alarms and red/green LEDs. Further, the design of this monitoring system is based on a cloud- computing platform to ensure the optimal behaviour inside closed zones in a real-time. The cost of this circuit could be maintained below 300€.

An infrared proximity switch such as the one we are using in this circuit has great application for real life. The sensor can function to detect human beings. Being that the only moving objects in a building are humans, for the most part, the sensor circuit can be used to detect human intruders for a given area. And then once the sensor detects a person, the circuit can be made to do anything such as sound an alarm, flash sirens, have a buzzer alarm go off, have a camera begin recording, etc. The sensor can also be made to pick up anything else that moves such as animals or any moving objects that may come into its path. So, the application in real life circuits is immense from this simple infrared proximity switch. The IR sensor needs power, so this is why the red wire gets connected to the 5V terminal and the green wire gets connected to the GND terminal. And the signal gets connected to digital pin 2. The digital pin can read this signal pin to determine whether it is HIGH (no object detected) or LOW (object detected). The Simplest Is the active Buzzer based Arduino. The buzzer alarm is connected with 2 female-female jumper wires to D2 and GND on the Arduino board.

The ESP8266 Wi-Fi module is a complete Wi--Fi network where you can easily connect as a serving Wi- Fi adapter, wireless internet access interface to any microcontroller-based design on its simple connectivity through Serial Communication or UART interface.

The Wi-Fi module is connected as follow: connect both ESP's VCC/3.3V/Power Pin and Enable Pin (red wires) to 10K resistor then to Uno's +3.3V power pin. Connect ESP's Ground/GND Pin (black wire) to Uno's Ground/GND Pin. Connect ESP's TX (green wire) to Uno's Pin 3 connect ESP's RX (blue wire) to 1K resistor then to Uno's Pin 2. Connect ESP's RX (blue wire) to 1K resistor then to Uno's GND Pin.

The Arduino Mega 2560 has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega is compatible with most shields designed for the Arduino Duemilanove or Diecimila. And it costs about 10€.

From this outlook, this project will help all sectors to control the behavior inside their closed zone using a low-cost automated system based Wi-Fi communication and iCloud platform.

For the long-term use of our service, we also want to provide an application service that would communicate statistical and real-time data to customers and visitors. Application development also requires a professional. Based on the perceived data, we would perform a statistical analysis modeling the attendance of each unit. Based on this, customers could plan when to expect less queuing and waiting. In addition, the app would also provide real-time data to customers about exactly how many people are in that location. These would be displayed by the application per business unit, which users could select from a well-structured list. The cost of developing this application is about 250 euros and the cost of maintaining the system is negligible.

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

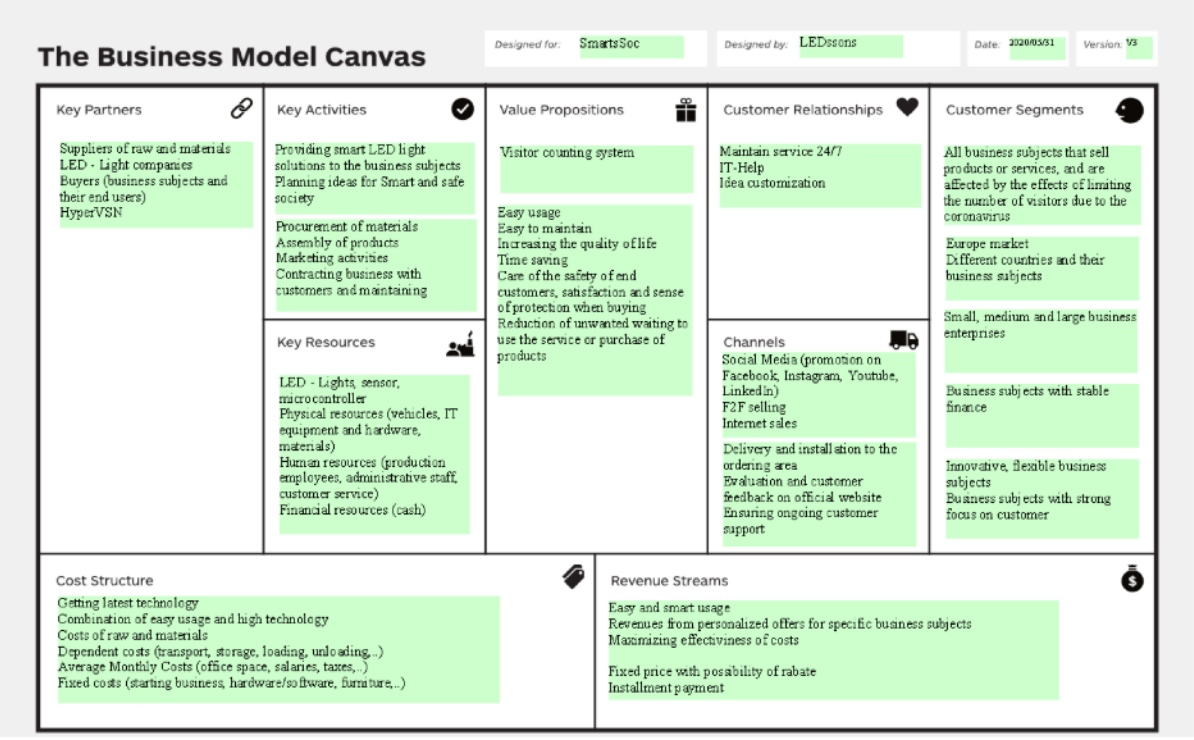
Below are embed snapshots (at different level of idea development, from version 1 to version 3) of Business Model Canvas for the product and service (application) proposed as the "solution" of the Entrepreneurial Case challenge - Visitor counting system.

The initial idea of the project solution was to supply rural and urban areas with intelligent LED lighting. Given the complexity and demanding solutions of the mentioned project, the initial idea was changed. In addition, project team LEDssons recognized the situation with the corona virus and the limitations of public gatherings as a current problem, and accordingly approached the creation of a solution that would meet the mentioned needs.

The second version of Business Model Canvas was created after a discussion of team members about all business segments - delivered value, customers, communication channels, possible costs and sources of revenue, key activities and partners that need to be included in the product/service creation process.

A deeper acquaintance with the topic, marketing analysis, perception of the market and market needs, led to the creation of Business Model Canvas version 3. The mentioned version is considered as a final value what LEDssons can offer to the customers.

BUSINESS MODEL CANVAS



Detailed Market Analysis, Management & team & resources, Start-up team development, Marketing activities, Responsible budgeting/Financial projections, Main risks, and the measurements for their reduction are described in Business Plan, which is available on SmartSoc Project Moodle.

SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

The aim of project is to help society. Our service is designed to support stores in complying with corona virus health safety standards. So many measures have been taken to curb the coronavirus pandemic, including restrictions on the number of shoppers staying in stores at the same time. Adherence to the restriction serves the health safety of all of us, so we have developed our service to help with this. It is important to minimize personal contacts, so it is especially useful during this period to involve different machines in everyday life instead of human workers.

Using our system, the customers don't have to worry about having dangerously amount of people in the store, and they don't even have to be counting if they are allowed enter or if they have to wait. The system clearly communicates to customers whether or not they are allowed to enter the store. The service can be used in smaller pharmacies, where only a few can stay at a time, and in larger grocery stores. Counting for customers in this way also reassures the business owner that he or she is complying with the restriction and does not commit any violations or expose his or her employees to a high risk of becoming infected with the virus. Our service thus provides protection from both the fair and the workers by reducing the risk of being infected with the coronavirus.

Once the virus has subsided, our service will become widely applicable in everyday life. Our system provides information on the number of participants during various events. For smaller events, participants are usually counted by people who keep records of the number of guests entering and leaving for up to eight hours at the entrance gate. This work is monotonous and the possibility of inaccuracy can be very high. The problem can be exacerbated by having multiple entry and exit points. In this case, we certainly do not know real-time information about the number of people inside. However, using our system provides a perfect solution for this. In case of emergency, this can be a crucial safety factor.

Our service can be widely used outside of events. Think of a post office that installs our system and gives public access to the data we provide. This could fundamentally change everyday life: based on the statistics we provide, people can choose the period when they are expected to be less customer in the post office and avoid peak times. The same can be applied to any administrative area, shops, stores, restaurants, tourist attractions, virtually any area where queuing can take place. By avoiding waiting, we save customers time and increase customer satisfaction. The publication of real-time and statistical data in the user gives the feeling that the service provider cares about the user and strives to best meet the needs of its customers, in such detail as to minimize consumer waiting. In addition, the service provider also benefits from customer satisfaction as it can increase consumer loyalty, etc. Furthermore, the statistics also reflect the performance of the company and can serve as a basis for further corporate decisions.

The system we offer therefore primarily saves time for the customers, increases customer satisfaction, which also creates value for the service provider. This is how we want to support the well-being of society.

HOME ALONE AND SAFE RELIEVING THE PRESSURE ON HEALTHCARE SYSTEMS

https://www.smartsoc.uniza.sk/ec-2020-07

AUTHORS

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HORIZON 2020 CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Climate, Energy, Mobility

SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

TASK TO SOLVE – INNOVATION FOSTERED BY ICT

Fast aging has a significant impact on healthcare. The burden of the aging population must be alleviated.

SMART PROPOSAL

- Design automatic health monitoring systems that increase the safety of people who live alone and allow older patients to be self-reliant.
- These systems are also known as Ambient Assisted Living systems (AAL).

SMART SPECIALIZATION STRATEGY TOPIC

The field of ICT innovation based on the Smart Specialization Strategy of Croatia is Health and quality of life. The sub-thematic priority area is health services and new methods of preventive medicine and diagnostics.

DESCRIPTION

The field of ICT innovation based on the Smart Specialization Strategy of Croatia is Health and quality of life. The sub-thematic priority area is health services and new methods of preventive medicine and diagnostics.

TECHNICAL ASPECT

- Student teams will need to identify and provide more details about specific technologies which can be used within the entrepreneurial case, for example, wearable and fixed sensors that are used in the development of the system
- Student teams will need to explore existing systems and their pros and cons to develop a better system.
- Students will need to develop a system which will be secure without failure because a life may depend on it
- Student teams will need to investigate healthcare systems and possible collaboration with them to react quick if something happens to the watched person.
- Student teams will need to ensure the security of the data acquired from sensors.
- Student teams will need to investigate further benefits from these systems, e.g. used for early detection of Mild Cognitive Impairment (MCI) and frailty conditions through the analysis of changes in the daily routine of the watched person.

BUSINESS ASPECT

- Student teams will need to identify their customers, whether they will go directly to the users in their homes or make an offer through their insurance company or healthcare system.
- Student teams will need to discuss and decide which customer model will be the best in terms of the future of the developed solution.
- Student teams will need to explore privacy agreements in light of obtaining data from sensors and keeping it secure and private.

SOCIETAL ASPECT

- Student teams will need to provide more details about how the entrepreneurial case is solving the pressure on healthcare systems.
- Student teams will need to identify the users' needs and their boundaries, for example, users not willing to allow usage of cameras within their homes.
- Student teams will need to provide more details about the acceptance of these systems with the target group.
- Student teams will need to investigate how this system is improving quality of life of target groups.

SmartHome

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM ES2020:07

STUDENTS

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ION IOVA *(University of Oradea)*
FRANCISCA GOMES *(Seinajoki University of Applied Sciences)*

SUPERVISORS

KATARINA MANDARIC, JURICA BABIC *(University of Zagreb)*

SHORT DESCRIPTION OF PRODUCT /SERVICE

SmartHome is a software program and supervisor founded in Europe to help our older generation, people who are disabled, sick, or live alone for some reason. Our idea is divided in 2 parts:

1. Provides check-ups and medical help for people. For the elderly people we have the supervisor system which means, there will be a router installed at their home where they can click green either they are good yellow if something is changing, and we should be aware and visit or call them and red if it is an emergency. For the user who can use technology this interaction app will be our main point to reach them. They will have psychology, physical, and social guidance through the process. They can join chats to talk with other people in the same situation and share their experiences and also connect with healthcare professionals to get advice.

2.We have a product which is similar to a fitness bracelet, a watch which has sensor for blood pressure and heart rate (bpm). This watch is directly connected to our app on the smartphone and when the pulse or blood pressure increases or drops by a certain value given by the doctor, this app will connect automatically to the emergencies or a relative. This product will help elderly people with medical problems who lives alone and do not want to go to a nursing home and don't have a family to take care of them. High blood pressure in seniors often accompanies additional medical issues that also need to be monitored regularly. There are a variety of age-related health conditions that can make it more challenging for seniors to live independently.

Our app is designed and created to be like a registered nurse, remembering people to take medication easier and in time, at a predefined hour. An additional part of the app is a section which has some kind o games to play. An example is the popular Scrabble game which is an ideal way to maintain their cognitive health. The screen displays the board and provides a list of letters, which are used to form words. The game keeps track of scores and provides new letters as needed. Older adults can play alone, with friends or loved ones, or as members of competitive teams. This amazing app can stimulate cognition, boost mood, and enhance safety for seniors, and so can having a compassionate trained caregiver close by. Seniors can face a variety of challenges as they age, many of which can be mitigated with the help of professional in-home caregivers who provide high-quality home care.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Nowadays, IoT (Internet of Things) is widespread and popular. Smart Homes are still in the focus of new research and big companies like Google or Amazon introduced their own first solutions for devices to connect everything in a common network and control them from one point based on the habitants 'needs. For a virtual assistant, as a service we need hardware to embody this service and software to make it smart and useful. On the hardware side there is the solution of wearable sensors like smartwatches. Studies from previous years4already provide us with a good starting point.

There is a big gap between the knowledge of the IT area between the young generation and older people, aged over 65. We do not want to offer them a small, hardly operable device mentioned above. Another type of sensor is fixed sensors. They can measure pressure, temperature, and many other things. But probably they don't provide a sense of attention because of their unnoticeable. Sensors can be well integrated into a system, which sends data to a virtual assistant. This assistant can be the soul of the smart home, as it can answer for the person's many questions, creating a feeling, that they are paying attention to the owner of the home. All data collected from sensors can use to study more and more about the habitant's state and his/her needs. Today artificial intelligence is a popular topic in technology like IoT. Combine these two areas healthcare can gain a lot. However, in machine learning there is still a question about how the machine will choose. They can answer some questions, like choose a picture of a dog from pictures to depict dogs and cats, but in healthcare the risk rises than that. So, we cannot let a computer make decisions all alone in some serious cases, but it is a great tool to get a decision support system. This path leads to close collaboration with healthcare workers.

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

Who might be interested?

Our target market includes groups of elderly people. Later scaling could help for people recovering from surgery or procedures. Young children/ adolescents (with mental, physical, or social problems) or people under house arrested.

All these groups have something in common: the limited access to the outside. This limited access can turn out to be a problem for the people, they can develop social anxiety, lack of integration, loneliness, the feel of dangerous and so many other physical, mental, and social problems.

Why purchases our service?

Our service offers a solution to most of these problems: we give safety, guidance, supervision, and more a place where you can also interact with other people. For the elderly group we give mainly security and supervision since the use of the software will be mainly for the other 3 groups. We cover these aspects by monitoring our costumers', doing constantly check-ups on the software (easy router for the ones who are not able to work with technologies), a personalized service: the check-ups change according to the people's issues, a 24/7 service where our professional is always ready to answer to the needs of our costumers'. All these features can be discussed when signing the subscription with SmartHome. And we have partnerships with hospitals and insurance companies, to ensure we can cover our promises.

COMPETITORS

COMPETITORS		OUR SERVICE
Uses words from day to day lives.	QUALITY OF SERVICE	**Specified to healthcare to understand questions from this area.**
Mainly mechanical voice.		**Emotionally improved to adapt the health situation.**
Cannot observe changes in the client's voice.		**Examine loudness of voice, pitch, and rate.**
Have a monopoly position in terms of financial and expertise capabilities.	RESOURCES	Build on a strong alliance with healthcare actors and government.

RISK

RISK	*RISK REDUCTION MEASURE*
Interest in the product is not as high as expected	• Invest in PR and brand improvement strategies
Quality problems appears in our product	• Find the best possible suppliers as partners. • Choose highly skilled employees to create an inspired team.
An incoming public complaint from the customer (social media etc.)	• Invest in PR and brand improvement strategies • Create customer service to handle customer feedbacks
An employee gives sensitive information from the company to competitors	• Hire high educated expert in law or a lawyer team. • Creating and signing a privacy statement.
A natural disaster has damaged our databases with an important and sensitive collection of data	• Design cloud-based storage. • Continuous backup, recovery plan development.
Someone from the management team left the project	• Involve an external business expert who can be a useful member of the team based on previous collaborations.
Changes in personal rights laws make the latter operation impossible	• Hire high educated expert in law or a lawyer team. • Build strong relationship with government actors.
Developing our software takes much more time than expected	• To inform those interested. • Find solutions to maintain attention. • Increase human resources (if this is the reason for the delay).

BUSINESS MODEL CANVAS

Economic Business model Canvas

Partners	Activities	Value Proposition	Customer Relationship	Customer Segments
Internet suppliers Hospitals, Smartwatch manufacturers, Government	Marketing, Software development, Health improvement and illness prevention campaign **Resources** Brand, Software updates	Virtual assistance and monitoring health state	Membership club, Personal assistance **Channels** Website, Call center	Elderly people: In our first years, we would like to focus mainly on this group. Later we plan to scale up our business involved others who are living alone for some reason.

Costs	Revenues
Buy smartwatches and devices from Partners, Marketing, Employees monthly salary	Sell smartwatches and devices scaled with assistant software, Tenders, government subsidies

Detailed Market Analysis, Management & team & resources, Start-up team development, Marketing activities, Responsible budgeting / Financial projections, Main risks, and the measurements for their reduction are described in Business Plan, which is available on SmartSoc Project Moodle.

SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Founding and functioning of the start-up on a society: In a social impact our solution needs to be prepared to a proactive side, where we support people to stay well if they can. The example of the current pandemic is also a good illustration that certain preventive steps (please wash your hands!) are a bit of relief for healthcare. We plan to teach a virtual assistant in some preventive knowledge.

Impacts: -Another case where family members must take care of their ill or older relatives. In these years people could find it difficult to stand in both a family and a workplace. The pressure of this duality is often found in the background of mental fatigue and harmful passions (cigarettes, alcohol). Avoid these factors, it creates a more sustainable society in our plan.
The experience of being alone is also a big problem in nowadays societies. Feel alone or to be not heard could lead to ruin in mental health. Without a company, the mind also degrades. Give a new perspective for all these people, they can feel still the part of society, despite they must not leave their home in some way.

Some bad impact is still the people's distrust about the IT area. One main challenge is data security because the data we collect throughout our homes can be very personal for many of us. We want to improve our knowledge in this area too because we find that invest in a healthcare assistant system only works well when a customer has significantly faith in us.

Environmental Life Cycle Business model Canvas

Supplies and Out-sourcing	Production	Functional Value	End-of-Life	Use Phase
Hardware production, Energy for charging the devices, Energy for operating the wireless network system	Software as digital value **Materials** Lithium (battery), glass, flexible polymer, like polydimethylsiloxane for sensors wearing on skin. As a biocompatible material, it has human skin compatibility, plastic.	Device controlled by voice commands, A etwork of smart devices like a smartwatch with monitoring functionality. => Smart Home, health people	Plastic waste, battery **Distribution** Plastic packaging of the product, Transport product from us to customer's home	Charging up devices, Infrastructure to support the network system

Environmental Impacts	Environmental Benefits
Plastic waste and other hardware elements.	As the need for personal contact with healthcare actors decreases, customer travel rare and emissions lower CO_2.

Social stakeholder Business model Canvas

Local Communities	Governance	Social Value	Social Culture	End-User
Contacts and deals with suppliers. Invite health care actors and take part in their conferences and other events.	Transparency in decision-make Take consultations with healthcare actors as advisors. **Employees** Support software-developers from any gender beside it is still a male-leaded area. Employees are part of our healthcare program.	Improve the quality of the customer's life with the most actual map of their health as possible. Relieving pressure on healthcare systems.	Feel the individualism and independence from the institution of hospitals. Society becomes more and more self-sufficient. **Scale of Outreach** With our website and personal assistant service, we would like to evoke a sense of constant care and belonging.	Higher expected age, Maintaining longer-term independence, Better knowledge of personal needs and health state.

Social Impacts	Social Benefits
Lost of personal space with a fully monitored home.	Relieves pressure makes happier hospital workers and more time to take care of their serious patients, but their family members also. With the knowledge of prevention society becomes healthier.

ENTREPRENEURIAL CASE STUDIES 2021

In the second year of the SmartSoc project, the Steering Committee had approved nine Entrepreneurial Case Studies (EC) within SmarSoc Blended Mobility 2021. According to the blended mobility's timeline, nine international students' teams (each team with 3-5 students) were assigned to deal with the business plan and activities related to the EC's tasks.

Table 4. SmartSoc 2021 Entrepreneurial case overview

EC2021	Entrepreneurial Case Study Title	AUTHOR´S Home Institute
01	Smart Museums	Technical University of Valencia, Spain
02	A self-driving tractor is changing the future of food business	Seinajoki University of Applied Sciences, Finland
03	Safe, effective and sustainable COVID-19 protection operations in congested areas	IMT Atlantique Bretagne Pays de la Loire, France
04	Smart recycling in the latest technologies too	University of Debrecen, Hungary
05	Health on the Move	University of Zagreb, Croatia
06	5G Open Radio Access Networks in event management	Szechenyi Istvan University, Hungary
07	Smart Package Solutions (Towards Sustainable Society)	University of Jyvaskyla, Finland
08	Creation of identification methods and tools to distinguish between original or counterfeit products	European institute for Labour and Industrial Relations, Alsbach, Germany
09	Cyber security	Technical University of Sofia, Bulgaria

The selected entrepreneurial case studies 2021 for SmartSoc Blended Mobility 2021 were linked to five specific calls/topics of Horizon 2020. Focus areas have been chosen to strengthen students´ critical thinking and ability to find innovative business and technical solutions with joint efforts in a relevant context for every stakeholder.

Table 5. Mapping of SmartSoc Entrepreneurial cases 2021 to Horizon 2020 (Societal challenges)

Horizon Europe global Challenges (Pillar 2)	SmartSoc Entrepreneurial case 2021
Culture, Creativity, and Inclusive Society	Smart Museums
Food, Bioeconomy, Natural Resources, Agriculture and Environment	A self-driving tractor is changing the future of food business
	Smart recycling in latest technologies too
	Smart Package Solutions (Towards Sustainable Society)
Civil Security for Society	Safe, effective, and sustainable COVID-19 protection operations in congested areas
	5G Open Radio Access Networks in event management

Horizon Europe global Challenges (Pillar 2)	SmartSoc Entrepreneurial case 2021
Civil Security for Society	Cyber security
Climate, Energy and Mobility	Health on the Move
Digital, Industry and Space	Creation of identification methods and tools to distinguish between original or counterfeit products

A social and environmental balance is a crucial priority for all countries and universities in our consortium. SmartSoc entrepreneurial case studies 2021, therefore, belong to ten of seventeen SDG's goals (UN AGENDA 2030) (Table 6). These predefined goals guided students to think about how to create a business plan not focusing only on profitability but also on communities, employees, business surroundings, and environmental protection. Besides achieving economic prosperity, environmental quality and sustainable circulation are essential based on rigorous protection of environmental compartments and using as few non-renewable natural resources and hazardous substances as possible. Furthermore, understanding that unlimited needs of people can be fulfilled just with limited sources and these sources should be accessible also for a future generation had given the students a chance to think about various sustainable aspects of their business suggestions.

Table 6. Mapping of SmartSoc Entrepreneurial cases 2021 to 2030 Agenda for Sustainable Development

SDG´s GOALS	Entrepreneurial Case Study 2021
2. Zero Hunger	A self-driving tractor is changing the future of food business
3. Good and Well - being	A self-driving tractor is changing the future of food business
	Safe, effective and sustainable COVID-19 protection operations in congested areas
	5G Open Radio Access Networks in event management
	Cyber security
4.Quality Education	Smart Museums
5. Gender Equality	5G Open Radio Access Networks in event management
8. Decent Work and Economic Growth	A self-driving tractor is changing the future of food business

SDG´s GOALS	Entrepreneurial Case Study 2021
9. Industry, Innovation and Infrastructure	A self-driving tractor is changing the future of food business
	Smart recycling in latest technologies too
	Smart Package Solutions (Towards Sustainable Society)
	Creation of identification methods and tools to distinguish between original or counterfeit products
	Cyber security
11. Sustainable Cities and Communities	Smart recycling in latest technologies too
	Health on the Move
	5G Open Radio Access Networks in event management
	Smart Package Solutions (Towards Sustainable Society)
12. Responsible Consumption and Production	A self-driving tractor is changing the future of food business
	Safe, effective and sustainable COVID-19 protection operations in congested areas
	Smart recycling in latest technologies too
	Smart Package Solutions (Towards Sustainable Society)
13. Climate Action	Smart Package Solutions (Towards Sustainable Society)
	Intelligent led lights for smart city
16. Peace and Justice Strong Institution	Cyber security
17. Partnerships to Achieve the Goal	Smart Package Solutions (Towards Sustainable Society)

SMARTMUSEUMS

https://www.smartsoc.uniza.sk/cases

AUTHORS

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Gemma Pinero Sipan
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HORIZON EUROPE CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Culture, Creativity and Inclusive Society

SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

TASK TO SOLVE – INNOVATION FOSTERED BY ICT

The entrepreneurial case aims to develop smart interactive multimedia content to enhance the real visit to the museum and provide online multimedia content to ease online visits to the museum for those that do not want or cannot visit it.

SMART PROPOSAL

The entrepreneurial case focuses on implementation of smart technologies in museums.

SMART SPECIALIZATION STRATEGY TOPIC

The Case Study focuses on Smart Cities, this subject falls in the framework of the Smart Specialization Strategy of Valencia Region “Quality of Life”. This policy includes programmes to group the actions in Smart Tourist Destinations, as the city of Valencia is.

DESCRIPTION

The way that the new generations is approaching cultural contents has changed dramatically. The audio-visual language has substituted traditional media as books, newspapers, magazines, written reviews or descriptions... Moreover, the easiness for accessing all kind of information on the Internet has provoked a curious paradox: what it is not in the Internet does not exist for the vast majority of the population. The breakdown of COVID19 pandemic has shown very clearly that the online access to contents and information is no longer an additional item for a cultural institution, but a must. Now museums face an important challenge to survive as cultural referents in this new paradigm: the introduction of new audio-visual languages in their exhibitions and the provision of attractive online contents.

TECHNICAL ASPECT

Student team will need to:

- identify and provide more details about specific technologies which can be used within the entrepreneurial case.
- identify current applications or systems used in museums to provide interactive enhanced experiences during the visits and online content and virtual visits.
- escribe a new application that can be used to enhance the experience of real and online visitors.
- identify the technical requirements of the resulting application: the input and output information flows of their solution, the developing technologies to be used, the limitations and drawbacks.
- identify the technological key performance indicators of the proposed solutions in the fields of cultural and tourist contents.

BUSINESS ASPECT

Since the proposed case study focus in a museum, economic profit is not the main objective. Nevertheless, the case should be treated as a business model considering the same issues but without strengthen in the financial revenue.

Student team will need to:

- identify potential customer segments for smart products/services they will develop/offer.
- identify the value of their proposition for the potential customers.
- identify the channels that will be used to arrive to the potential customers and, consider that the case study is based on a collaborative approach.
- to identify the key resources, key activities and key partnerships required to set up the business model.

Finally, although financial revenue is not a primary objective, the student team should identify the cost structure and the way to finance it, so that possible sources or revenue streams coming must be investigated.

SOCIETAL ASPECT

Student team will need to:

- provide more details about how the entrepreneurial case is solving mobility problems, climate pollution and green management. •
- provide more details about how the case study will impact of quality of life of different sectors of society.
- provide details about how the proposed solution impacts on the related to Smart Tourist strategy.
- identify the social key performance indicators of the proposed solutions in the fields of culture, creativity, and inclusive society.

VISEUM

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM EC2021:01

STUDENTS

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SUPERVISORS

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EVA MALICHOVA *(University of Zilina)*

SmartSoc Workhop 2021 Student presentation (Team 1):
https://youtu.be/uN3LwFBV3Wo

SHORT DESCRIPTION OF PRODUCT /SERVICE

ViseuM offers application using virtual reality which allows the visitors to admire the exhibitions anywhere and anytime. Visitors can through the application access to related museums. The product can be used as a substitute to real visit in the exceptional period, e.g., Covid-19, maintenance of some exhibition rooms, etc.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

ViseuM will be a mobile-based app with relatively low hardware requirements. The main required technological features are the following:

- Intuitive, UX-friendly interface
- Browsing and navigating between 3D photos (cheap and efficient representation of the museums)
- AR (augmented reality) support for additional interactivity / visual stimulation with ARCore (https://developers.google.com/ar)
- User management system (login, registration, preferably via Google/Facebook accounts)
- Online payment integrations for buying virtual museum tickets
- Billing system for the tickets bought via the app
- User ratings
- Playing audio for virtual museum guidance / auditory stimulation
- Playing video for virtual video guidance / audio-visual stimulation
- QR code generation (so real-life visitors can access the AR content in the museum as well)
- Databases:
    - Storing information, data about specific museums
    - Storing information about the connections between museums and art pieces (e.g. connections between all transportation-themed museums)
    - Storing users' information (registered users, payments, bills, etc.)

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

To provide these features, the following expertise and positions are crucial for the IT/engineering team:

- Software Developers / Engineers: for cross-platform availability (iOS and Android as well) and AR support, the combination of Unity + ARCore is a great choice. For this, the team needs experienced C# / Unity developers.
- Web Developers: for the online user management / payment system
- Database Engineers: experienced using SQL or NoSQL databases (e.g. MySQL)
- Software Testers: experience in testing mobile applications and/or user interfaces
- UX Designer: experience in designing user-friendly mobile user interfaces
- 3D Artist: to create the 3D models for the AR experience (Blender)
- IT Project Manager: to make sure that the IT / Engineering team can co-operate and work together

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

CUSTOMER SEGMENTS

	Description of Customer Segment
Students/ young adults	ages 20-28; city & village; knowledge of English; eager to learn; low-med income; shopping behaviour is based on price, accessibility and entertainment; male and female
Adults/ enthusiasts	ages 30-55; city & village; shopping behaviour is based on free time, price, accessibility and entertainment/interest; male and female; laid-back lifestyle (for online experience) or travel-oriented for VR enhanced museums
Older people	ages 55-70; city & village; shopping behaviour based on physical factors, price and accessibility – will base on online visits; knowledge of English; give greater value for museums/galleries
Kids/ primary & elemental school	impulsive; active; knowledge of English and basic skills of using a mobile phone and/or PC/laptop; interests in fun/games - VR will be interesting to them; more emphasis on the fun/ adventure aspect rather than to learn/ study whilst exploring, technical school with interactive learning; tech schools, art schools, modern schools

PERSONA

Jane Student

"I need an affordable and more relaxing way to visit various museums, galleries and exhibits - that which suits my time and college life."

Age: 23
Occupation: Student
Location: New York, NY
Status: Single

Personality

Introvert — Extrovert
Thinking — Feeling
Sensing — Intuition
Judging — Perceiving

Clever | Ambitious | Focused | Enthusiastic | Versatile | Self-dependent | Organized

Goals

- finish college
- explore and visit history monuments/ museums while having the time
- to grow and use time wisely
- expand options
- to maintain good grades while having time for hobbies and social life

Frustrations

- traveling is expensive, stressful and time-consuming
- unavailability of museum resources
- wishes things were more available online and in the comfort of ones own home
- there is not enough emphasis on improving and maintaining museums, art, exhibitions, galleries etc.

Bio

Jane is an ambitious college student that enjoys art, history, and culture. Other than that, she enjoys reading books or spending time around technology. She is quite social, but still prefers to spend some time alone. She is very successful at college and so she does not have much time to spend on bigger hobbies. Traveling and exploring different museums has always been a dream of hers, so until she has the time and needs necessary she will be looking for alternative ways of achieving it.

Motivation

Incentive
Fear
Growth
Education
Achievement

Brands

SONY, The New York Times, CHANEL, Louvre, Van Gogh Museum

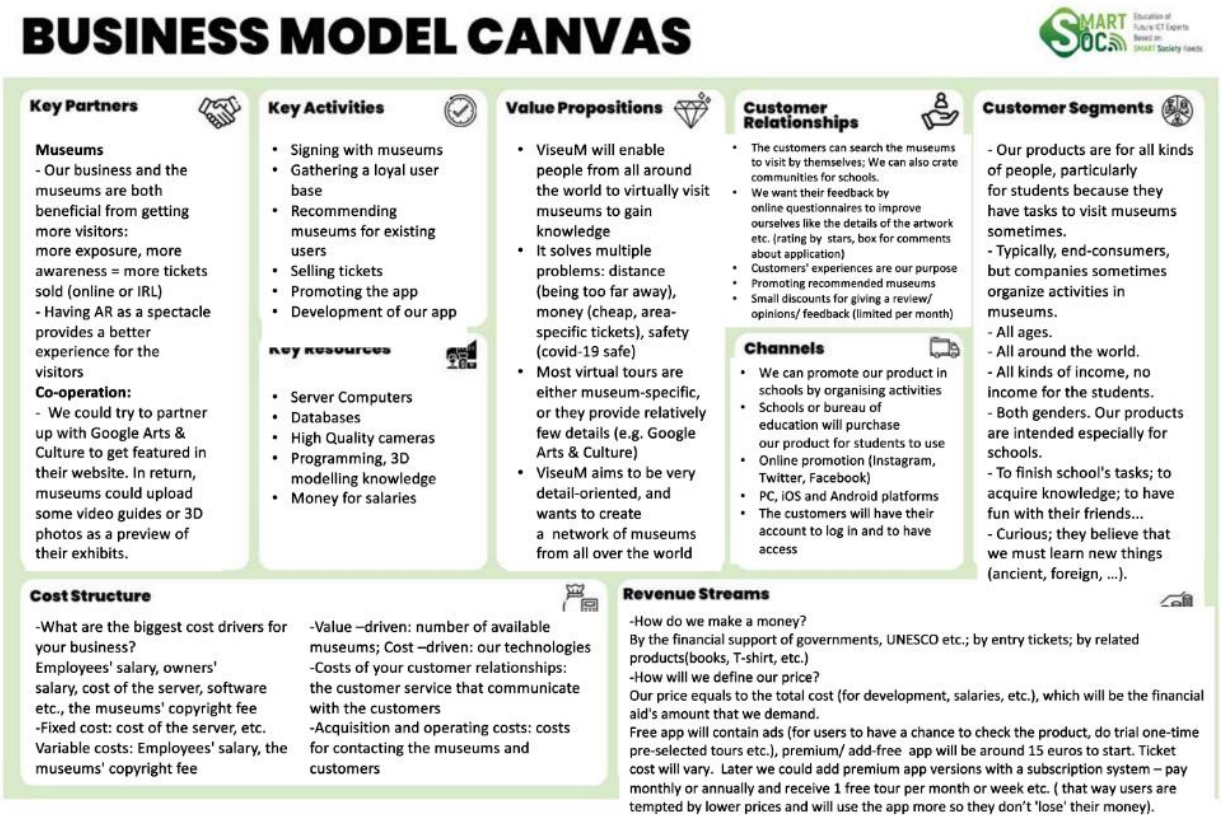
Technology

IT & Internet
Social Media
Computer
Mobile apps

COMPETITORS

Direct competitors	*Indirect competitors*
Google Arts & Culture	Wikipedia
Brussels Centrale #TRYTHISATHOME	Visualise
The Louvre's Online Tours	Google Expeditions
YouVisit	
Matterport	

BUSINESS MODEL CANVAS



Detailed Market Analysis, Management & team & resources, Start-up team development, Marketing activities, Responsible budgeting/Financial projections, Main risks, and the measurements for their reduction are described in Business Plan, which is available on SmartSoc Project Moodle.

SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Societal impacts	*Environmental impacts*
Better economic growth -more income, less spending on physical cleaning, sustaining, protecting, less travel costs	***Less pollution*** *-travel fuel and pollution can be reduced, less garbage and waste, less tourists -> less pollution*
Global partnerships *-finance, technology, science and trade improvement* *-capacity is not a problem any more with online access*	***Less marine pollution*** *-sea travel & negative fuel impact*
Learning possibilities *-school institutions development* *-learning, exploring, developing* *-quality education*	***Sustainable transport and settlements*** *-less need of travel, transport and spending*

Sustainable tourism *-less crowded physical places, online access to certain aspects (museums)*	*Green economy* *-energy for sustaining the project is green (electricity), other aspects are societal ones that solve the problem without harmful consequences* *-affordable* *-modern* *-greener environment due to less trees being cut down (physical tickets, books, notes, receipts)*
Employment *-more jobs, online jobs*	*Less energy cost and less harmful energy* *-negative impacts (fuel, diesel…)* *-modern spending of electricity and product buying (online, virtual…)*
Accessibility *-easy and simple service* *-available to almost all*	*Illness and outbreak* *-income and product availability is not affected therefore no need of travel* *-less spreading of airborne viruses/ diseases (due to less movement)*

A SELF-DRIVING TRACTOR IS CHANGING THE FUTURE OF FOOD BUSINESS

https://www.smartsoc.uniza.sk/cases

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HORIZON EUROPE CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Food, Bioeconomy, Natural Resources, Agriculture and Environment

SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

TASK TO SOLVE - INNOVATION FOSTERED BY ICT

How could self-driving tractor change the future of food business? Robust primary production, food system skills, versatile investments, already existing development platforms and extremely broad user networks and national and international networking all create a strong base for operations. Seinajoki and its surrounding municipalities, have the particular role of business operations development for the field bioeconomy and food systems. The focus of research and development for the area is the smart use of raw materials, sustain-able and efficient food system processes and user experience, perception, and welfare as a part of food systems. The smart use of raw materials is associated with the development of special products and the utilization of raw material components as a source in non-food applications. Food production bio-products such as field biomass and manure can, for their part, be utilized as energy sources.

SMART PROPOSAL

Sustainable and efficient solutions for food systems are focused on food production and consumer systems and their management. Solution elements concern primary production, agriculture and production technology, foodstuff refining, logistics and environmental solutions, trade and marketing as well as consumption and use experience.

SMART SPECIALIZATION STRATEGY TOPIC

The strategy for smart specialization is tightly coupled with the combined regional plan and regional strategic program of South Ostrobothnia and to other program lines made in the province.

DESCRIPTION

The goal of smart specialisation is to promote the regeneration of business life and to answer future skills requirements in selected thematic business sectors. The South Ostrobothnia smart specialisation operation model is based on the learning benefits of the concentrated province, flexibility and above all the region's way of working, which is widely renown for being entrepreneurial and straightforward. South Ostrobothnia is a smart and outstanding province with a versatile industrial structure and where strong sectors form an intertwined, dynamic entity. Furthermore, the strengths of South Ostrobothnia are, a distinctive operation and development culture and active regional, national, and international networking. South Ostrobothnia is the most specialised Finnish region in primary production and food-stuff refining, regardless of how it is observed, from the number of workplaces, personnel, and turnover perspectives. Relatively speaking, in Finland, the highest employment in agriculture and the food industry is in South Ostrobothnia, with 16% of turnover for the whole country's food industry located in the region. The effect of agriculture on the regional economy is almost €400 million and the food industry is over €1.3 billion, which is 25% of the total GDP of the region. Students should therefore focus on development of new innovative sustainable and efficient solution in the field of agriculture and production technology.

TECHNICAL ASPECT

Student team will need to identify and provided more details about specific technologies that can be used within the entrepreneurial study for example:

- self-driving tractors / smart tractors,
- other automation solutions, what can be used when sowing grain automatic,
- other technical solutions what can be used to automatic farming,
- ICT-solutions that can be used when farming automatically,
- other ICT solutions what have to be invented before launching this service/company,
- what skills/knowledge are needed to solve technical problems,
- ICT-services what potential customer could appreciate.

BUSINESS ASPECT

Student team will need to identify potential:

- customer segment for smart tractor,
- value proposition for customers and product developers,
- channels for sellers,
- value of customer relationships,
- revenue streams,
- key resources and activities,
- key partnerships,
- cost structure.

SOCIETAL ASPECT

Students' teams will need to provide more details about how the entrepreneurial case is solving:

- sustainability of food business,
- working conditions and work balance of farmers,
- zero hunger,
- responsible production of food.

AGRO TECH

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM EC2021:02

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PAVOL ADAMIK *(University of Zilina)*

SUPERVISORS

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MICHAL HODON, EMESE TOKARCIKOVA (*University of Zilina*)

SmartSoc Workhop 2021 Student presentation (Team 2):
https://youtu.be/um4oJfuH4Zw

SHORT DESCRIPTION OF PRODUCT /SERVICE

Generic Product: **Basic model to attach on tractor and with gsm infrastructure setup included, server storage included and 5 years warranty.**

Augmented Product: World first tractor attachment that converts tractor to smart tractor.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

For our Smart Tractor we will use existing GSM network (3G, 4G), we need agreement with the tractor manufacturers for implementing our software/hardware, only those models will be able to "convert" to smart tractor. After attaching our product to specified tractor, our product will establish internet connection with server and get data on what to do next according to outside factors. Tractor will use artificial intelligence to improve harvesting and do jobs more efficiently and to communicate with other near tractors (collision detection, data share, etc...). Tractors will be fully autonomous after our product attachment, more efficient, will have options for job scheduling, our system will provide multiple sensors (proximity, gps, moist...), embedded security sensors and safety procedures. Tractors will be communicating with server for new tasks and weather info, also sending feedback in case of component failure and task completion. App will be available for mobile devices and as a web application.

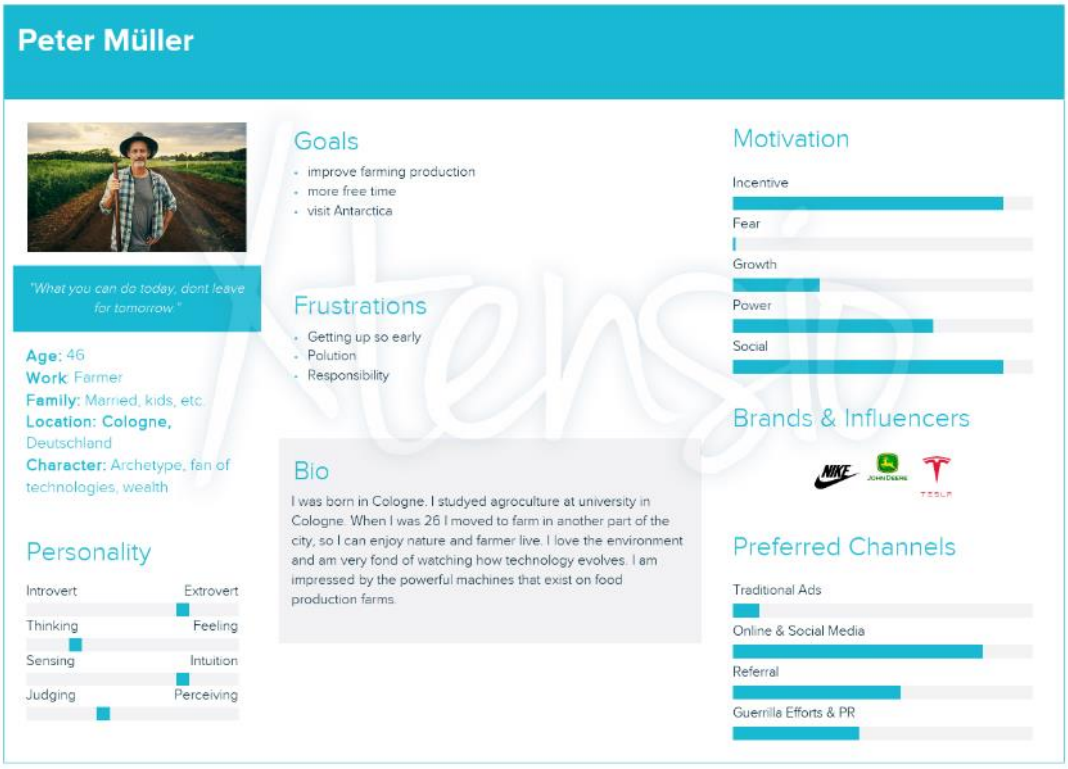
BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

CUSTOMER SEGMENTS

Description of Customer Segment

Farmers	Farmers / age 45+ /English and German language/ area: Europe / end customers / low income / For those interested in future farming, which wants to make their farming easier
Entrepreneurs	Subjects that are willing to participate in improving agricultural industry and linking it with technology
Companies	Companies that need our service and are willing to buy huge amount of products (potentially biggest income segment of our company). Companies like **Adecoagro, Adler Seeds, Agria Corporation** etc..

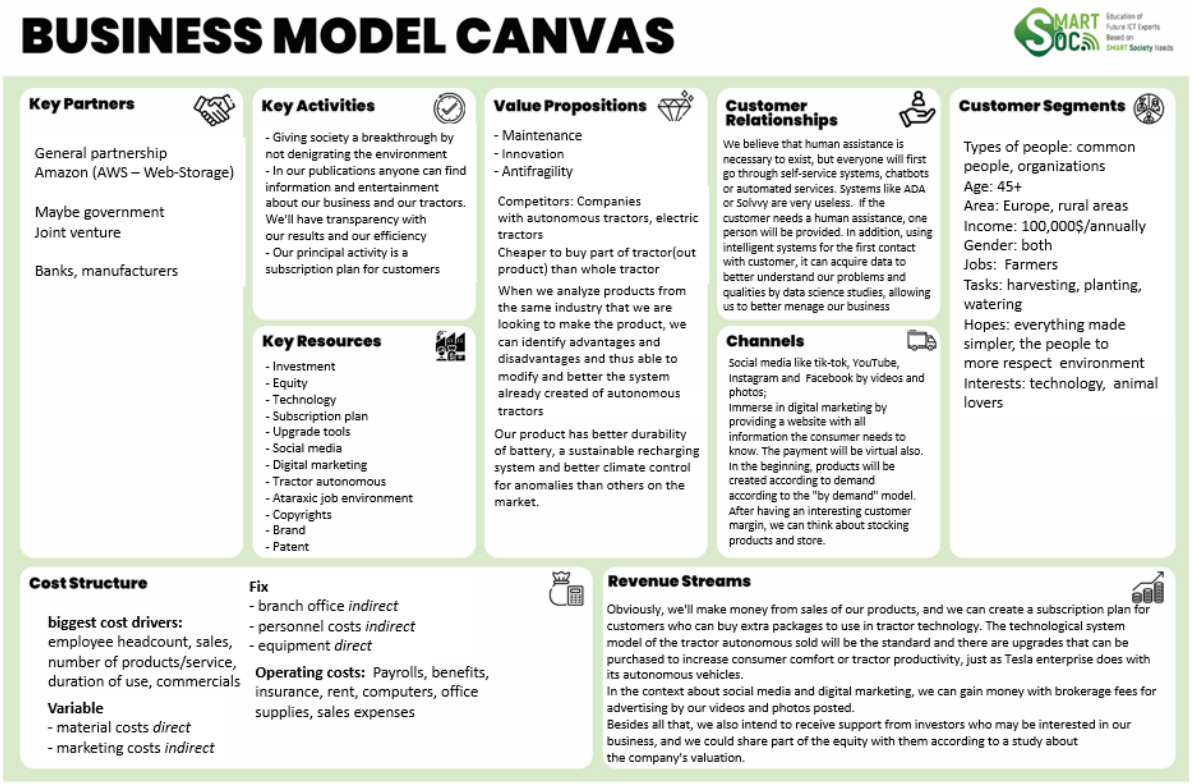
PERSONA



COMPETITORS

Direct competitors	*Indirect competitors*
John Deere	New Holland Agriculture
Case IH	Farm Trac
MONARCH	Kubota
Massey Ferguson	
Fendt	

BUSINESS MODEL CANVAS



Detailed Market Analysis, Management & team & resources, Start-up team development, Marketing activities, Responsible budgeting / Financial projections, Main risks, and the measurements for their reduction are described in Business Plan, which is available on SmartSoc Project Moodle.

SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Societal impacts	*Environmental impacts*
Protection from physical work (physical impairment)	Protection against water waste
Innovation (Agriculture of the future)	Optimal seed distribution
Autonomy through automation	
Artificial intelligence	

SAFE, EFFECTIVE AND SUSTAINABLE COVID-19 PROTECTION OPERATIONS IN CONGESTED AREAS

https://www.smartsoc.uniza.sk/cases

AUTHORS

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SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

HORIZON EUROPE CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Civil Security for Society

TASK TO SOLVE - INNOVATION FOSTERED BY ICT

Conception of systems (robots & automation) assisting in screening or disinfection operations in case of pandemic in order to:

- Relieve operational overhead of human personnel
- Reduce contagion risk
- Reduce single-use products

Applications domains:

- Hospitals, airports, schools, hotels, work spaces, public spaces

SMART PROPOSAL

The use-case of interest concerns the conception of autonomous systems performing screening or disinfection operations in areas such as hospitals, airports, schools, and public spaces more generally. The role of such autonomous systems would be multifold, namely, reducing the operational overhead of human personnel and infection risk, ensure more systematic and accurate operation while having a significantly lower ecological impact thanks to a reduced use of disposable products and the benefits for workers, students' health.

SMART SPECIALIZATION STRATEGY TOPIC

The Case Study will focus on Technologies for the Digital Age and on Health and wellbeing for a better quality of life.

DESCRIPTION

With the COVID-19 pandemic having incurred a heavy toll of human life at a global level, societies are urgently in need for adapting previously established practices in face of a new reality. Undoubtedly, ICT has played a prominent role in mitigating the impact of the pandemic in numerous ways, paving the way towards innovative tools, services, and products. In this context, relieving the operational overhead of hospitals in treating incoming patients or more generally of civil personnel when screening for potential infections, constitutes a technological challenge as well as an opportunity to alleviate the risk of services saturation. Shifting the paradigm from human intervention towards increased use of ICT would further reduce the need for excessive application of single-use, protective and disinfection products, therefore being advantageous from a sustainability point of view. The use-case of interest concerns the conception of autonomous systems performing screening or disinfection operations in areas such as hospitals, airports, schools, and public spaces more generally. The role of such autonomous systems would be multifold, namely, reducing the operational overhead of human personnel and infection risk, ensure more systematic and accurate operation while having a significantly lower ecological impact thanks to a reduced use of disposable products. Such systems could be based on robots and artificial intelligence techniques that capitalize scientific knowledge specific to COVID-19 but their design should allow their application to similar situations.

TECHNICAL ASPECT

- Specify the hardware/equipment specifications that are required in order to address the entrepreneurial case. If multiple components of different vendors will be indeed, address interoperability/conformability aspects for their integration.
- Following a software-engineering paradigm to model your system, define the actors that will interact, the types of interactions, the sequences of interactions that may occur during the operation of the system using UML diagrams.
- Define the extent to which every required functionality of your system can be implemented using ready, off-the-self solutions, for example, publicly available software or commercial components with integrated functions (such as face recognition, robotic manipulation, etc). For cases where ready solutions do not already exist, determine algorithms, ideas for their implementation.
- Define a set of tests to use as indicators for the performance of your system in real conditions.
- Define levels and conditions of minimal performance for your system possible failures, unaddressed situations, non-conformal use and generally the limits of the operation of your system.

BUSINESS ASPECT

- Identify customer segments together with expected need for using the product, its required performance level. Indicative examples include establishments such as hospitals, schools, airports, restaurants, accommodations - hotels, supermarkets, etc.

BUSINESS ASPECT

- Value proposition: Evaluate the value created by your system compared to a human worker performing the same task, also considering the cost of worker infection while performing the task, his rehabilitation, etc.
- Revenue streams: Determine whether your system will be leased/rented or purchased and accordingly, the cost that this implies in terms of channels, technical support, or guarantee.
- Key resources: what kind of engineers/employees will be required to design, develop, and support your system?

SOCIETAL ASPECT

- Which parts of your system can be designed by 3D printing to reduce the overhead and the environmental cost of the production process?
- To which extent the materials used by your system can be recycled?
- How your system should be adapted to non-expert users?
- Shall your system be adapted according to different age groups (is age a relevant criterium), for example is there a specific category of users reluctant to use robotics?

DRONITIZER

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM EC2021:03

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SmartSoc Workhop 2021 Student presentation (Team 3):
https://youtu.be/uiLRNDebR5E

SHORT DESCRIPTION OF PRODUCT /SERVICE

- Dronitizer – autonomous drone that disinfect indoor environments
- Contains liquid tank
- Obtains environment information through camera
- SLAM technology and modern algorithms

Product´s strengths

- Sanitizing of the surfaces in schools (especially used in classrooms)
- An autonomous drone that uses sanitizing liquid by spraying surfaces around the class/office.
- A sanitizing machine that ensures clean, virus- free surface in classrooms. Sanitizing could be done faster during break times.
- An autonomous drone that could be operating in various room sizes.
- It is recycled by our company after years of usage and before that remanufactured. This way we can get informational value about our product after client has been using it and what could we possible change to improve it.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Hardware/equipment specs

Main parts of the drone:

- Frame of the drone - The frame serves us as a skeleton to which all other parts of the drone would be fixed. It is important that the frame is made of solid and light material. The most suitable material that would also be used is carbon fiber. The size of the frame would be about 450mm.
- Motors - Since we have predicted that the drone has four propellers, four motors will be needed to rotate them. Given the weight they have to lift, DC brushless motors of size 2212 (or larger) and 1000KV (or smaller) would be used.
- Electronic speed controller - This is an electronic control board that varies the motor's speed. This is attained by gauging the amount of power used by all the motors.
- Flight control/Board – It is the "brain" of a drone. An additional microcontroller, if required, will be considered Flight control. All information received from the camera would be processed in Flight control. After processing the information, a judgment would be made in which direction the drone should move and which functions should be used.
- Propellers – The rotation of the propeller creates a force that lifts the drone into the air. Considering the speed of the motor and the weight of the drone (about 2 kg), propellers made of plastic would be a good solution (1000KV is not too high a speed), so there is no need for some better / more expensive materials. The size of an individual propeller would be about 9 inches.
- Radio Transmitter – It is needed to establish communication between the drone and the user.
- Battery – The battery acts as the power source to the drone. One lithium polymer battery would be used and placed in the lower part of the frame.
- Camera - The drone obtains information about the space mainly through a camera. A frame-based camera would be used to analyse the surfaces to be disinfected.
- Disinfectant fluid tank – The liquid tank would be located in the upper part of the drone. The capacity of the tank would be between 0.5 -0.75 l.
- Tubes for disinfectant liquid - Disinfectant fluid is piped under a single propeller to ensure successful fluid routing.
- Sensors – In order for a drone to move automatically it must rely on a multitude of sensors. Some of the sensors that could help in navigating the drone are: time of flight sensors and SWAP sensors based on SLAM method. A specific sensor is also used to indicate how much liquid is in the tank.

Operators and interactions specs

The goal is to enable the drone to autonomously navigate and disinfect the surfaces in closed room. The user's job is to bring the drone to the room where the disinfection will be performed, while the navigation itself does not need to worry. Drone data would be obtained through a mobile application through which the user could monitor factors such as: battery percentage, amount of liquid in the tank, insight into the image provided by the camera, etc. The mobile application would also control the drone in terms of approval to start / stop disinfection.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Software/functionalities specs (face recognition, manipulation, mobility dialogue, temperature screening etc)

The main problem is to allow the drone to move autonomously indoors (where there is no GPS signal) so the drone obtains information about the space mainly through a camera. Using SLAM technology and modern algorithms, the drone independently analyses the space around it. In order to make it easier for the drone to navigate in space and determine its trajectory, aruco markers are placed on the surfaces to be disinfected, as an indicator of where the drone should move. Aruco markers would also help the drone determine its distance from the surface and thus allow it to navigate more easily in space.
Based on the information obtained from the camera and sensors, the microcontroller using SLAM technology allows the drone to navigate in space. The connection of the mobile phone with the drone would be realized via the wi-fi network transmitted by the drone.

System performance indicators

If the drone has done the job (disinfection) to the end without showing an error, it is a sufficient indicator that the job has been done properly.

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

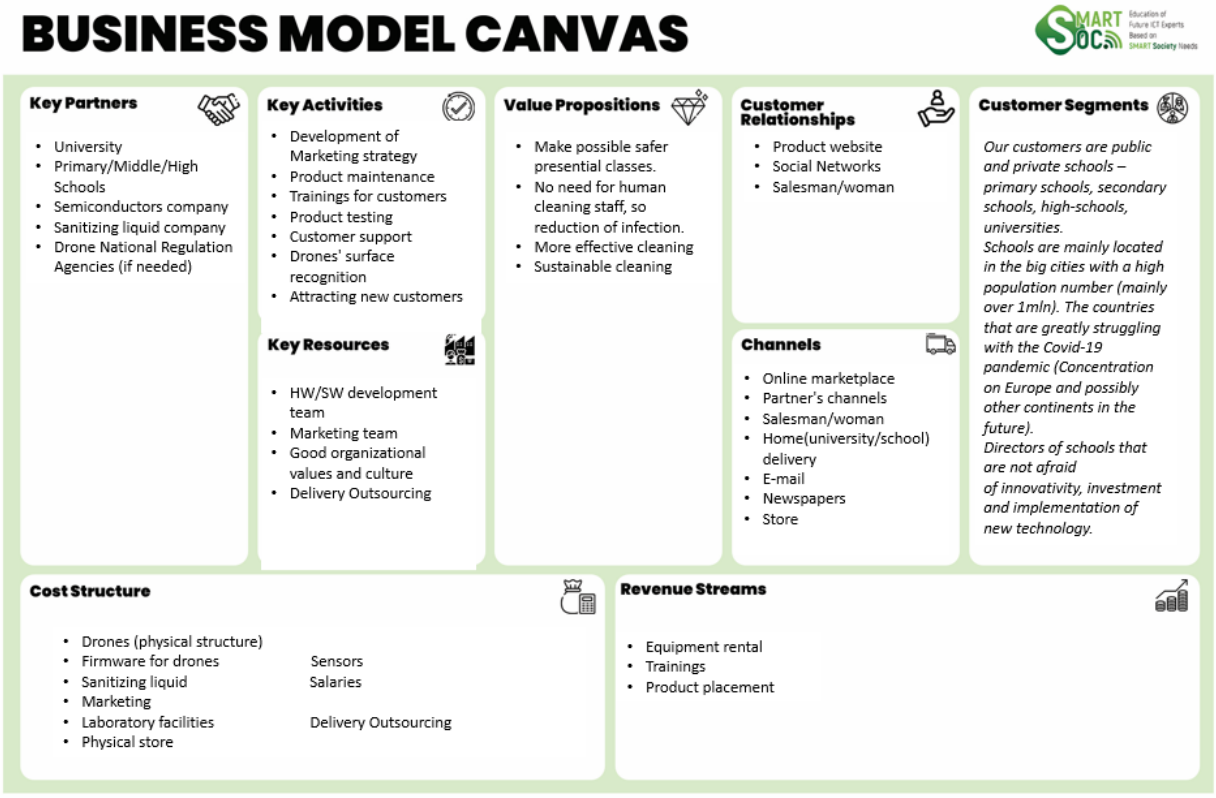
CUSTOMER SEGMENTS

Description of Customer Segment

Public and private schools – primary schools, secondary schools, high-schools, universities – technical colleges	Main market: Europe The first contact customer would be a head of a given school. He would be the one investing in the Dronitizer. However, students and teachers would be direct users of Dronitizer on a daily basis. All of them would go through a training on how to behave and act with drone machines. Public schools might have a chance to get funding from own governments.
Offices of big companies that have a contact work or who cannot work remotely. (incl. Accountancy firms, marketing firms etc.)	Main market: Europe A branch of a bigger company which works internationally. Designed both for open space offices as well as for traditional rooms. Office workers would be the ones who benefit from the Dronitizer on a daily basis. The company CEO is the one making the final decision; however employees would be asked if they are willing to work in the office in the presence of drones.

PERSONA

BUSINESS MODEL CANVAS



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SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Societal impacts	*Environmental impacts*
Better economic growth -more income, less spending on physical cleaning, sustaining, protecting, less travel costs	***Less pollution*** *-travel fuel and pollution can be reduced, less garbage and waste, less tourists -> less pollution*
Global partnerships *-finance, technology, science and trade improvement* *-capacity is not a problem any more with online access*	***Less marine pollution*** *-sea travel & negative fuel impact*
Learning possibilities *-school institutions development* *-learning, exploring, developing* *-quality education*	***Sustainable transport and settlements*** *-less need of travel, transport and spending*
Sustainable tourism *-less crowded physical places, online access to certain aspects (museums)*	***Green economy*** *-energy for sustaining the project is green (electricity), other aspects are societal ones that solve the problem without harmful consequences* *-affordable* *-modern* *-greener environment due to less trees being cut down (physical tickets, books, notes, receipts)*
Employment *-more jobs, online jobs*	***Less energy cost and less harmful energy*** *-negative impacts (fuel, diesel…)* *-modern spending of electricity and product buying (online, virtual…)*
Accessibility *-easy and simple service* *-available to almost all*	***Illness and outbreak*** *-income and product availability is not affected therefore no need of travel* *-less spreading of airborne viruses/ diseases (due to less movement)*

SMART RECYCLING IN LATEST TECHNOLOGIES TOO

https://www.smartsoc.uniza.sk/cases

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HORIZON EUROPE CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Food, Bioeconomy, Natural Resources, Agriculture and Environment

SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

TASK TO SOLVE - INNOVATION FOSTERED BY ICT

Waste handling is one of the issues that everyone is interested. Student´s task to solve is to try to decrease the amount of waste or increase the rate of recycling.

SMART PROPOSAL

The entrepreneurial study should focus on two aspects:

- Planning effective methods, strategies to enforce people (companies, schools, and individuals) to collect different kinds of filaments became waste during 3D printing, unused or broken 3D printed objects. Besides, they should provide a solution how to produce filament from the waste again. The team has to consider whether other commerce types of waste can be transformed into filament (such as PET bottles).
- If customers collect and return the empty rolls of filament, then these rolls can be reused to hold filament again. To achieve these goals, we need to have relationships with different companies (if our company grows, we can do more and more phases by ourselves), a gamified mobile application to motivate participants, and good marketing. Environment-conscious customers will be committed to purchasing recycled filaments.

SMART SPECIALIZATION STRATEGY TOPIC

The Case Study will focus on sustainable energy and recycling. One priority of national Smart Specialization Strategy is aimed at promoting the sustainability of the environment. Through the research, application, and development of modern technologies. 3D printing is one of the emerging technologies that can bring innovative solutions for many issues which Overcoming is could be beneficial.

DESCRIPTION

The entrepreneurial study touches the following aspects of smart specialization strategy:

- Recycling can help reduce the quantities of solid waste deposited in landfills, which have become increasingly expensive. Recycling also reduces the pollution of air, water, and land resulting from waste disposal.
- Recycling can result in decreasing specific energy consumption, which leads to cost savings and indirectly affects air quality as well.
- More affordable filament prices promote the education of 3D printing, which contributes to development of digital literacy.

TECHNICAL ASPECT

Student team will need to identify:

- which types of filaments can be recycled (fully recyclable or used only as an additive).
- how filament is created, what tools are needed.
- properties of filaments, what criteria are there in quality control.
- tools of gamification.

BUSINESS ASPECT

Student team will need to identify:

- what is the cost of recycling filaments?
- potential customers, personalized proposition.
- selection of communication channels, advertising opportunities
- revenue opportunities.

SOCIETAL ASPECT

Student team will explore:

- What are the consequences of reducing the waste (environmental effects, how much new raw material can be saved)?
- Where and how could the good practice be used?
- The need for attitude change: not everything is waste that you no longer need
- How youngsters can be contacted via ICT solutions such as gamified mobile applications

SWIP3CYCLE

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM EC2021:02

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SmartSoc Workhop 2021 Student presentation (Team 4):
https://youtu.be/Tsh8PtZGH2s

SHORT DESCRIPTION OF PRODUCT /SERVICE

The aim: How to enforce people (companies, schools, and individuals) to collect a different kind of filaments that became waste during 3D printing, unused or broken 3D printed objects and organizing the process to produce filament again from the trash.

Our product´s core is 3D filament, products (picks etc.), Recycled, but great quality product (filament). Usable, good quality products (items made from recycled waste), Accessible to everyone, various types of products (several products will be made from filaments)

Our service will be available on a larger scale and from different type of wastes.

Our company helps people get rid of their plastic and 3D waste. People usually get rid of their plastic waste locally.

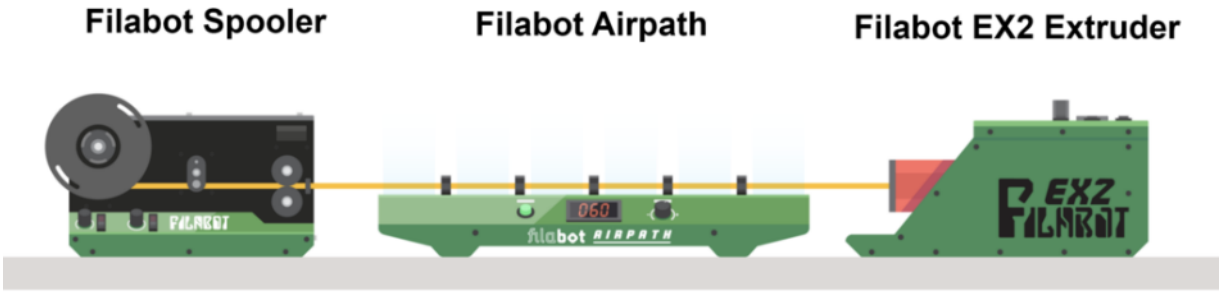
Price of our recycled filaments is cheaper than new filament (5€-15€ cheaper depending on the quantity).

Our company stand out thanks to the production of various products (picks, coaster, etc.).

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

We need a machine to recycle all the waste and afterwards this machine (or another one) will be processing (melting) this waste. We will use machines like Filabot ex2 extruder setup. This machine includes extruder+cooler+spooler. So, it would be easy to produce filaments. The machine is able to make 0.9 kg of filaments per hour if we are using it 16 hours a day for 26 days a month. It comes to 374.4 kg a month, based on amount that we want to sell we need to make about 500 kg a month so we will get two to be able to match the demand and to not overwork a single machine so it wouldn't brake.

Then we will need shredder for making small pieces from plastic. After grinding plastic objects up into chips with something that emulates a high-power blender, you can blend different materials to create new textures, blend colours together and create weird patterns, or make a small production out of a solid mold.

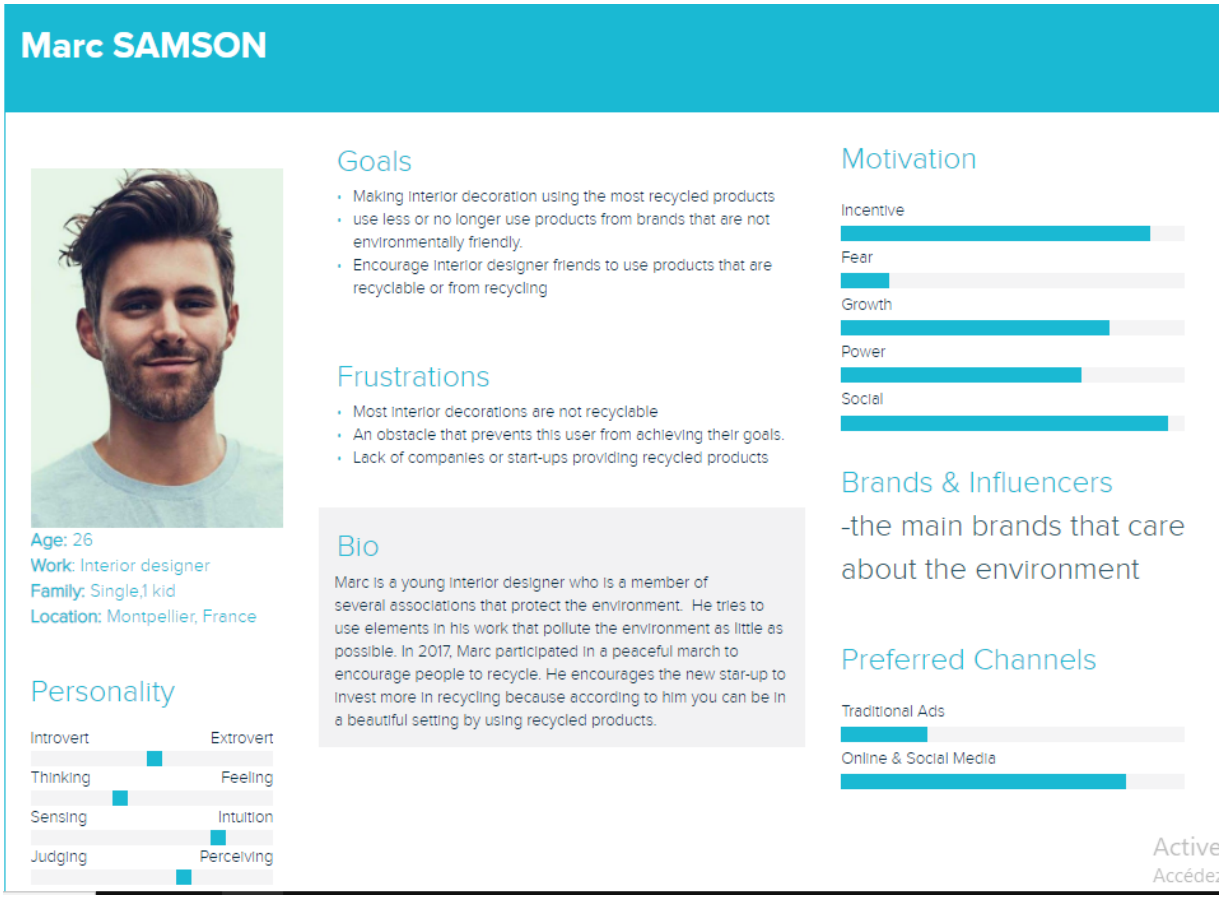


BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

CUSTOMER SEGMENTS

	Description of Customer Segment
customer segment 1	People, institutions and companies that produce 3d printer waste as well as any kind of plastic waste that we can acquire and make into plastic filament.
customer segment 2	People, institutions and companies that use filament in any kind of way shape or form. These people and companies are generally ones that want to reduce their carbon footprint by buying recycled filament.
customer segment 3	People that would find interesting and would be willing to buy products that we will hopefully be making from recycled filament. These people are generally people who care about the environment.

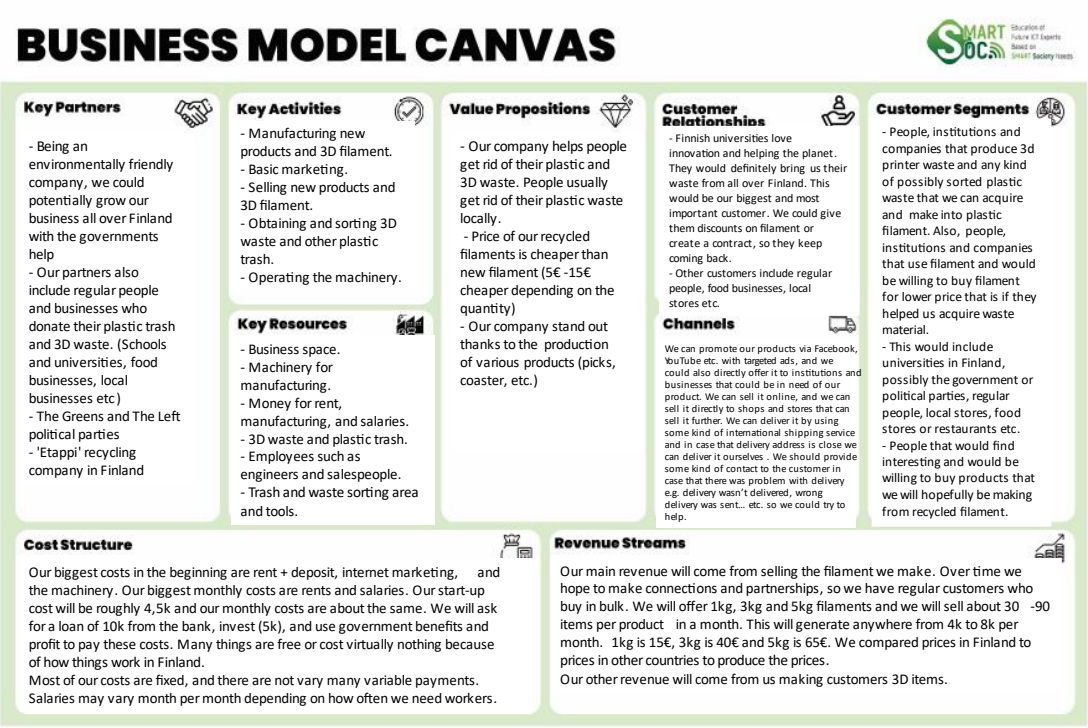
PERSONA



COMPETITORS

Direct competitors	*Indirect competitors*
Reflow filament	*Recycling companies that accept 3D waste*
ReDeTec	*filabot*
Nefilatek	*people who reuse their 3D waste*
REFLOW	
fishyfilaments	

BUSINESS MODEL CANVAS



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SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Societal impacts	Environmental impacts
Change how people think about waste, and show them useful ways in which we can use plastic waste.	By recycling plastic materials, we will reduce amount of waste that pollutes the environment
By providing quality product we will make it possible to replace broken parts in certain technologies and prolong the lifetime of specific gadgets	Less new products have to be created if the lifecycle of the devices can be prolonged.
Providing innovative and useful service to other businesses and society in general	By reusing existing plastic, we will reduce the need to make more new plastic.
Set an example for future entrepreneurs by making a sustainable business	By reducing amount of waste with reusing it, we will make wildlife and nature less polluted, we will hopefully continuously pollute less and less
Setting higher bar for future businesses that have Environmental impacts and inspire society in general to come up with more ways to reduce waste.	With less plastic waste in the system and people inspired to do something about waste in general, we will have cleaner cities
By reusing waste, we will become more efficient as a society.	

HEALTH ON THE MOVE

https://www.smartsoc.uniza.sk/cases

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HORIZON EUROPE CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Climate, Energy and Mobility

SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

TASK TO SOLVE – INNOVATION FOSTERED BY ICT

The entrepreneurial case is focused on facilitating transportation and mobility using IoT to positively impact the travellers' health. Transportation is one of the major challenges caused by urbanization. One of the consequences are traffic jams and people spending more and more time in traffic, sitting in cars, using polluted travel routes and the like. MaaS - Mobility as a Service, a new mobility solution, aims to improve the current traffic problems by integrating different forms of mobility (e.g., public transport, taxi, bike sharing). Students are encouraged to harness the potential of using IoT along with MaaS to create useful and valuable product ideas focused on improving the quality of life and health of passengers. The idea is to explore the existing similar solutions in their country, Europe and the world and offer a unique solution!

SMART PROPOSAL

Mobility as a Service (MaaS) is a new solution which exploits the benefits of ICT to improve the current transportation system. The general idea behind the MaaS concept is to combine different forms of transportation services (e.g., public transport, taxi services, private transport, and bicycles) and provide them to users in an integrated way. Maas can benefit from the integration of Internet of Things (IoT). IoT is a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies (Source: Recommendation ITU-T Y.2060).

SMART SPECIALIZATION STRATEGY TOPIC

The Case Study will be based on the Smart Specialization Strategy (RIS3) of our country (Croatia) is "Transport and mobility".

DESCRIPTION

There are many issues that cyclists face during their journeys, e.g., the quality of bicycle roads, alternative possible travel routes. Most people choose bicycles over cars because of the money savings and their health, but how do they know if that is true? Yes, they are getting exercise this way, but is it always healthier to ride a bike? Unfortunately, users do not have detailed insights into air pollution for the length of their ride to work, the grocery-store, or just for their ride for fun. IoT and MaaS can change that. By using sensors to detect air pollution, users can be given the best possible route depending on time and pollution. This does not benefit only cyclists, but also people in other forms of transport. This idea can be further developed if the users' vital functions are considered. For example, a smart watch can detect that the user is sitting for a long time and suggest them to cycle when the weather is nice, and the pollution is low. MaaS in collaboration with IoT can help improve people's health and safety, as well as make a significant positive difference in their time management, while also being environmentally and cost efficient.

TECHNICAL ASPECT

Student team will need to identify and provide more details about:

- Where will you start? What will you focus on first?
- How long will it take you to develop a useable solution?
- How will you create a network of connected devices, i.e. Things?
- How will you store, manage and secure data?
- How will they communicate (analyse energy consumption of various communication technologies!)?

TECHNICAL ASPECT

Student team will need to identify and provide more details about:

- What are you going to take into account first when starting your project?
- How will the technical architecture look like?
- How will you ensure scalability of your solution?

Creating a network of connected devices, i.e. Things, storing, managing and securing data, communication (energy consumption of communication technologies), architecture, scalability identify the technological key performance indicators of the proposed solutions in the fields of cultural and tourist contents.

BUSINESS ASPECT

- Student team will need to identify:
- What will you offer your customers?
- How will you present your solution to customers?
- How will you attract customers (advertise)?
- How will you engage them to use your solution?
- Who will you partner with?
- Stakeholders and their needs, possible partners, attracting customers (advertisement), minimum viable product, fighting" competition with similar solutions

SOCIETAL ASPECT

Student team will need to provide more details about :

- How will you handle waste, e.g. broken sensors or actuators?
- Is your solution helping reduce pollution? How?
- Define and estimate direct and indirect social impact.

MOV'N HEALTH

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM EC2021:05

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SmartSoc Workhop 2021 Student presentation (Team 5):
https://youtu.be/5TRIwqw6MF4

SHORT DESCRIPTION OF PRODUCT /SERVICE

The core of our application is to give the proper and usable environmental information for choosing healthier way of mobility and outdoor activities. Service which provides travel and air pollution information for people in mobile app/webpage. Customer gets information about faster/healthier mobility e.g., travel options to their destination. Our service also provides the right way and the air quality to reach the user's destination through the same platform. Include new and different types of mobility and improve knowledge based on the collected data. Also, detection of potential sources of air pollution through weekly forecast.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

- Equip vehicles and buildings with IoT systems
- Collection of various data from environment
- Provide predictions
- Informing our users

Our idea is to collect various data from the environment and/or users (depending on transportation method they use). Some of them are for example temperature, humidity, air pollution, CO2, CO, NO2, O3 other gases from IoT sensors or biometric data from the user, like heart rate, O2 concentration. The idea is to equip bicycles, e-cars for rental and public transport with IoT systems (e.g., air quality sensors, GPS solutions) and wireless module (e.g., Lorawan, LTE-M, eMTC, 5G) to communicate with end-devices and exchange data with Data Center.

Thanks to the collected data from equipped transportation options (e.g., public transport, bicycles, cars) and external API's (Google maps, Waze, Windy, Windfinder), we can get various predictions related to the effect of external conditions on health, patterns of community activities, time of transport, traffic jams, levels of air pollution and even prevention of health problems (lung and heart problems).

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

People using our service/app will be informed about the most congested and polluted traffic areas and be offered alternative travel routes to reach their destination. They can also be warned about the potential health hazards. And the opposite the system can inform people about the positive impact on their health if they use the specified route and transportation option.

The picture below describes the core architecture of our solution. We collect air data thanks to wireless IoT sensors implemented on buses and buildings or Data sources API and process these data in order to alert our users about the air quality through mobile app/website/external API.

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

CUSTOMER SEGMENTS

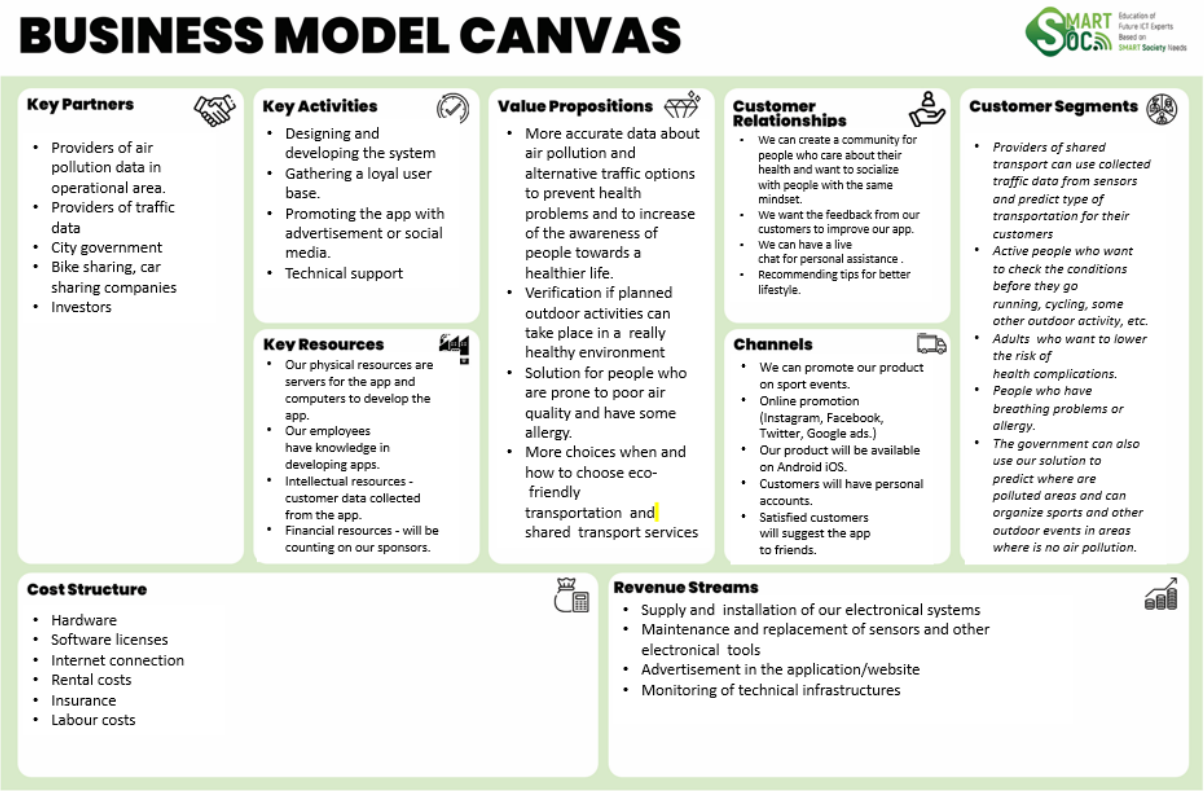
	Description of Customer Segment
Providers of shared transport/mobility services	Use collected traffic data from sensors and predict type of transportation for their customers Bike sharing companies can predict routes to destination according to air polluted areas.
People (citizens)	Students/young adults (both female and male) who live in the city and who want to start living healthier and prevent future health related issues. Adults (both female and male) who want to lower the risk of health complications. People who have breathing problems or allergy. Active people who want to check the conditions before they go running, cycling, some other outdoor activity, etc.
City government	The government can also use our solution to predict where polluted areas are and can organize: • sports events, cultural event • other outdoor events in locations where there is no air pollution or gov. can provide it also as a city -service for their citizens

PERSONA

COMPETITORS

Direct competitors	*Indirect competitors*
Capture	*European Environment Agency*
Transit	*BBC, RTVS, etc.*
Windy	*IQAir*
CO2GO	
LiveGreen Daily Carbon Tracker	

BUSINESS MODEL CANVAS



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SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Societal impacts	*Environmental impacts*
Better economic growth -more income, less spending on physical cleaning, sustaining, protecting, less travel costs	***Less pollution*** *-travel fuel and pollution can be reduced, less garbage and waste, less tourists -> less pollution*
Global partnerships *-finance, technology, science and trade improvement* *-capacity is not a problem any more with online access*	***Less marine pollution*** *-sea travel & negative fuel impact*
Learning possibilities *-school institutions development* *-learning, exploring, developing* *-quality education*	***Sustainable transport and settlements*** *-less need of travel, transport and spending*

Societal impacts	*Environmental impacts*
Sustainable tourism *-less crowded physical places, online access to certain aspects (museums)*	***Green economy*** *-energy for sustaining the project is green (electricity), other aspects are societal ones that solve the problem without harmful consequences* *-affordable* *-modern* *-greener environment due to less trees being cut down (physical tickets, books, notes, receipts)*
Employment *-more jobs, online jobs*	***Less energy cost and less harmful energy*** *-negative impacts (fuel, diesel…)* *-modern spending of electricity and product buying (online, virtual…)*
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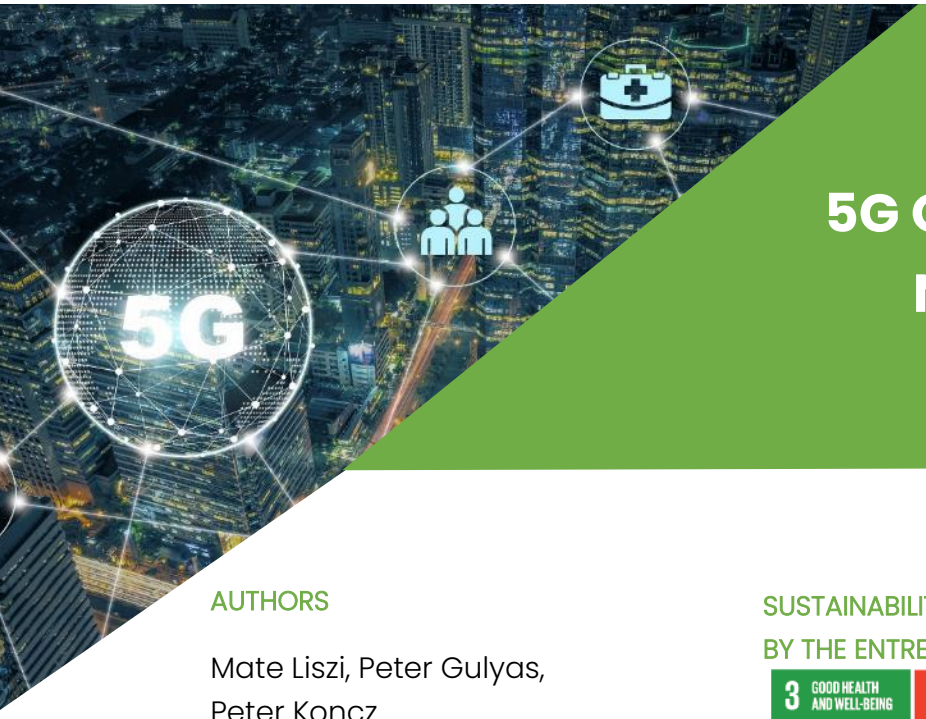

5G OPEN RADIO ACCESS NETWORKS IN EVENT MANAGEMENT

https://www.smartsoc.uniza.sk/cases

AUTHORS

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HORIZON EUROPE CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Civil Security for Society

SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

TASK TO SOLVE – INNOVATION IN ICT

The task is to provide an entrepreneurial plan to deploy a reliable network (Open Radio Access Network) for small or big events, with independence from the providers network as much as possible, but still with internet access. The participants must understand the 5G capabilities, and selecting the functions, which only needed for the specified event. Participants have to plan an acquisition of assets capable for fulfil these functions.

SMART PROPOSAL

This proposal will be about an entrepreneurial effort to provide more secure, safer events, with increased capacity of telecommunication services provided by the brand new, innovative, and flexible 5G Open Radio Access Networks. While developing the startup plan, students will familiarize yourselves with the 5G technologies, management, safety, security of events, and disaster recovery.

SMART SPECIALIZATION STRATEGY TOPIC

The Case Study will focus on special materials, advanced materials, modern materials technologies.

DESCRIPTION

The ORAN (Open Radio Access Network) is a promising, but compromised feature of the 5G technology. It is promising, because it can openly provide access to the 5G technology for any small and medium enterprises, with its small market share. On the other hand, it is compromised, because the business risk is high for these enterprises, as the big companies already have solutions for realizing RAN in many cases and events with losing its openness. Working with ORAN is a real and modern entrepreneurial challenge, as the participants have to find a way to apply a specified and small set from 5G technology capabilities, only what needed for the event to deploy, keeping the costs low, the QoS high.

TECHNICAL ASPECT

- What are the technical aspects of event management?
- What can be dangerous in an event, and how it varies with the type of event (club, festival, conference, wedding)?
- How the demand for telecommunication services varies with the type of event?
- What are the traditional tools and devices to provide appropriate telecommunication services to security, safety, and for entertainment on an event?
- What is 5G Open RAN, and what opportunities it provides?
- What elements the 5G RAN system contains, and where to install them?
- How can the event staff and the guests access services have provided to them?
- How to predict maximal load capacity, and provide good QoS? What to do with the acquired "big data „and how to protect data of guests based on Directive 95/46/EC "GDPR"?

BUSINESS ASPECT

- What is event management in aspect of business?
- What are the differences of types of events regarding the business partner types (governmental, corporate, private)?
- How you plan to provide services to fulfil general and special needs of the customer/business partner?
- What would be the permanent inventory and staff of our company, and what we need to rent from time to time?

SOCIETAL ASPECT

- What services we can provide on events?
- What is the expectation of the guests (safety, equality), and the business partner in societal aspect (rejecting minor from parties, unauthorized personnel in conferences)?
- What is disaster recovery/management/relief, and how can the ICT be helping in these?

NEXT GEN EVENTS

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM EC2021:06

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SmartSoc Workhop 2021 Student presentation (Team 6):
https://youtu.be/vIXIcpL2XCY

SHORT DESCRIPTION OF PRODUCT /SERVICE

We offer fast and reliable internet service, big capacity for events with a lot of attendants, security for people and their data, we guarantee network coverage in every part of the venue.

Core benefit = helping in organizing large events. No glitch/lagging in telecommunications services.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Architecture:

Modern telecommunication and mobile networks are increasingly complex from a resource management perspective, with diverse combinations of software and infrastructure elements that need to be configured and tuned for efficient operation with high quality of service. Open radio access network (O-RAN) is a term for industry-wide standards for RAN interfaces that support interoperation between vendors' equipment. Network operators can benefit from open RAN standards because the operators could customize their RAN infrastructure get new features to market faster and have a lower capex due to vendor competition. O-RAN Is an Alternative Way of Building Networks That Promises Greater Interoperability and More Competition. The main challenge facing O-RAN standardization is the major RAN vendors are not adopting the interfaces, leaving little room for competitors to break into the space.

The reference O-RAN architecture introduced by the O-RAN ALLIANCE was envisioned with an eye towards next-gen RAN infrastructure with virtualized RAN on open hardware and artificial intelligence intrinsic to radio control.

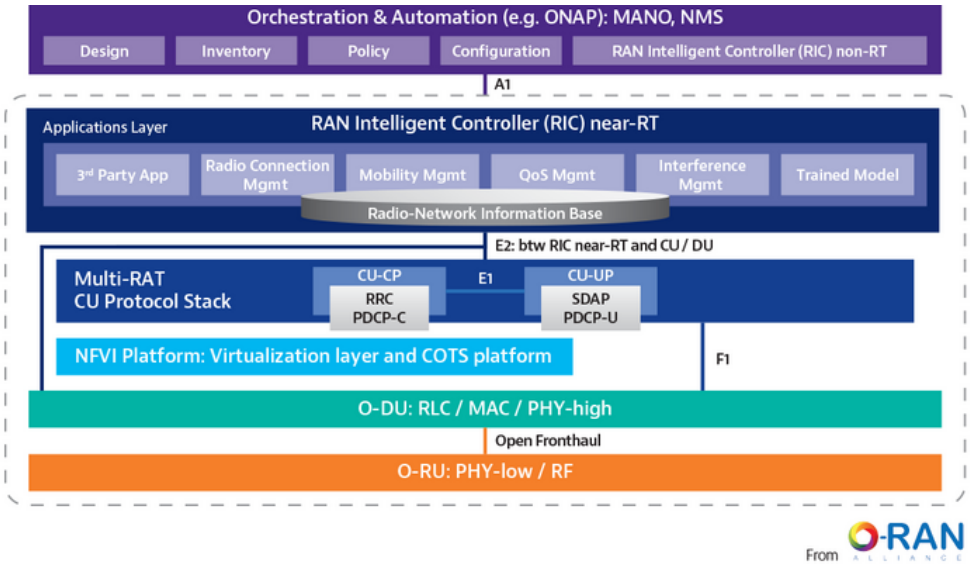
Functional modules of O-RAN architecture include the RIC non-Real-Time layer to perform operations including policy management and analytics, and the RIC near Real-Time layer to perform time sensitive functions such as load balancing, handover and interference detection. Layer integration allows the RIC near Real-Time layer to benefit from intelligently trained models and real time control functions distributed by the RIC non-Real-Time layer.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Architecture:

The multi-RAT CU protocol stack, deployed on a virtualization platform, supports protocol processing for 4G or 5G while establishing security isolation and virtual resource allocation, among other functions. The open radio unit (O-RU) and open distributed unit (O-DU) elements are integrated through an O RAN fronthaul interface with a well defined lower level split (LLS) that supports eCPRI and RoE. Further definition and standardization of these interfaces will drive interoperability, competition and innovation into the O-RAN supply chain.

Disaggregation is essential for 5G deployment and evolution, enabling mobile operators to open the RAN network and leverage multi-vendor solutions. Open RAN provides new avenues for RAN customization and flexibility that are commensurate with the diversity of 5G use cases and requirements. By lowering the barrier to entry for new participants into the O-RAN 5G ecosystem, the innovation needed to meet ever evolving customer expectations can be fully unlocked. Operators will be empowered to utilize best-of-breed components based on their individual network use case profile. This opens opportunities to reduce development cycles by developing different parts of the network separately while harnessing more innovation horsepower collectively.



Functions of the 5G Open RAN architecture:

Core: where the RF signals are received, transmitted, amplified and digitalized. It is important to adequate the signal here at the beginning to reduce the loss of the RF in the next steps of the architecture.

CU: where the less sensitive time packet processing resides. It is placed between the Core and the DU units. 5G network was made with an open interface implementation between the different parts of the architecture so it would be possible to have a software from vendor A working with software from another vendor in the next steps of the architecture.

DU: where the real time baseband processing occurs. In the 5g it can be divided into different DUs so each one has one vendor's software thus the company can choose the software that fit best for their needs.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

APPLICATIONS:

- Accessed by the guests

Accessing the digital map of the event, connecting to games created by the event.

Attendees will also have the ability to access digital signage and, via a mobile app, will also receive personalized updates, crowd density information and tips on the best ways to avoid crowds and maintain social distancing. Application for remote access to the seminar or job fairs and interaction with presenters even from a distance.

- Accessed by the administrators

Opening a new area door, checking the security cameras.

- Accessed by us (our company's technical staff)

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

CUSTOMER SEGMENTS

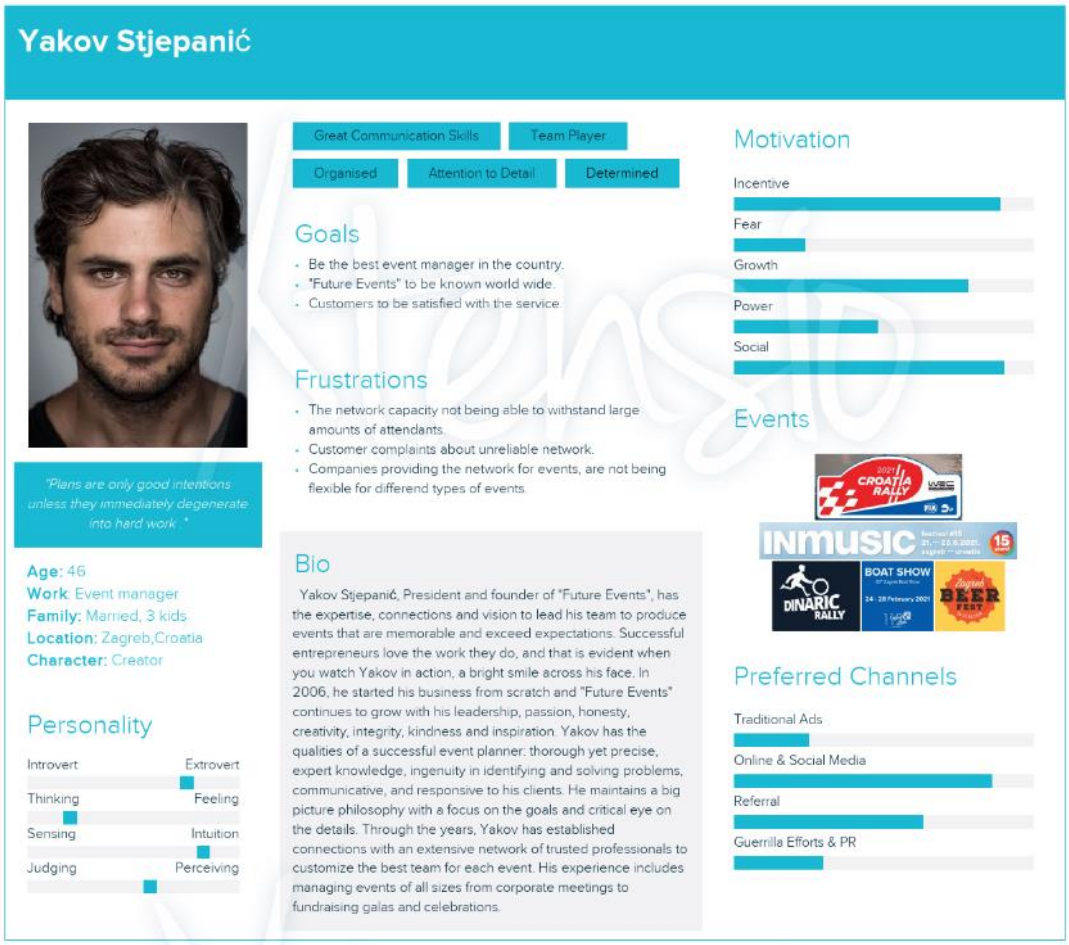
Description of Customer Segment

customer segment 1	First ideal costumer segment for our service are universities/colleges. Universities and their leading people will use our service in order to organize job fairs for their students in easy and efficient way. Large job fair is an event of various attendants, students, young people, but also highly educated and experienced experts. That implies that our service will be used by wide range of people, but the clients are colleges because they are organizers of these events. Colleges and their leading people have a goal to attract more and more people to job fairs every time, and fast and reliable connection and successful management of an event are prerequisite for that. University/college leaders are primarily highly educated individuals, in middle ages, that live in bigger cities, and usually they are multilingual. They like to use technology to simplify their lives, so our company fits in their lifestyle.
customer segment 2	Another customer segment for our service can be event managers of gaming events. Those are also events with many different attendants, but mostly young and tech-educated, but our service buyers are event managers. In order to successfully fulfil attendants' goals – fast and reliable network connection, event managers are in need of our service. 5G offers higher speed, smaller latencies and improved safety aspects in comparison to 4G and other technologies. As event managers are fully attendants-oriented individuals, they will do everything possible to make user experience better.

Description of Customer Segment

customer segment 3	Another customer segment for our service can be natural disaster help organizations. When natural disaster occurs (for example earthquake like one that happened recently in Petrinja, Croatia) it is very important to have reliable network connection to maintain normal functioning. Users here are all people that are affected by disaster, but our clients are services that provide help on those areas. For example, our service can be provided in collection centers – places where people find shelter after natural disaster. This organizations are human, want to help, and usually on level of whole country. They make decisions fast, as help is needed as soon as possible, and our company can help in way of maintaining connection on affected areas.

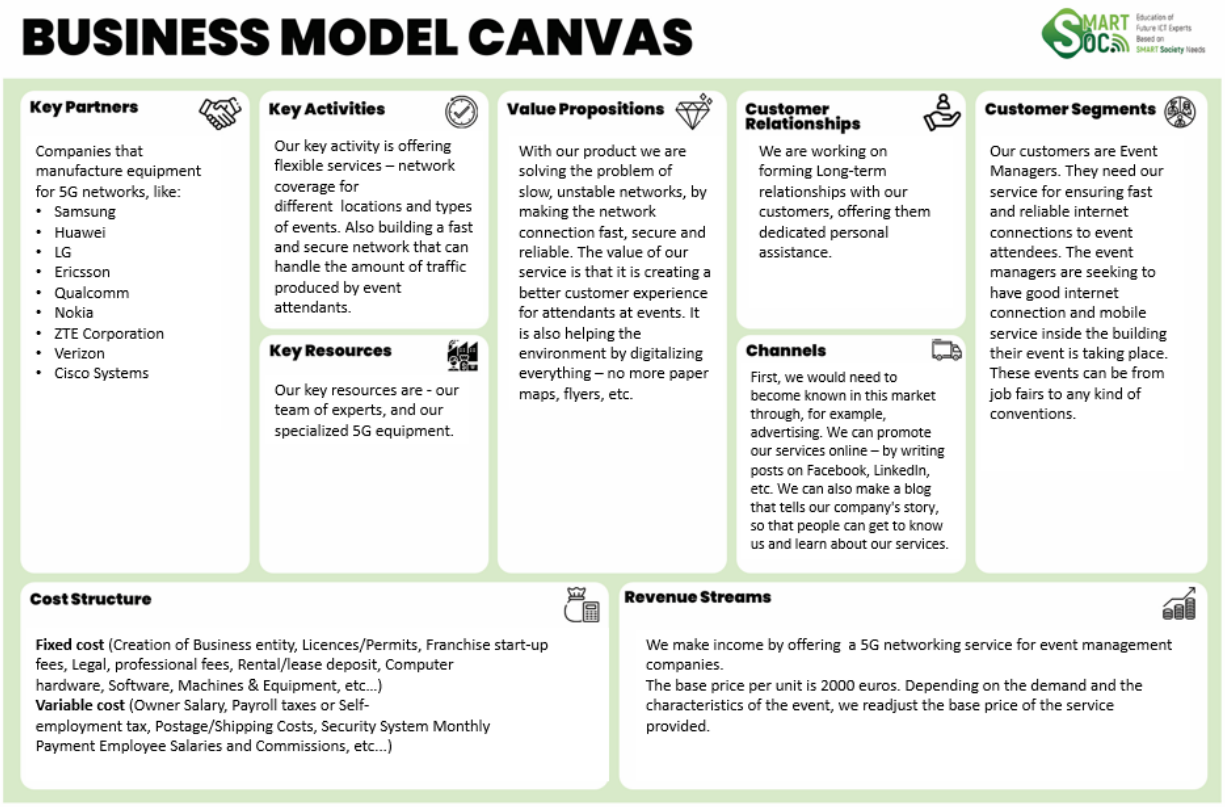
PERSONA



COMPETITORS

Direct competitors	*Indirect competitors*
John Deere	New Holland Agriculture
Case IH	Farm Trac
MONARCH	Kubota
Massey Ferguson	
Fendt	

BUSINESS MODEL CANVAS



Detailed Market Analysis, Management & team & resources, Start-up team development, Marketing activities, Responsible budgeting / Financial projections, Main risks, and the measurements for their reduction are described in Business Plan, which is available on SmartSoc Project Moodle.

SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Societal impacts	Environmental impacts
Better experience on the people attending these conventions/fairs because they would still have good internet connection, something that is very necessary in our daily lives.	The making of the equipment, the process it takes to make the equipment can have an impact in the environment as the process would need from heat, plastics, dealing with metals etc.
By designing a network that will be easy to use and that will connect many people attending the event, we will help form friendships easier. By making sure the security at the venue is being monitored and attendants could be alerted when something happens – we can avoid conflict situations.	When the usage live of the product comes to an end. It would be good if there is a plan that consists of reusing/recycling the raw materials used in order to minimize the waste of these materials. Like separating the metals from plastics and try to reuse them for future products.
The quality of the connection we offer will also contribute to the quality of education, as those attending the conventions will be able to learn better in good conditions. Also, with our 5G network, the transmission of these conventions by videoconference will be of good quality and secure too. This will allow us to reach a wider audience.	We offer paperless events – everything is going to appear on attendants' phones- like map of the venue, brochures for different activities. Doing this we will help the environment by not having to buy paper and saving a tree. Afterwards there will be no paper garbage left at the event.
	Our solution will reduce energy consumption and emissions. According to international standards, 5G requires much less power to operate than 4G, which means using less energy while transmitting more data. For the events, our 5G network linked to the IoT will also reduce energy consumption, as devices will be able to turn on and off automatically when not needed.

SMART PACKAGE SOLUTIONS

https://www.smartsoc.uniza.sk/cases

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SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

HORIZON EUROPE CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Food, Bioeconomy, Natural Resources, Agriculture and Environment

TASK TO SOLVE - INNOVATION FOSTERED BY ICT

Understand the problematics with packaging. Select the most promising case. Develop a technical case. Develop business case.

SMART PROPOSAL

When the package is manufactured, a (remote readable) tag is added. - The tag is connected to database. - The database is based on utilization of blockchain technology. - Package manufacturing information is stored in the database. - Information of package content and transportation are stored in the database, as well as possible reuse. - At disposal, the package is sorted to produce the highest possible added value based on raw materials used.

SMART SPECIALIZATION STRATEGY TOPIC

The Case Study will focus on special materials, advanced materials, modern materials technologies. The Case Study should propose an EU-based solution for global markets. Optimum market entry strategy to be identified at a cost beneficial ratio.

DESCRIPTION

This case proposes a blockchain powered solution to be developed for sustainably managing the increasing amount of packaging materials and especially their re-use and recycling. The core idea of the case is to introduce a Smart Package, that can be tracked throughout its life cycle from manufacturing to the end of life and until raw materials are to be re-used/ recycled. Within the life-cycle management of the Smart Package, there are several opportunities for new business development, spin-offs and IPR (e.g., patents). Some of the main goals of such solution are:

- waste reduction
- improved re-use of packaging materials as raw materials (e.g. cardboard, plastic)
- lower costs for raw materials through efficient recycling
- decreased consumption of natural resources by efficiently utilizing existing packaging materials
- lower CO2 footprint in production of packaging materials, when increasing the re-use of existing materials (e.g. less cutting down of forests for wood, less oil pumping required for plastic, less cargo emissions)
- measurable metrics (e.g. raw-material consumption, re-used raw materials, life cycle of packaging materials)
- possible integration points to the actual use of the package (i.e. what, where and when is packed into the package and how the package is used)
- start-up and investment opportunities.

TECHNICAL ASPECT

Evaluate how utilizing blockchain would create added value:

- tracking the life cycle of the package (from raw material back to raw material again)
- identifying the Smart Package itself and the materials used in the package.
- identification, separation and recyclability of the types of various packaging materials measuring the environmental (CO2) footprint of the Smart Package throughout its life cycle.

Explore what other ICT/IoT/hardware/software technologies in addition to blockchain should be required.

Propose, explore and rank several high-level technical proposals/architectures.

Select one solution that fits the best from both technical and business point of view.

BUSINESS ASPECT

- Who are our target customers? For whom do we generate value?
- What are the channels to reach our customers? Do we need to segment our customers? What customer problem are we attempting to solve?
- What customer needs do we try to satisfy?
- What value do we generate for our customers?
- How does our proposition differ from that of competition?
- What resources are essential?
- What activities are essential?
- Who are most important partners?
- What will they get out of working with us?
- Who are our main suppliers?
- What are the principal costs in our business model?
- What are the financial risks? How do we address them?
- What are our sources of revenue? What is the customer willing to pay for?

SOCIETAL ASPECT

Describe the amounts of goods used in Europe:

- Where are these goods manufactured?
- How are the goods used in Europe packed? How much in general is packaging material needed per ton of goods?
- Range of variation?
- How are the packaging materials treated when the goods are unpacked?
- What is the rate of reuse and recycling of packing material today in average?
- Sketch the material flows of packing material!
- Estimate the reuse and recycling potential of the packing material!
- What information is needed to track, to get a better reuse and recycling rate?
- What is the impact on environment? Compare the current situation and situation when the reuse and recycling is fully utilized.
- How are the material flows changed?
- What are the changes in environmental impact?

You can estimate environmental impact using the most important 6 environmental categories:

- Acidification Potential (AP)
- Eutrophication Potential (EP)
- Global Warming Potential (GWP)
- Ozone Depletion Potential (ODP)
- Photochemical Ozone Creation Potential (POCP)
- Primary Energy Use

EXHILAYLE

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM EC2021:07

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SmartSoc Workhop 2021 Student presentation (Team 7):
https://youtu.be/2msHy0Iz6D4

SHORT DESCRIPTION OF PRODUCT /SERVICE

Our idea is to develop smart package, that can be tracked throughout its life cycle from manufacturing to the end of life. We will offer a variety of these smart packages (different sizes) to the courier companies.

When delivering between customers, courier can just scan QR code, which contain information about package manufacturing, package content, transportation and materials used for package production and many more.

- Primary benefit of our product is protecting the shipment. It is also very ecological and helpful with extra functions such as mobile tracking for customers etc.
- Protecting box, which covers the shipment and mobile app with interface for all, who are involved in courier companies (stakeholders).
- Green ecological box made of 80% recycled material, which perfectly covers her/his shipment. Also, app which gives detailed info about production date of package, materials that are used for production, location, etc. This info is stored in the database.
- Our product will involve recycling of packages in a way that app will track number of package usages during a given period of time. It will have different recommendations regarding the use cycles depending on the package material.
- Adding more features to tracking app, such as packet temperature, exposure to light, impacts, shaking and similar.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

QR code: To use this technology we need a company which produce huge amount of QR codes. We use QR codes because it's the cheapest way. We can save a lot of money for the scanner devices, because we can scan that code with mobile phone, which are owned by everybody. The codes should look like a slim plastic QR code, so before the recycling, those can be easily removed from the package (which has a notch for a slim plastic QR code (etched or carved)) and we can reuse them multiple times in the future.

App with different interfaces: We need app with different interfaces connected to database. This solution is for customers and also for courier companies. Customers can track their order and courier companies can check all important information about boxes such as life cycle etc. We need a programmer who understand the blockchain system and is able to develop basic Android/iOS app to scan the codes plus more important features. This part of job will require a team of experienced programmers for both Android and iOS, and also Data Engineer for creating database with all needed information and automatization.

Choosing QR code over other technologies: While QR code itself is almost a three-decade old technology it has gained popularity with the rise of the smartphones. Alternatives such as NFC, RFID are more expensive and require compatible devices. While iBeacon is also considerable it comes in at a higher price point overcomplicating our product. The QR code doesn't have to contain large amounts of data as it will be processed in the background in a database. To ensure that there is no misuse of our QR code, it will be made protected, where only person who is authorized via app can scan it and get access to read/write data from/on database (Based on given rights).

The backbone: A database representing data about the package. Geolocation, content, current state, ETA, Time of dispatch, etc. The QR code scanned by the app would relay information to this database, providing important data about the scanner (who scanned it, when and where) providing quality assurance. If the package gets damaged, it is easier to narrow down where did the accident happen.

As described earlier the app would have two separate interfaces. Accessing the same database with read-only privileges for users and read-write privileges for couriers. This provides instantaneous update to the end-user and exactly accurate ETA calculations.

After the box is no longer needed by the end-user, they can return it to a collection point. These collection points can mean any small or large business who is willing to take care of this. It is mutually beneficial because they attract potential customers while the courier collecting packages will have a predefined route. In the end a route can be calculated that's the most optimal for delivering and collecting packages.

Another way of protection and providing more accurate info about our packages would be with introduction of "Blockchain". Our product will have 5 blockchain phases, as shown in picture below:

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

This kind of approach would ensure that every phase is well documented and "bullet-proof" to wrong information's. As stated in picture, with blockchain customer can be certain about origin and production of a package and be sure that he can get correct location of package at any time, (*More info about tracking real location in next section) while companies would have precise info about stocks and transportation to/from their warehouses. With blockchain we can gather info which will improve our business through all phases shown on picture. So, in case of factories, we can ensure that customer will be certain about product/packaging provenance and authenticity of raw materials. This phase could also bring us information about ethical practises in factories and ethical sourcing of materials if there are some.

Role of Inspector phase, would be validating factories products in terms of its quality, and quantity sold to other business. This could be done using "Smart contracts" instead of involving third parties to manage this process, which could be costly and unsafe.

As stated before, our system will have a "real time tracking" of package during transportation to customer. Combining our protected QR code, courier can scan packaging and assign it to himself. Every courier company vehicle will be equipped by GPS tracker which we would acquire from other company and integrate it with our system. Our system knows what vehicle is courier using, so it can refresh location of package at any given time. Additional advantage of this system will be notifying customer that package is ready to be delivered, so customer can respond with "time frame" when he is at home, and can pick it up, so courier does not need to deliver it multiple times, or leave it in post office, in case that customer was not at home.

Phase which is already mentioned before, and is mainly concentrated to help companies is Warehouse phase. Integrating this phase of business into blockchain would give advantage to companies in a way that stocks and supplies stored in warehouses, are always 100% documented with correct information's. These information's would include to/from transport data, persons who got in touch with packages and similar. Companies will always know number of stocks/supplies in their warehouses which can help them to manage them accordingly.

And last phase of blockchain benefit will be precise times of deliveries to clients as stated in the upper paragraph and other package handovers (For example between warehouses). This, and other info that was mentioned before will be available to customer via mobile phone app including history of every delivery with complete info about it. Additional feature will be tracking packaging in case it was returned to courier company, with info about packaging recycling.

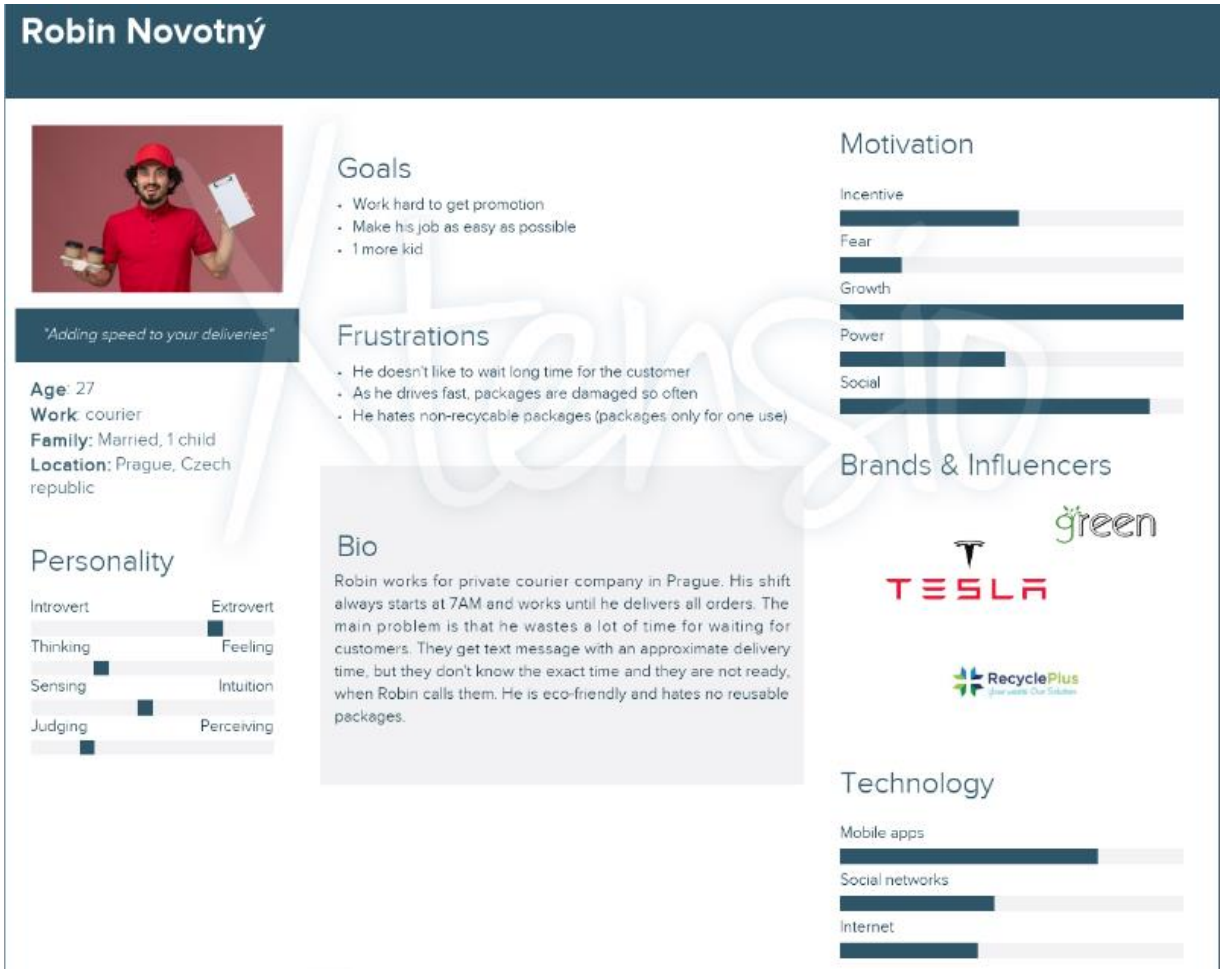
BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

CUSTOMER SEGMENTS

Description of Customer Segment

Young, people who are in they twenties or thirties and who care about the environment.	People in young ages prefer to shop online nowadays. And because of the interest about the environment and pollution, they would like to choose a green option about the packaging. **Demographic:** Age:25, Gender: Male, Marital status: Single, **Education:** University degree, Income: 350.000Huf=1000€, **Geographic**: Central Europe – for example: Hungary, Győr, Hungarian language, 9milion people in the country, 200k people in Győr, **Psychographic information**: They are trying to live without pollution and use green options such as collets selectively the garbage, use bamboo toothbrush and read about the product packages. And they are also encouraging other people to live this way. **Shopping behaviour**: They are buying their clothes, food, and nearly everything online. They are trying to choose green options about many things, but they focus on the price because they are an entrant and the average salary in Hungary (also Slovakia and Croatia – homelands of contributors) are very low compared to the prices. They buy not so much clothes, but what are they buying are very expensive and high branded clothes because they like the fashion.
Newcomer courier companies	In these pandemic days the delivery companies have more jobs, and they need a lot of boxes. **Demographic**: 100k euros income, just a few people working here **Geographic**: Central Europe – for example: Hungary, Budapest, 2M people in the city and 9 M in the country, Hungarian language. **Psychographic information / Shopping behaviour:** They are preferring the cheapest way of everything, because they want to be profitable, and they are just a newcomer company. They are just buying the extremely necessary things. These companies have lack of the framework about tracking app, good database, and that is required for the business. So, we can offer them a transparent database with trackable packages, and good environmental packaging solution. They really need this solution because of these shortcomings they have many complaints. They want to compete with another companies.

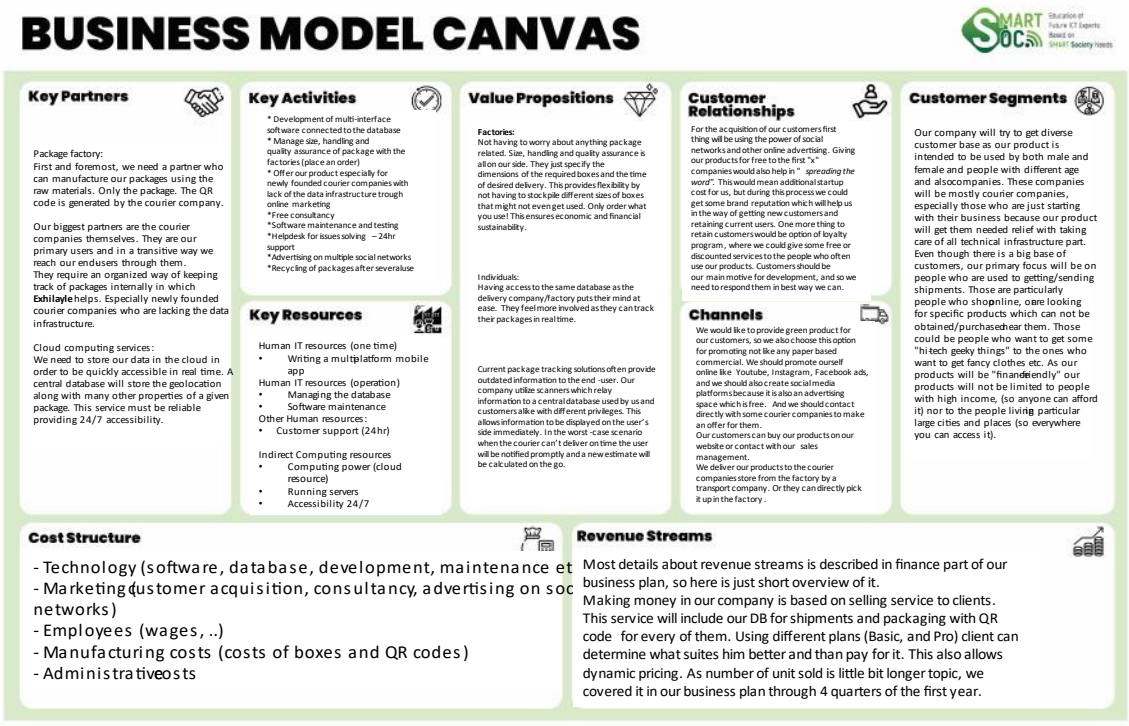
PERSONA



COMPETITORS

Direct competitors	*Indirect competitors*
Spectos	*DPD*
GAO RFID	*UPS*
HopeLand	*DHL*
SmartBoxes	
Scantrust	

BUSINESS MODEL CANVAS



Detailed Market Analysis, Management & team & resources, Start-up team development, Marketing activities, Responsible budgeting/Financial projections, Main risks, and the measurements for their reduction are described in Business Plan, which is available on SmartSoc Project Moodle.

SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Societal impacts	Environmental impacts
As Corona virus struck whole world, we could make agreement with courier companies which would give help to vulnerable groups, in which cases some kind of discount or free packaging would be applied. (UN Goal - 10)	Using our smart tracking, especially by notifying customer about delivery we could reduce number of travels by vehicle, because courier will not have to come multiple times to customer in case he was not at home. This would have an impact on CO2, and other greenhouse emissions. (UN Goals - 13,14,15)
We will try to bring little bit more equalities between countries, in a way that we will try to regulate our prices based on purchasing power and similar parameters of countries. (UN Goals – 10 and 11)	Using blockchain technology and database, we will have reduced paper usage because most of the info would be in digital form. That being said, could have impact on forests and deforestation. (UN Goal – 15)

Societal impacts	Environmental impacts
Society would be also helped in a fact that our solution would give everyone more free time in terms of not waiting half a day for package to come. In that way people can use that time for lot of useful things, such as helping community or personal development etc.	Recycling materials that we use, especially plastic, would have a huge impact and benefit to eco-system. For example, lots of plastic is thrown in seas and oceans these days, and by recycling it we could lower this negative impacts. (UN Goals – 13,14,15)
We could also help with UNs "goal 12": Support developing countries to strengthen their scientific and technological capacity This could bring big benefit to countries who yet don't have any kind of smart systems in transport.	Using our blockchain phases, especially one connected to factories, we could help in an efficient use of natural resources. (UN Goals – 9 and 12)
By establishment of our start-up company, we can offer a job for couple of people. We can cooperate with work offices and offer a place in our company to long-term unemployed people and improve their life. (UN Goal – 1)	

CREATION OF IDENTIFICATION METHODS AND TOOLS TO DISTINGUISH BETWEEN ORIGINAL AND FAKE PRODUCTS

https://www.smartsoc.uniza.sk/cases

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SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

HORIZON EUROPE CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Digital, Industry and Space

TASK TO SOLVE – INNOVATION FOSTERED BY ICT

Counterfeit products cause billions of Euros of economic damage and even cause serious physical or psychic harm to buyers. The growth of legitimate businesses and consumers are affected by lost revenue, downtime, and replacement costs. The task is to solve counterfeits problems, to help maintain the integrity of the goods and reassure consumers.

SMART PROPOSAL

An ICT supported approach can help to avoid and/or reduce the risk of getting the victim of counterfeits respectively fake products also to prevent others from selling counterfeits. Embrace technology and innovative high-tech solutions make identifying fake products easier and extending and protecting ownership rights.

SMART SPECIALIZATION STRATEGY TOPIC

The case study should focus on the secure way of protection of own product against counters. It can be solved at the national level by focusing on innovation under Strategies for Smart Specialization (RIS3) and on the territorial level within "Sustainable Regional Innovation Initiatives (BMBF, 2020) or /and Federal Government´s High –Tech Strategy 2025.

DESCRIPTION

This case proposes is to find appropriate methods and tools how to detect if the product is original or fake. This information is from the sustainable aspect is worth not only for customers but for all market´s stakeholders. Enforce them to act with respect and effectively with limited sources, be responsible to all economic actors, save the environment by reducing waste and create real value for everyone.

TECHNICAL ASPECT

Identification of a product can be related to a specific manufacturer or an individual product. Examples are identification based on:

- marking or labelling of products, e.g. serial numbers of technical products
- marking or labelling of packaging, e.g. in pharmaceutical industry
- embedded marking, e.g. clothing

Which technologies are already available to identify products (RFID, QR-Code…)?

How can these technologies be used to identify an original and a counterfeit?

BUSINESS ASPECT

- Taking your technical solution proposal for an identification method and tool, how can you depict in a business plan?
- How does your proposal cover the financial damages caused by fake products to individuals, industry, society, and other interested parties?
- How does your proposal cover other than financial interests of the mentioned parties/groups?
- How does your proposal take into account liability and legal responsibility?
- What risks and opportunities do you see for your solution regarding the different interests of the parties concerned?

SOCIETAL ASPECT

- Which other impact than the financial ones do you see for concerned parties/groups in your case study? Examples could be:
  - uncontrolled working conditions
  - loss of workplaces
  - danger for health and well-being
- How are these impacts considered in your solution proposal?
- What other aspects of social responsibility could be related to the case study and are reflected in your solution proposal?

AUTHENTICQR

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM EC2021:08

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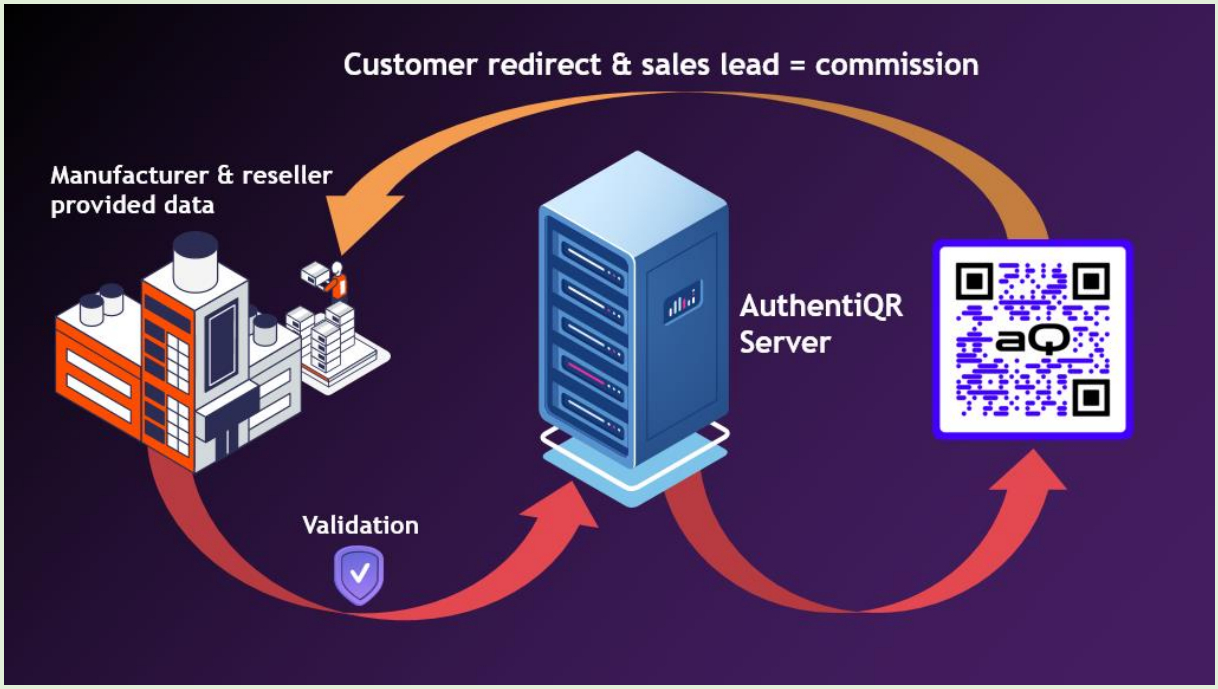
SmartSoc Workhop 2021 Student presentation (Team 8):
https://youtu.be/b-7P2T9f68Q

SHORT DESCRIPTION OF PRODUCT /SERVICE

- A mobile-application accessible on any smart phone with a camera.
- Verification of genuineness
- Community
- Affiliated recommendation
- B2C backed B2B



TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Possible technical implementation:

There are three basic types of mobile apps if we categorize them by the technology:

- Web apps are responsive versions of websites that can work on any mobile device or OS because they are delivered using a mobile browser. (Requires the less resources)
- Hybrid apps are combinations of both native and web apps, but wrapped within a native app, giving it the ability to have its own icon or be downloaded from an app store. ("intermediate" in terms of resources)
- Native apps are created for one specific platform or operating system. (Android or iOS) (Requires the most resources)

Technical strategy:

To keep the initial costs lower we want our beta app to be built by web-based (minimal viable approach) or hybrid (normal approach) technology. Web based and hybrid apps behave similarly to native apps, you can install them, but they are just the projection of a very fast website. Here the common technology is HTML5, CSS or JavaScript. These apps are highly sustainable, and easily programmable. Also, in the future when we will have the adequate number of resources, we can port our web-based app to a native app.

PROS of web-apps:

- There is no need to customize to a platform or OS. This cuts down on development costs.
- They will not take up space on device memory like a native app, making maintenance easier by just pushing the update live over the web. Users do not need to download the update at the app store.

CONS of web-apps:

- There will be functionalities available within one browser and not available on another, possibly giving users varying experiences.
- Because they are shells for websites, they will not completely work offline. Even if they have an offline mode, the device will still need an internet connection to back up the data on your device, offer up any new data, or refresh what is on screen.

The database of our application plays a very important role, as it stores all the verification data. Security and availability are key factors here.

Popular mobile app databases:

- MySQL: An open source, multi-threaded, and easy to use SQL database.
- MongoDB: A schemeless, JSON document database which is known for its flexibility and scalability.
- Google Firebase: All in one mobile application development platform.

SQL vs NoSQL:

SQL programming can be effectively used to insert, search, update, delete database. NoSQL is a non-relational DMS, that does not require a fixed schema, avoids joins, and is easy to scale. NoSQL database is used for distributed data stores with large data storage needs. NoSQL is used for Big data and real-time web apps. Google's Firebase service provides the fastest and most reliable database solutions for a newly developed app like this.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

QR-code generation:

The main technology for identification and data-storing will be QR-code technology. To be able to generate such code, we have to implement an API to our main mobile application.

API is the acronym for Application Programming Interface, which is (an already built) software intermediary that allows two applications to talk to each other. Each time we use an app like Facebook, send an instant message, or check the weather on your phone, we are using an API.

The earlier mentioned affiliate marketing solution is an easily implementable formula:

The target company provides us a special no-follow link that we can embed in the "product recommendation" part of our application. These links leave an active cookie on the user's device, which will be tracked by the business partner's website for 15-30 days. If the consumer purchases a product while the cookie is activated in his or her device, we get a commission.

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

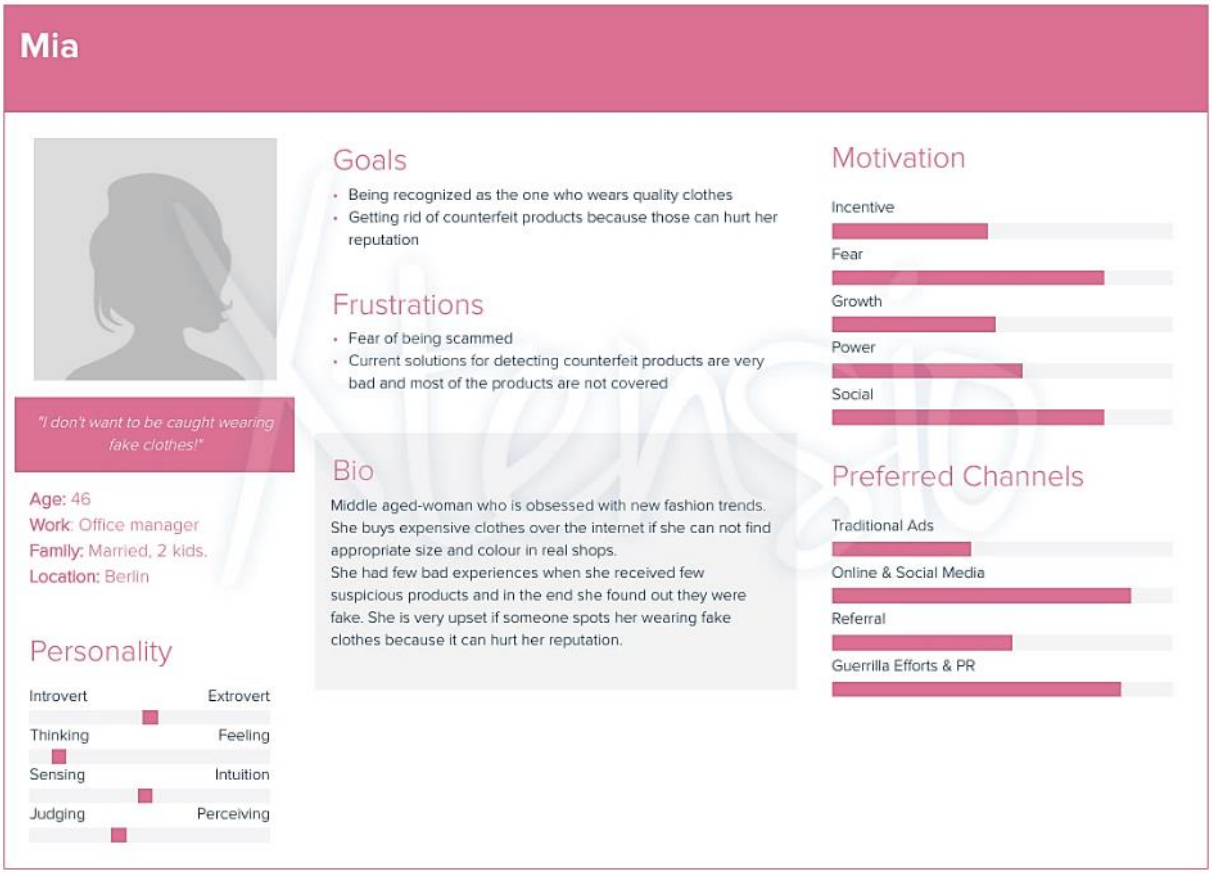
CUSTOMER SEGMENTS

Description of Customer Segment

Adults who may use the app in their everyday life	Our biggest customer segment. They may want to check a wide variety of products. Consumer appliances of entertainment purpose (TV, phone). Something of short-term use (gadgets, groceries) and even long-term use items (electric appliances, cooker, stove, electric oven etc.) Their need to verify a product may be caused by practical or economic reasons - to avoid buying a counterfeit product that may last shorter time or might be dysfunctional and therefore avoid additional expenses by having to buy another product
Teenagers and young adults, mostly from upper middle class and higher societal classes	There is often a need in their community to buy "branded" and original products of specific high quality consumer brands. These products might be made limited which regularly results in a higher price, thus the customer wants to make sure he gets original for the price. Their need of buying an original product might be rather emotional than rational. They want to avoid not only additional expenses but "actually getting a fake", that can be considered rather a question of image (buying a branded product is part of having some "image" or "social status" rather than just a necessity) Also, a lot of customers focus on high-end branded products because the want the original product, not only for image but for the guarantee of quality offered.

B2B business segment.	The goal is to: a) save additional expenses by avoiding accidental buying of a counterfeit product that would cause additional expenses. b) in case of manufacturers or resale businesses, to avoid any possible problems (either legal or non-legal). Key sentence: Building mutual trust between business and business or business and customer by using our verification system.

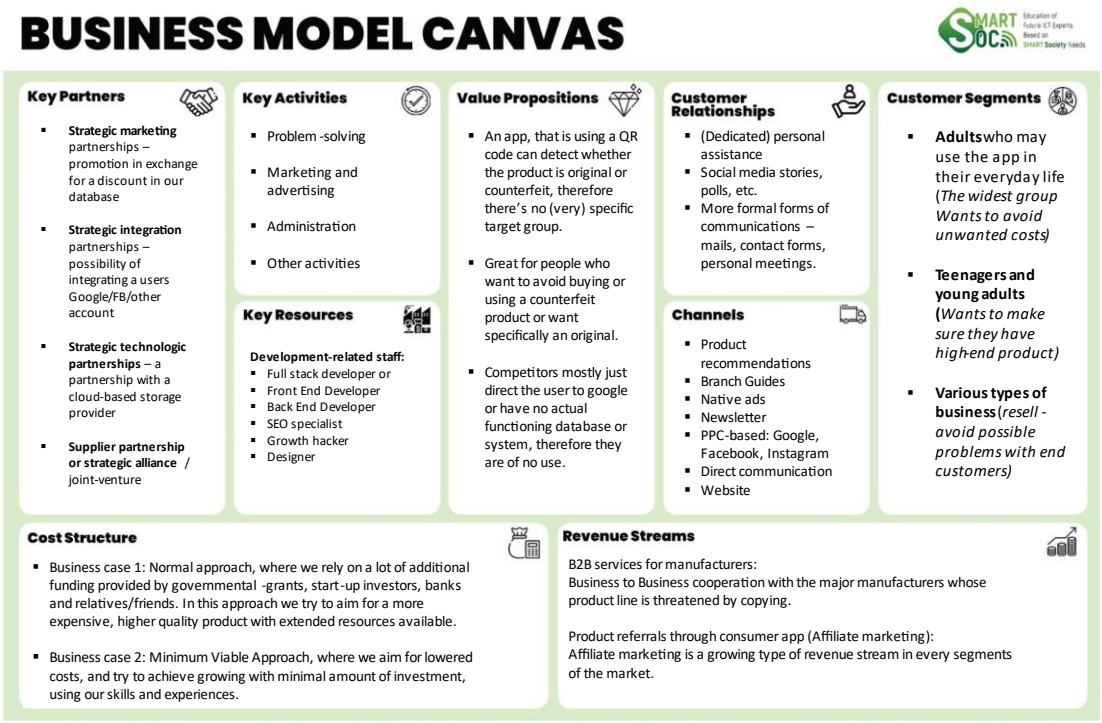
PERSONA



COMPETITORS

Direct competitors	*Indirect competitors*
Chkfake	*Cortem Group*
ScanTrust	*UniqoLabel*
LetsVeriFy (an affiliated branch of ThinkCurve)	*trusted.com*
HiddenTag	

BUSINESS MODEL CANVAS



Detailed Market Analysis, Management & team & resources, Start-up team development, Marketing activities, Responsible budgeting / Financial projections, Main risks, and the measurements for their reduction are described in Business Plan, which is available on SmartSoc Project Moodle.

SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Societal impacts	Environmental impacts
We assume that our product is good for the community since it helps people to distinguish counterfeit products from original products.	Since our product is only an application and not a physical entity, it will not have a measurable negative environmental impact.
Our company will fight to ensure sustainable and inclusive economic growth for our employees. Our goal is to have happy employees and a positive atmosphere around the company.	We predict that our product might even have a positive environmental impact because it might discourage the manufacturing of counterfeit products.
Cultural acceptance - our product does not discriminate, anyone can use it, from any continent, country, race, or culture.	The power consumption of our product is insignificant. Our main power consumption is represented by the usage of phone batteries of end users. Also, our -future- main host server (computer machine) will use some energy, but we do not see it as a problem since computer components are getting more and more power-efficient.

Societal impacts	Environmental impacts
We assume that our product is good for the community since it helps people to distinguish counterfeit products from original products.	One of our motivations is to ensure sustainable consumption of natural resources.
	Since our product is only an application and not a physical entity, it will not have a measurable negative environmental impact.

CYBERSECURITY

https://www.smartsoc.uniza.sk/cases

AUTHORS

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Technical University of Sofia

SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

HORIZON EUROPE CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Civil Security for Society

TASK TO SOLVE - INNOVATION IN ICT

The entrepreneurial case is focused on the development of a product or service that will be able to face the main challenges of the main threats in the cyber area to information systems of medical institutions. The result of this entrepreneurial case will assist hospitals management when measuring the effectiveness of cyber defence and analysing averted cyber-attacks.

SMART PROPOSAL

Usage of applicable suggestions and solutions focused on prevention of e-health information systems and data in medical institutions against certain cyber-attacks.

SMART SPECIALIZATION STRATEGY TOPIC

The entrepreneurial case focuses on "Informatics and ICT" and "Healthy life and biotechnology industries" priorities of Bulgarian Smart Specialization Strategy. This policy includes programmes to support the actions in cyber security as an important area of information systems development.

DESCRIPTION

This entrepreneurial case goal is to find appropriate methods and tools for prevention and averting of cyber-attack in information systems of medical institutions. E-health is an important area where the newest findings in ICT are applied. E-health and related information systems should be sustainable, safe, secure, and reliable. Information systems of hospitals contain unimaginable amount of data. This data contain often private records and it is necessary to protect them. Managers of e-health systems and information systems are duty to protect the privacy and confidentiality of health information very seriously. They need robust "safeguards" in place to help keep this information secure and confidential.

TECHNICAL ASPECT

Identification of a product or service that could be related to the hospital information system and is able to detect the main attacks in the cyber area. Beside this, it is important to answer these questions:

- What are measures for cyber defence and analysis of the attacks?
- What are the approaches to improve the cyber security in e-health systems?
- What is impact of the human factor?

BUSINESS ASPECT

Students need to make business analysis considering the technical point of view and the situation on the market.

- What is the current situation on the market?
- What can be offered as a solution of the security problem for different types of medical institutions?
- What kind of products or services can be developed and offered to customers?
- What resources are essential?
- Is it necessary to cooperation with government organisation? Which way?

SOCIETAL ASPECT

Student team need to provide more detailed analysis that will be able to answer questions related to:

- social impact of the cyber security
- human factor in the cyber world
- most common attacks in cyber space
- who in the society is the most vulnerable
- what will be the improvement for the social life?
- handling personal data
- direct and indirect social impact.

MEDICYBER

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM EC2021:09

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SmartSoc Workhop 2021 Student presentation (Team 9):
https://youtu.be/qBiI_Y4_HUo

SHORT DESCRIPTION OF PRODUCT /SERVICE

Any institutes such as hospitals and clinics work with medical devices. Internet of things, respectively of medical devices is rising rapidly and before mentioned institutes cannot handle issues and threads connected with using internet devices. We want to do the cybersecurity part for them and let them do what they are good at.

Need assessment:

Medical institutes need proper security measures being applied externally and effectively without bothering them.

Vision:

Doctors are healing patients with devices; we are securing their devices.

Goal:

Clinics have developed proper security measures in all possible ways.

Our main product is rather service. We want to ensure that our clients have access to professional security strategies. Concrete product our customers will receive is a strategy connected with a consultancy where we will properly examine all the threads at different levels and provide them with strategy to secure their medical devices.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Implantable medical devices

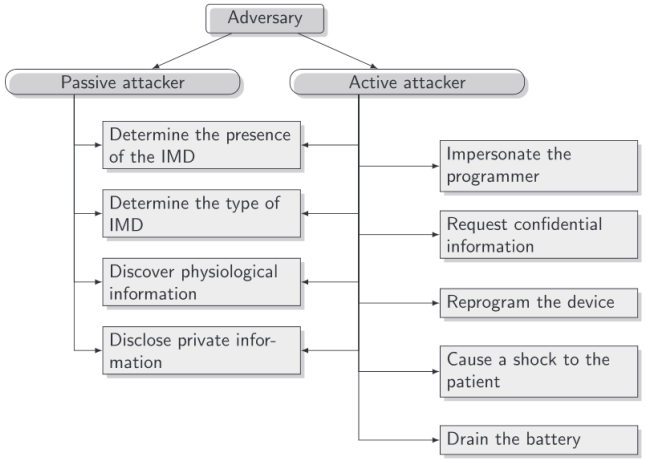
An IMD is often defined as an electronic device that is permanently or semi-permanently implanted on a patient with the purpose of treating a medical condition, improving the functioning of some body part, or providing the user with a capability that he did not possess before. These devices are often implanted around 2–3 cm under the patient's skin and connected to the organ that needs treatment or monitoring. Cardiac implants are possibly the most widely known example of IMDs, but many others are increasingly being used to deal with different medical conditions more efficiently than by traditional methods. The most common types include:

- Cardiac implanted devices: Pacemakers, Implantable Cardioverter Defibrillators (ICD).
- Neurostimulators
- Drug Delivery Systems (DDS).
- Biosensors

Security assumptions

Security threats against the IMD can be categorized using the STRIDE methodology. The acronym stands for six general categories of attacks: Spoofing, Tampering, Repudiation, Information disclosure, Denial of service, and Elevation of privilege.

Types of attackers:



Limitations and trade-offs:

IMDs have restricted capabilities in three separate dimensions: **energy, storage, and computing power**. All three of them have security implications, either because they can be misused or because they limit the security mechanisms that can be afforded.

Protection measures:

Different security mechanisms that have been proposed to thwart security threats in IMDs. Many of these proposals explicitly address the trade-offs and tensions previously discussed, while others simply focus on counteracting specific attacks. The majority are preventive and attempt to stop attacks from happening in the first place, although detection and correction mechanisms have been also suggested.

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

CUSTOMER SEGMENTS

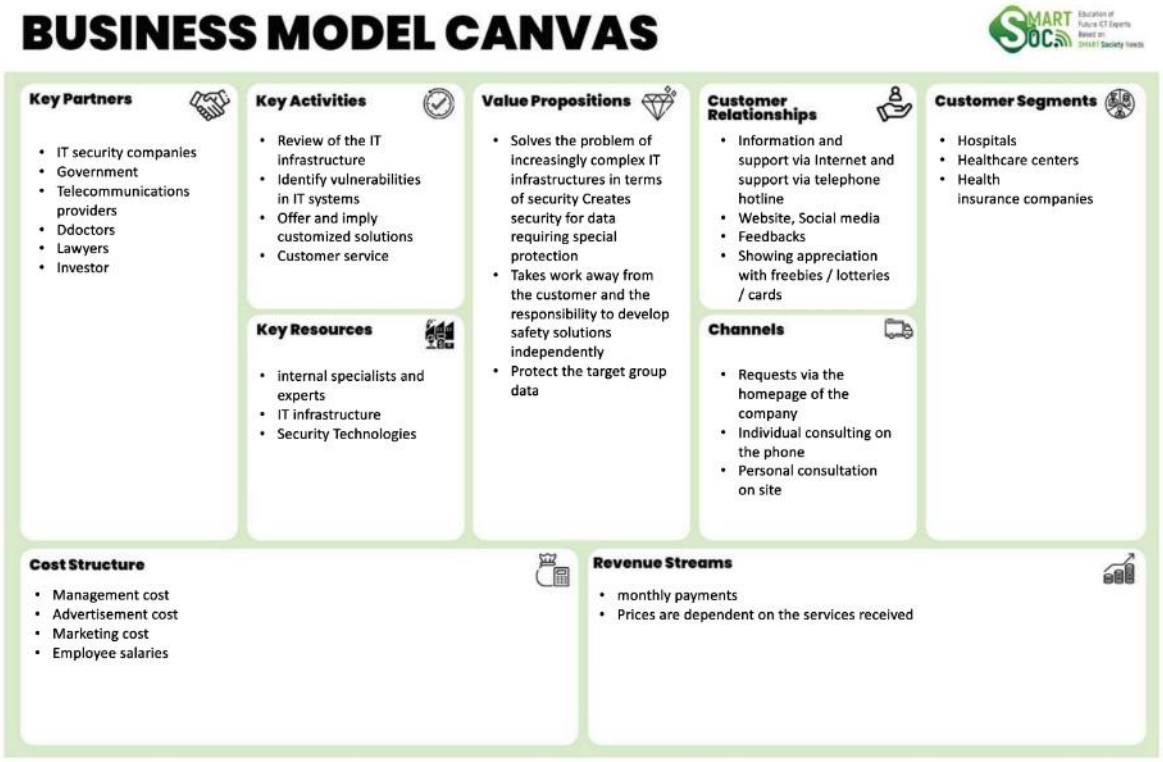
Description of Customer Segment

Primary target group	Clinics such as hospitals, healthcare centres, elderly homes, private hospitals.... Hospitals with this further ddescription: Hospital winch use IOT sensors, devices connected to the internet. Hospitals with developed networks which want to start using IOT sensors.
Secondary target group Key partners, needed for our technical solutions	Doctors, medics, nurses, patients, clients of elderly homes.... Company producing devices (We must work with these producers to secure the devices) Another IT companies, competitors, national centers for cyber security
Another partners	Health insurance companies, founders of hospitals, clinics,

COMPETITORS

Direct competitors	Indirect competitors
IT security companies	Microsoft
Nethemba	QuEST Global Services
HackerOne	McAfee
ImmuniWeb®	
Intruder	

BUSINESS MODEL CANVAS



Detailed Market Analysis, Management & team & resources, Start-up team development, Marketing activities, Responsible budgeting/Financial projections, Main risks, and the measurements for their reduction are described in Business Plan, which is available on SmartSoc Project Moodle.

SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Societal impacts	*Environmental impacts*
POVERTY (#1): "Ending poverty depends on individuals being able to access information over the Internet." With our solutions, we are helping to reach that goal. Our solution will keep the medical data of all the users safe, this way the ones in the most *vulnerable position can trust their information to the helpers.*	Digitalization means that there's no need to use paper and storage units for those.
GOOD HEALTH AND WELL BEING (#3): Increased digitization of the healthcare sector exposes patients and hospitals data to new risks and attacks - Medicyber will be on the front line securing the medical datas and therefore supporting economic growth by preserving the benefits digitization and increasing trust in it.	

Societal impacts	*Environmental impacts*
GENDER EQUALITY (#5): "End all forms of discrimination against all women and girls everywhere." "Reports and studies of discrimination and violence against women from online resources and suggestion that cybersecurity inequalities exacerbate existing societal inequalities, including along gender lines." Keeping the data safe is also contributes to this widespread problem.	

ENTREPRENEURIAL CASE STUDIES 2022

In the third (final) year of the SmartSoc project, the Steering Committee had approved seven Entrepreneurial Case Studies within SmarSoc Blended Mobility 2022. Each author of the entrepreneurial case study made a video to present its aim and tasks. According to the blended mobility timeline, seven international student' teams (each team with 4-5 students) were assigned to deal with the business plan and activities related to the entrepreneurial case study tasks.

The solutions of the Entrepreneurial Case Studies were presented and evaluated within SmartSoc Workshop 2022 which was held on Valencia from 9 to 20 May 2022.

Table 7. SmartSoc 2022 Entrepreneurial case overview

EC2021	Entrepreneurial Case Study Title	AUTHOR´S Home Institute
01	Entomophagy – Smart Insect Farming	EIAB, Wilhelm Buchner Hochschule, Germany
02	Boosting collaborative and smart governance in COVID times	University of Oradea, Romania
03	Minimizing the Risk of SARS -CoV-2Virus Infection by Assessing Virus Exposure	Jurij Strossmayer University of Osijek, Croatia
04	Creating learning and team building with 3D printing	University of Debrecen, Hungary
05	Smart Google Street Map – based Route Analysis for People with Special Needs	IMT Atlantique Bretagne Pays de la Loire, France
06	It's Fake News. Detection of (Un)reliable Information	University of Zagreb, Croatia
07	NoMo-FoWa No More Food Waste. Digitalization Against Food Waste Pro Circular Economy	University of Jyvaskyla, Finland

The selected entrepreneurial case studies 2022 for SmartSoc Blended Mobility 2022 were linking of with four specific calls/topics of Horizon 2020. Focus areas have been chosen to strengthen student´s critical thinking and ability to find smart business and technical solutions with joint efforts in a relevant context for every stakeholder.

Table 8. Mapping of SmartSoc Entrepreneurial cases 2022 to Horizon 2020 (Societal challenges)

Horizon Europe global Challenges (Pillar 2)	SmartSoc Entrepreneurial case 2022
Culture, Creativity, and Inclusive Society	Boosting collaborative and smart governance in COVID times
	Creating learning and team building with 3D printing
	Smart Google Street Map – based Route Analysis for People with Special Needs
Food, Bioeconomy, Natural Resources, Agriculture and Environment	Entomophagy – Smart Insect Farming

Horizon Europe global Challenges (Pillar 2)	SmartSoc Entrepreneurial case 2022
Civil Security for Society	Minimizing the Risk of SARS -CoV-2Virus Infection by Assessing Virus Exposure
Digital , Industry and Space	EC2022 06 It's Fake News. Detection of (Un)reliable Information
	EC2022 07 NoMo-FoWa No More Food Waste. Digitalization Against Food Waste Pro Circular Economy

SmartSoc entrepreneurial case studies 2022 belong to eleven of seventeen SDG's goals (UN AGENDA 2030). These predefined goals guided students to think about how to create a business plan not focusing only on profitability but also on communities, employees, business surroundings, and environmental protection. Besides achieving economic prosperity, environmental quality and sustainable circulation are essential based on rigorous protection of environmental compartments and using as few non-renewable natural resources and hazardous substances as possible. Furthermore, understanding that unlimited needs of people can be fulfilled just with limited sources and these sources should be accessible also for a future generation had given the students a chance to think about various sustainable aspects of their business suggestions.

Table 9. Mapping of SmartSoc Entrepreneurial cases 2022 to 2030 Agenda for Sustainable Development

SDG´s GOALS	Entrepreneurial Case Study 2022
1. No Poverty	NoMo-FoWa No More Food Waste. Digitalization Against Food Waste Pro Circular Economy
2. Zero Hunger	Entomophagy – Smart Insect Farming
	NoMo-FoWa No More Food Waste. Digitalization Against Food Waste Pro Circular Economy
3. Good health and Well - being	Entomophagy – Smart Insect Farming
	Minimizing the Risk of SARS -CoV-2Virus Infection by Assessing Virus Exposure
4. Quality Education	Creating learning and team building with 3D printing
	It's Fake News. Detection of (Un)reliable Information
	NoMo-FoWa No More Food Waste. Digitalization Against Food Waste Pro Circular Economy

SDG´s GOALS	Entrepreneurial Case Study 2022
8. Decent Work and Economic Growth	Minimizing the Risk of SARS -CoV-2Virus Infection by Assessing Virus Exposure
9. Industry, Innovation, and Infrastructure	Minimizing the Risk of SARS -CoV-2Virus Infection by Assessing Virus Exposure
	It's Fake News. Detection of (Un)reliable Information
10. Reduce Inequalities	Boosting collaborative and smart governance in COVID times
	Creating learning and team building with 3D printing
	Smart Google Street Map – based Route Analysis for People with Special Needs
11. Sustainable Cities and Communities	Entomophagy – Smart Insect Farming
	Boosting collaborative and smart governance in COVID times
	Smart Google Street Map – based Route Analysis for People with Special Needs
	NoMo-FoWa No More Food Waste. Digitalization Against Food Waste Pro Circular Economy
12. Responsible Consumption and Production	Entomophagy – Smart Insect Farming
	NoMo-FoWa No More Food Waste. Digitalization Against Food Waste Pro Circular Economy
13. Climate Action	Entomophagy – Smart Insect Farming
16. Peace and Justice Strong Institution	Boosting collaborative and smart governance in COVID times
	It's Fake News. Detection of (Un)reliable Information

ENTOMOPHAGY – SMART INSECT FARMING

https://www.smartsoc.uniza.sk/cases

AUTHORS

Klaus Fischer, Lutz Buchner
EIAB, Wilhelm Buchner Hochschule

HORIZON EUROPE CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Food, Bioeconomy, Natural Resources, Agriculture and Environment

SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

TASK TO SOLVE - INNOVATION FOSTERED BY ICT

Entomophagy means the use of insects as foodstuff for humans or as a feedstuff for animals. While human insect-eating is often a taboo in Northern countries, it is a common phenomenon in many parts of the world. The use of insects as an alternate source of protein is not new and insects are/were regularly eaten by humans. Several studies show that the consumption of insects contributes positively to the environment and to health and livelihoods. However, in the last decades, a global "nutrition transition" is taking place, exporting the non-sustainable meat-based Western diet to other parts of the world. As in other sectors, too, the transfer of Western styles of production and consumption lead to high environmental loads and resource depletion and promotes unhealthy lifestyle patterns.

SMART SPECIALIZATION STRATEGY TOPIC

The case study "Entomophagy – Smart Insect Farming" is mainly contributing to the Priority "Sustainable economy and energy" of the German Smart Specialization Strategy (RIS3), thereunder to the fields of bio-economy, sustainable agricultural production, sustainable consumption.

DESCRIPTION

TECHNICAL ASPECT

From a technical as well as a business development point of view, there are a couple of challenges here which should be addressed in this case study:

- Still missing data on optimal breeding conditions, in particular in Northern production sites • Manual steps of insect farming lead to high costs of production
- (Local) production capacities are insufficient for market development and penetration

Research questions: The research question of this case study are:

- Which technologies can be used to identify the individual status of the insects for sorting and to optimize culture conditions etc.?
- How can smart technology solutions foster the upscaling of insect farms, e.g. for urban farms and/or industrial insect production?
- How can smart technology help to learn from the process and can optimize it (for example: artificial intelligence)?

Possible relevant task fields for technology support are:

- Sorting insects by different stages of development (e.g., eggs, larvas, pupa and adult insects)
- Optimizing culture conditions (e.g., humidity, temperature, feed composition)
- Separating "waste materials" as rotten feed, moulting skin, dead insects and dung (moulting skin and dung are rather co-products and can be utilized/capitalized)
- Decision support as warnings in case of diseases, identifying the optimal time of harvest, determining the maximum harvest (ensuring a constant or growing culture)

BUSINESS ASPECT

Which business models can be developed for "smart insect farming"? EU policy background:

- On 1st June 2021, the European Commission authorized the placing on the market of dried yellow mealworm as first insect in its novel food list, following a stringent scientific assessment made by the European Food Safety Authority (EFSA).
- Under Horizon Europe, insect-based proteins are considered one of key areas of research.
- The "Farm to Fork" Strategy of the European Green Deal requires sustainability and traceability along the whole food value chain.

At present, insects as foods represent a very small niche market in the EU. However, a rising commercial production of insects as food and animal feed is expected and there is an increasing number of production facilities, also in Western countries. Most relevant questions are:

- How to reduce the high costs of manual process step which are a major barrier for up-scaling production in EU countries?
- How to develop adequate business models for smart technology solutions for insect farming?
- Which PESTEL-factors can be identified (P: Political, E: Economic, S: Societal, T: Technological E: Environmental; L: Legal)

SOCIETAL ASPECT

According to the Food and Agriculture Organization of the United Nations (FAO), insects as food emerge as an especially relevant issue in the twenty-first century and for meeting the UN Sustainable Development Goals (mainly in the fields of the goals zero hunger, health and

wellbeing, sustainable production and consumption as well as climate protection) due to the following reasons:

- rising cost of animal protein
- food insecurity
- environmental pressures
- population growth
- increasing demand for protein among the middle classes.

Here, insects for food provide a couple sustainability benefits:

- insects are a highly nutritious and healthy food source with high "good" unsaturated fats, protein, vitamin, fibre and mineral content
- alternative protein source facilitating the shift towards healthy and sustainable diets
- high feed conversion efficiency of insects
- less greenhouse gas emissions
- less use of water and arable lands
- insect-based bioconversion as a solution for reducing food waste

Inspirinsect

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM EC2022:01

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SmartSoc Workhop 2022 Student presentation (Team 1):
https://youtu.be/oKW7GgA-Bj8

SHORT DESCRIPTION OF PRODUCT /SERVICE

System that detects automatically different forms of insects. In a simple example prototype, after certain threshold level has been surpassed (for example 5% of the pixels have RGB values under 40) system reports through API that certain action (like separation) has to be done. In reality we need more advanced image recognition algorithm.

This is detection process that can be used with mealworms since beetle state has distinct black colour compared to other states. Same logic applies approximately to soldier flies too. System can be further developed with ability to detect dead insects with more advanced image recognition algorithms.

Aforementioned technology is expected to raise costs significantly so this technology could be primarily marketed towards bigger companies. House crickets don't have such a distinct colour difference between states like mealworms, however male adults produce high frequency sound that can be detected. Therefore, microphone can mark time when it detects first time continuous enough sound sample of this high frequency chirping and decibel differences in chirping. From these datasets, system reports again through API when certain threshold values are surpassed. However, this sound technology should be left for future development for now.

Since we are talking about software here, version of the software can be sold through play/app store on mobile platforms, so smaller companies and individuals can repurpose old smartphones and turn their insect farms to smart insect farms. However separate hardware can ensure more accurate results with standardization.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Recycling old smartphones as cameras:

In the past 10 years the smartphones were equipped with decent cameras, and many sensors such as hygrometers (humidity). A solution is to use the smartphones for their sensors and the camera, the camera of the smartphones would be efficient enough as we don't need the highest tier quality. The sensors, in the case of hygrometers don't need to be 100% accurate as we could use the delta between a known humidity rate and the desired humidity rate.

Ex: Samsung Galaxy S4 (2013) – 13MP Camera, thermometer, hygrometer.

The phone would be plugged to a recycled server or desktop running Linux to allow more performance on data analysis (image recognition etc..), optionally image recognition could be running on smartphone itself with lower accuracy. In this low accuracy mode phone should only take pictures every couple of seconds in order to free resources for image recognition.

Smartphones should take photos instead of video for reduced strain on Soc and for lower complexity in image recognition. Photo every couple of seconds should be more than enough for image recognition to have enough data for as accurate as possible results. Our software should also allow to stream live video feed in order to check if separation is necessary.

User would have mobile app and/or web site with credentials where to follow sensor status and change thresholds. Servers would be built on google cloud platform or AWS. Video feed doesn't necessarily require encryption since we are talking about non-sensible stuff. We could also include database of easily accessible information about insect farming to further help the farmers. Sensor side android app should also have battery charging limiter in order to prolong the lifespan of batteries since if the battery fails recycled phone will most likely power off.

Software-wise, using Flutter development for would allow the application to run on any smartphone and exploit sensors.

Image recognition could use template matching method and connected domain method. It has been proven in multiple papers that smartphones and Raspberry Pis are capable of running simple insect detection image recognition algorithms so there shouldn't be need for separate processing unit. Since lighting conditions, camera angle and background of insects will remain mostly the same, image recognition algorithm can be relatively simple.

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

CUSTOMER SEGMENTS

	Description of Customer Segment
Industrial Companies	High level farming companies that might benefit from the automated system.

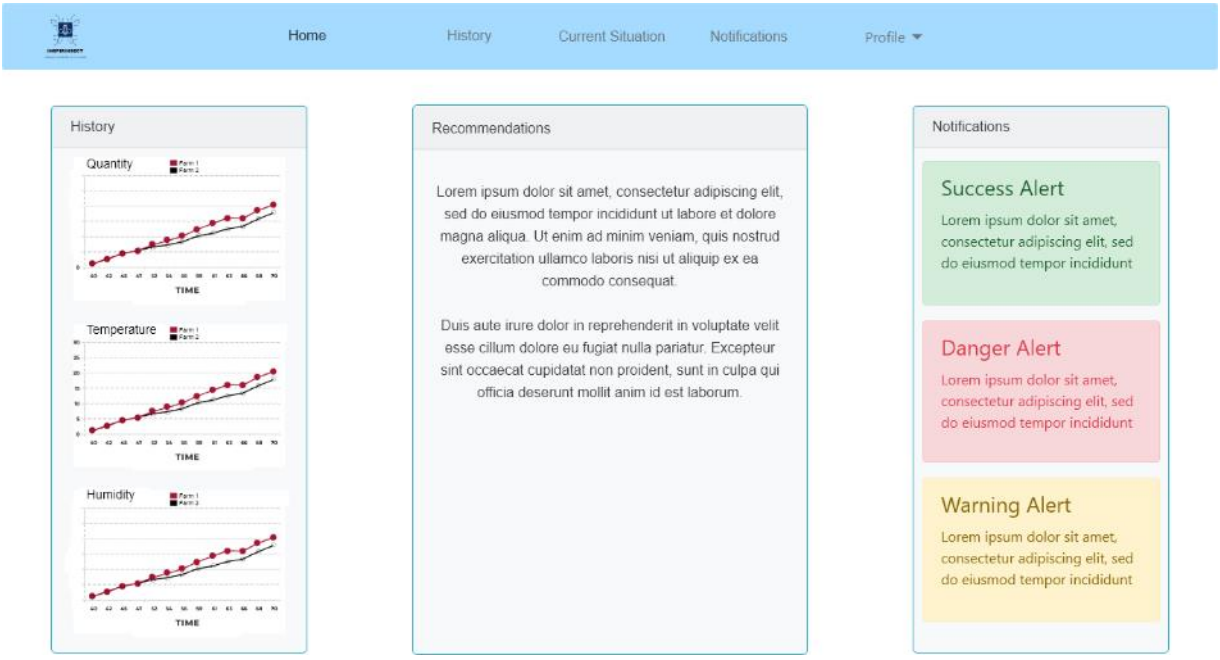
	Description of Customer Segment
Main customer: Smaller Companies/ Startups	Companies that do insect farming in a smaller level and don't have fully optimized production process yet, especially those highly focused on environmental issues and sustainability. Our technology will allow their manufacturing of their insect's products to be quicker and more scalable.
Individual enthusiasts	Individuals that are trying out insect farming and aren't very familiar with the topic yet.

PROTOTYPE

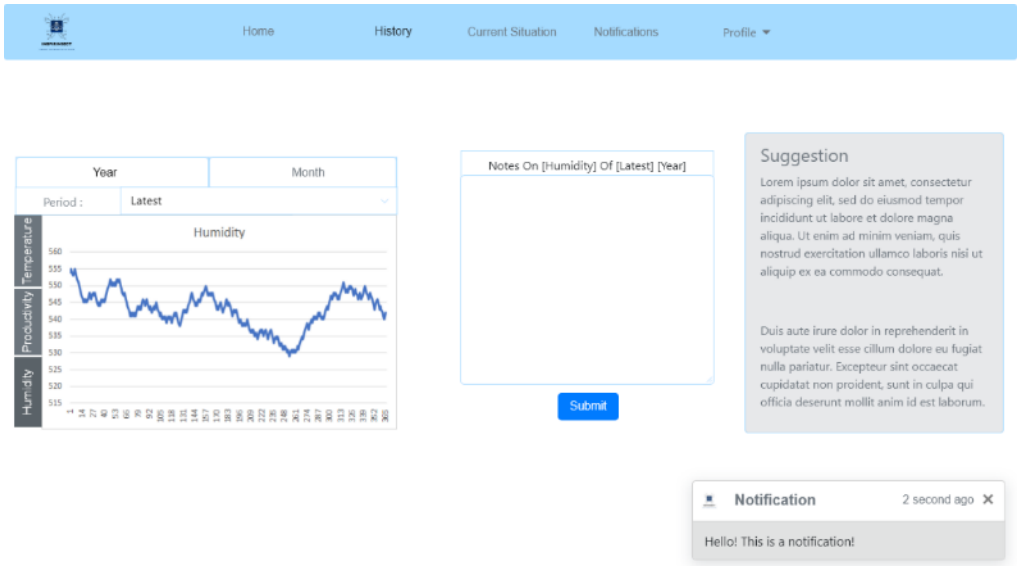
UI/UX

In order to manage the farms, the customers must have information. Using a website, our solutions focus on providing recommendations to the customers in order to improve the outcome.

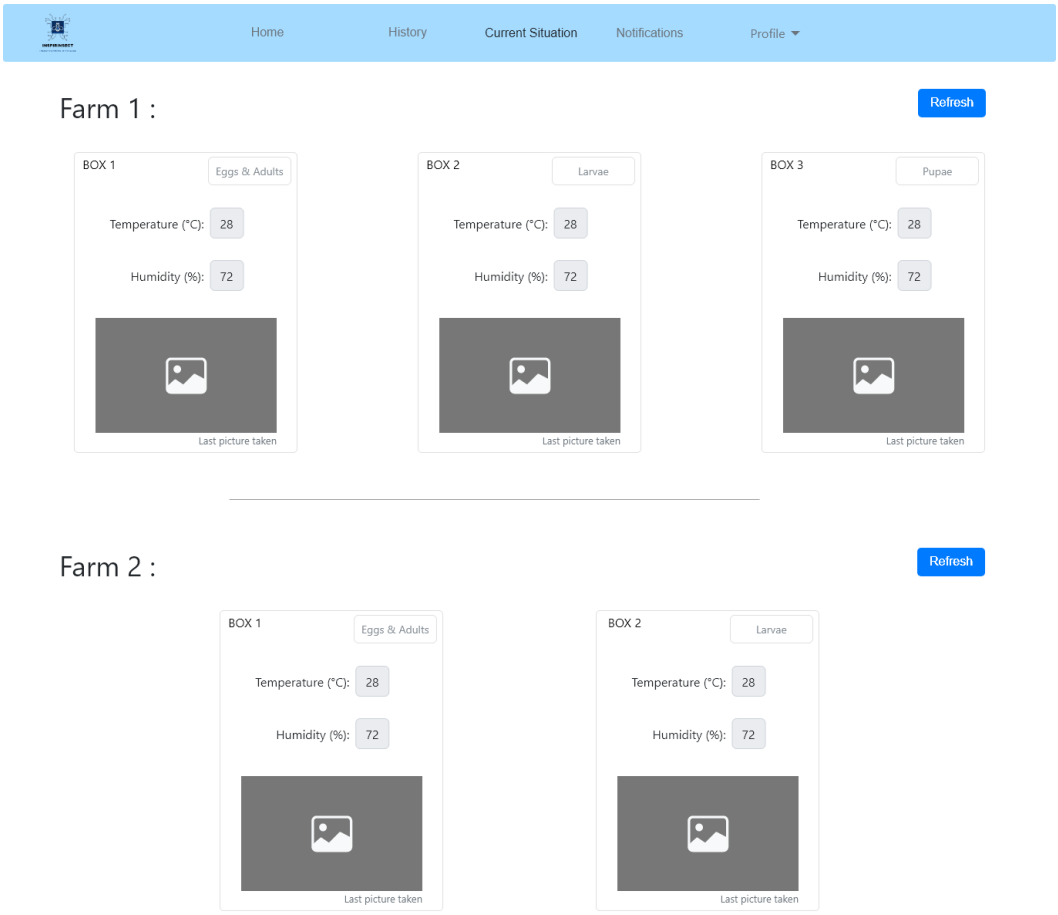
The homepage is the first page that customers see. It provides the main information on the history of the different containers and recommendations to improve the outcome, with notifications to be informed on problems happening or that happened since the last log in.



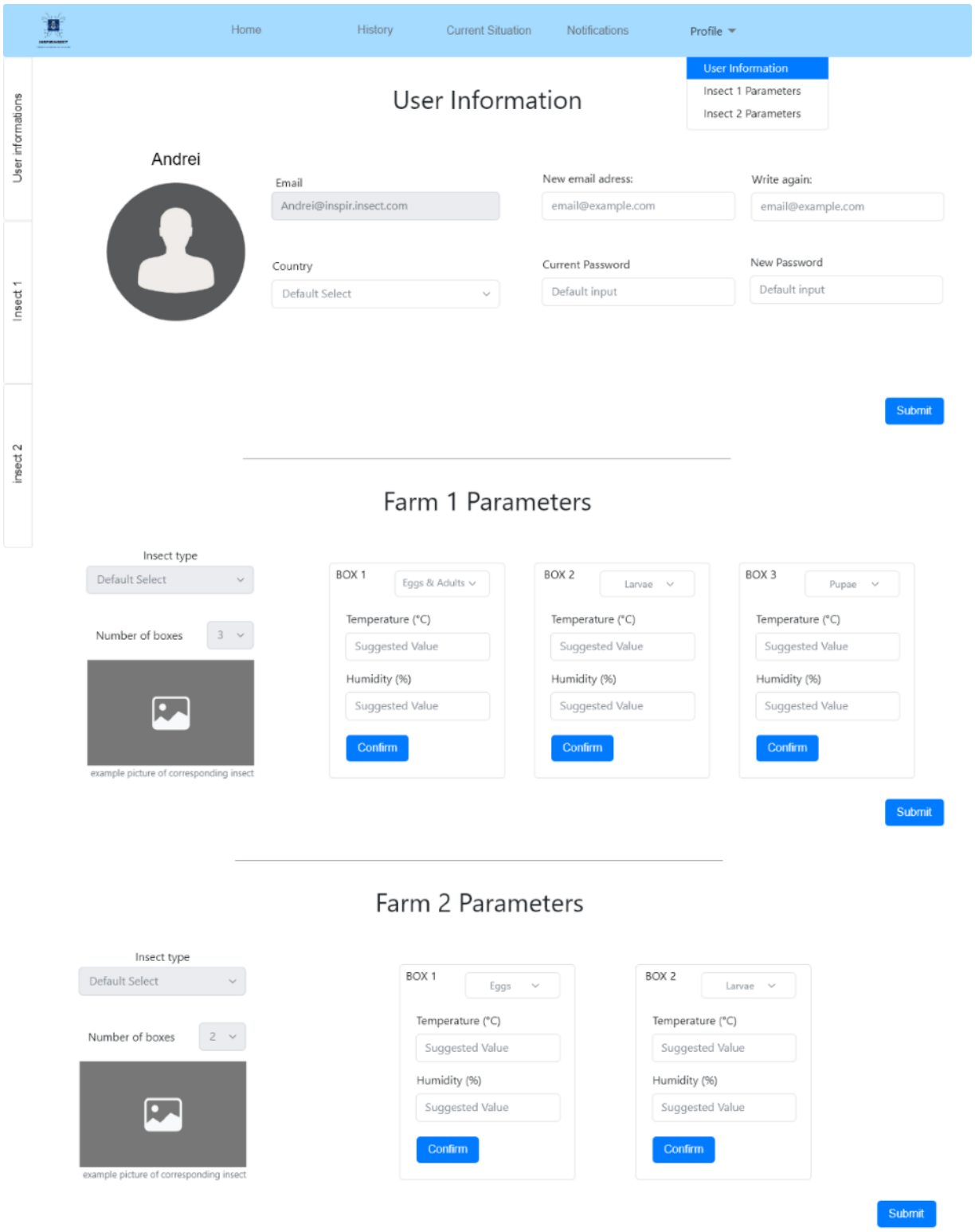
The history page is the main tool for the customers, they have analysis on the farm since the first day, input notes to keep track on the modifications, and have suggestions to improve the outcome based on that period.



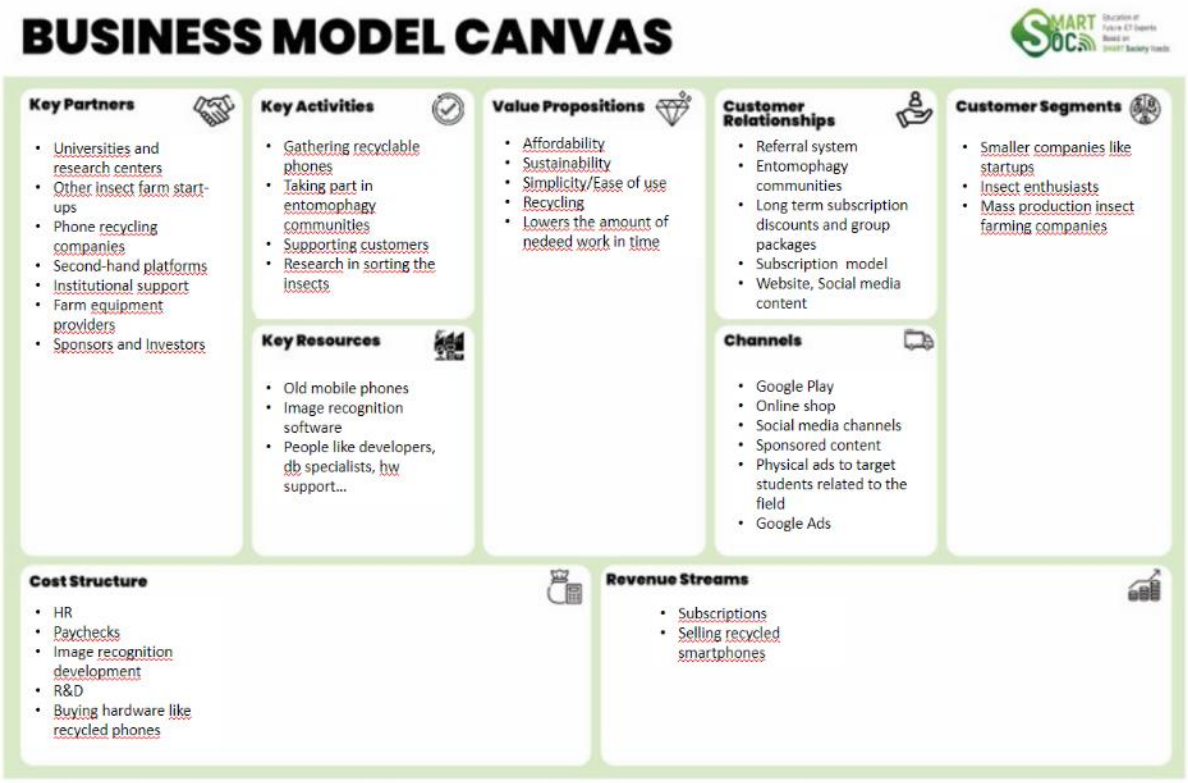
The Current Situation provide the latest information for humidity, temperature and the latest picture taken. It allows the customers to see if everything is going well. If needed, the pictures can be increased in size.



The Profile and Setting Page provide brief information on the logged in user and allows them to change their password and e-mail address. Under, they can change the settings related to the different farms such as insect type, number of boxes used, the temperature, the humidity, and the corresponding cycle for each box. Using the drop-down menu, they can access easily to the field they are interested to.



BUSINESS MODEL CANVAS



Detailed Market Analysis, Management & team & resources, Start-up team development, Responsible budgeting/Financial projections, Main risks, and the measurements for their reduction are described in Business Plan, which is available on SmartSoc Project Moodle.

SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Societal impacts	*Environmental impacts*
Foster acceptance towards second hand products.	Promotes recycling, which helps in reducing the number of waste phones. The glass made of phones can take up to one million years to decay, for the battery it can take up to a hundred years. By reusing phones and computers for our product we are relieving the earth of several waste product which could have taken thousands and thousands of years to be degraded
Promote entomophagy as part of the western diet, as a healthy and sustainable alternative to meat products.	Our product promotes entomophagy which has positive impacts on the environment compared to normal animal farming like • Lower consumption of water and need of land hence a lower Impact on the environment. • The greenhouse effect of insect farming is lower.

	• Insect feed on organic by products hence there is less pollution in the environment. Insects convert protein more efficiently than large animals hence feeding them and equivalent amount of food can yield better results than with large animals
Help to achieve the following United Nations Sustainable Development Goals: **Goal 2: Zero Hunger** Insects are great protein source, and produce quality human food and animal feed. Being able to develop affordable technology for this purpose would allow local production, and could help ensure food access on developing countries.	**Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.** Many species are endangered today because we continuously farm them to feed ourselves or other animals. By promoting entomophagy, our product introduces a new source of protein which has the same benefits as others while being more environmentally friendly.
Goal 12: Responsible consumption and production Our company aims to recycle old devices and repurpose them, tackling the current e-waste global problem and ensuring sustainable production patterns.	**Goal 13: Climate action** Our product would help insect farming, which requires less land and water than other extended productions, and generates less greenhouse emissions.
Other Sustainable Development Goals would be Goal 9, industry, innovation and infrastructure and Goal 15, life on land.	Ensure circular economy, using environmental resources efficiently.
Foster acceptance towards second hand products.	Promotes recycling, which helps in reducing the number of waste phones. The glass made of phones can take up to one million years to decay, for the battery it can take up to a hundred years. By reusing phones and computers for our product we are relieving the earth of several waste product which could have taken thousands and thousands of years to be degraded

BOOSTING COLLABORATIVE AND SMART GOVERNANCE IN COVID TIMES

https://www.smartsoc.uniza.sk/cases

AUTHORS

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HORIZON EUROPE CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Culture, Creativity and Inclusive Society

SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

TASK TO SOLVE – INNOVATION FOSTERED BY ICT

The Covid-19 pandemic has transformed our interactions, creating social distancing, online meetings, and has prompted the reconfiguration of our public spaces. Notwithstanding the dissipated shock of the lockdown and the prospect of vaccinations and new treatments, political actors have started promoting the use of technologies to reimagine and redesign our social interactions to maintain their resilience in challenging times. At the same time, smart cities rely heavily on the component of smart governance. The prospect of involving citizens in decision-making in smart cities is mentioned heavily in the literature (see references below) as one of the components of smart cities, along with smart living, smart economy, smart mobility etc. Citizen involvement should not be an obligation or a nuisance in smart cities, but it should be a source of knowledge that feeds into the technological development of cities. The resurgence of the pandemic waves, as well as the resilience discourse, call for solutions to help maintain the smart governance component alive in the era of social distancing. Based on this context, the purpose of the entrepreneurial case study is to design participatory tools meant to boost citizen participation in smart cities, from decision-making to implementation and evaluation of local policies. The case study should focus on boosting involvement of citizens from diverse socio-economic categories, including from disadvantaged categories, because only diverse sources of data cand help paint a wider picture of the issues that a smart city is facing.

SMART SPECIALIZATION STRATEGY TOPIC

Pillar III – Regional digital agenda, priority – ICT, aims to develop the ICT sector of the region and to boost the digital economy. The challenge for the North West region, in this domain, is to reduce the dependence of IT companies from subcontracting and client-oriented software development. The aim is the development of their own products. This entrepreneurial case study is an opportunity for the start-ups to develop their own products.

DESCRIPTION

Summarizing, the entrepreneurial case study should aim to answer the following questions:

- How can smart cities improve citizen participation (co-creation, co-design, co-implement) beyond the traditional online consultations and meetings?
- How can public consultations be held in challenging times in order to limit a democratic deficit?
- How can smart cities stimulate the participation of diverse socio-economic categories with the help of ICT tools?

TECHNICAL ASPECT

The developed solutions should target interoperability so that they can be easily integrated in the existent IT ecosystem of the city. Students should therefore answer these questions:

- What kind of hardware or software is going to be used?
- How do you plan to provide opportunity for diverse and disadvantaged categories to be a part of co-creation, co-design, and co-participation? The user experience is especially significant.

BUSINESS ASPECT

- Who is your main target customer?
- What is the current situation on the market?
- Who are the competitors and what other solutions for participation and inclusiveness are being used? What kind of competitive edge does your solution have?
- Scalability of the solution is significant for achievement of financial targets. The proposed solution should be scalable and customizable to the needs of the different administrations and jurisdictions.

SOCIETAL ASPECT

A number of societal and sustainability concerns need to be addressed by the solution:

- How do you aim to balance data collection and privacy? How do you aim to protect the data of the citizens?
- In order to be a sustainable and inclusive solution, how do you design experiences for diverse and disadvantaged socio-economic categories?
- What energy efficiency measures do you aim to implement?

EULER

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM EC2022:02

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SmartSoc Workhop 2022 Student presentation (Team 2):
https://youtu.be/fG6ERasjhGM

SHORT DESCRIPTION OF PRODUCT /SERVICE

An application that helps disabled people navigate and communicate with the government website platforms.

Main function:

Automatically execute the relevant processes to satisfy the users' queries which helps with the ease of use of digital government services. For example, if a user says "I want to make an appointment for COVID-19 booster shot" the app takes them to the relevant government website, fills in their authentication data and helps them through the entire process. This makes the government's services more approachable and user-friendly.

Users can also customize different assistant macros which trigger a specific action on a government website. When the application is needed, it will execute the process as it's been set previously. For example, a user can set a process for applying for financial grants that need to be done monthly. By clicking the assistant macro, it automatically connects to the relevant webpage and fills the personal data. User just has to check whether the data is correct and commit in the application.

Appended functions:

Well-developed teaching section: which helps users learn how to use our application, as for blind people it's hard to use something new for them as they might not be familiar with the layout and interface of the application.

Artificial intelligence: which can improve services according to learned behaviors from users.

Security system: which protects users' personal data. Users need to input the PIN code to authenticate who is using it.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

The service will be available through an Android and an IOS application, also it will be implemented in current smartphones for blind people, such as Blindshell. The project will be built around new technological developments, such as artificial intelligence (AI), machine learning, deep learning, cloud computing and neural language processing. These technologies will be the essential part of the project, as we will need to recognize and process the voice commands given by the end users in real time.

We will have a great focus on the implementation of secured authentication processes and privacy, to provide a better and more secured way of communication between the end user and the entrusted (governments, etc.).

Our service's key selling point will be the user-oriented interface, as our policy goes, we build our service to be easily used even with zero vision. To achieve this, we will hire employees with visual impairment, who can directly test and develop at the same time. Also, to achieve a next generation user experience the app will have a highly interactive learning section where even users with less technical knowledge can easily learn how to use the app.

The backend will aggregate data about the most common user problems and searches. Using this data and user behavior patterns the system will optimize future delivery of search results. The app could also keep track of the user's movements and record often visited locations. Later it can suggest alternative or optimized paths for users to take on their daily commute.

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

CUSTOMER SEGMENTS

	Description of Customer Segment
Elder people (end user)	*Demographic information:* Age group would be 55 - 80. The gender, the educational level, the marital status and the Income will stay unspecified. *Geographic information:* The settlement should be in a developed area where internet connection is available. The user's Country should have capable infrastructure and a collaborative government. The language would be the country's most spoken language. The population will stay unspecified. *Psychographic information:* Broad type of lifestyle, the attitudes, the preferences and the values will stay unspecified. *Shopping behavior:* Generic buying type, consumers of conventional marketing like television advertisements, newspapers and radio channels.

	Description of Customer Segment
Visually impaired individuals (end user)	*Demographic information:* Having greatly reduced vision, age 18 and above, all genders, from basic through advanced education, unspecified marital status/income. *Geographic information:* Live in a European country with e-Government services, use the country's respective language. *Psychographic information:* Visually challenged lifestyle, low attitude in terms of e-management capabilities, prefers simple, easy to learn methods. *Shopping behavior:* Not an active customer segment for lack of viable options; will require marketing/information

VALUE

Value for customer = feeling from using the product

Euler creates a bridge between digital government platforms and their visually impaired customer base, providing an easy to setup system that enables the end users to navigate the websites with ease. Visually challenged people have difficulty navigating government websites, albeit these websites are designed to be simple enough for the sighted user base, the visually challenged (potential) user base is not held in mind. Euler aims to clear the gap between these users and the governments' official sites thus increasing their reach and usefulness and making the target user's life easier.

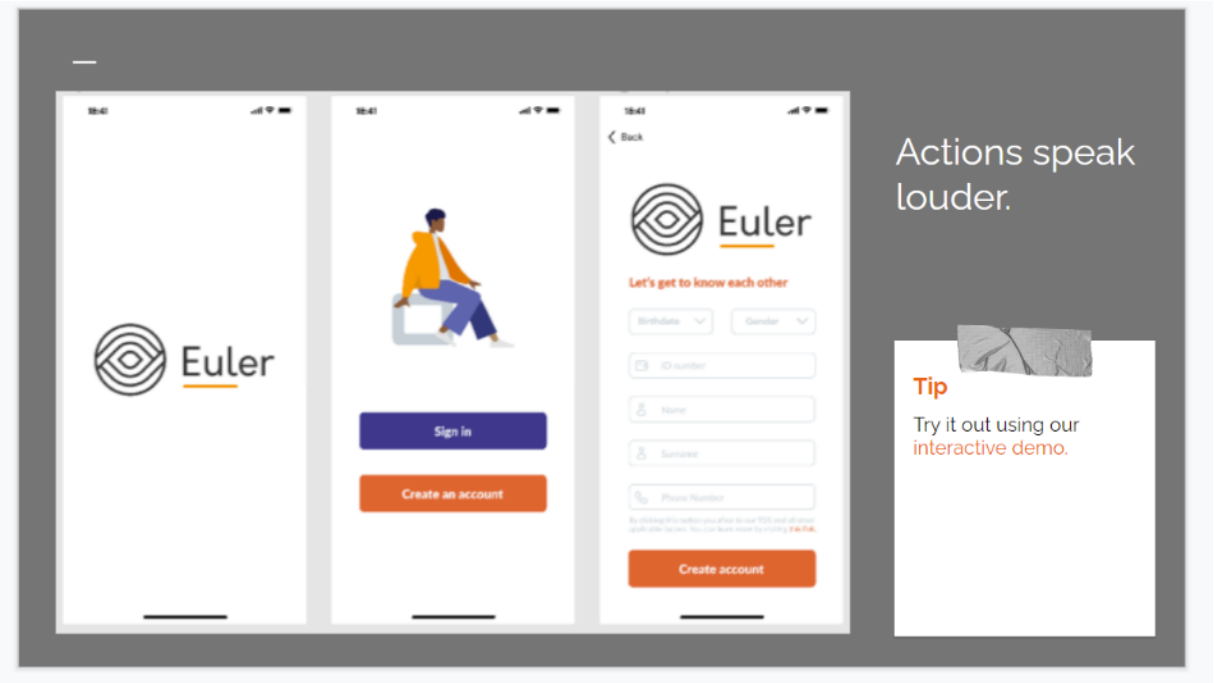
As we try to create an assistant service that's yet to exist in the target countries, we don't have direct competition. Other similar services focus on giving assistance to general users, mostly via a text-based chat-bot, while we specialize on the exceptionally set back potential user base who are unable to rely on visual cues or text only. These people will now have the option to manage their own e-government business. Our service will implement general voice commands on the governmental entities' websites, but this is only the first step to our goal, which is to provide an exceptionally smart assistant that can - with the help of the AI - deliver the most suitable answers based on the user's age which may determine what could be the most relevant. The day of the year, month or week can also be an indicator what other documents should be filled soon or what deadlines are coming up. It can for example fast forward the user to the taxing to-dos, or previously handled cases can also be a calling point for other actualities.

Our product will help the user to finally be able to participate in their settlements' affairs, thus their suggestions can be easily forwarded to the city council.

We aim to make a service which is useful for the users, and to achieve that goal we will hire visually impaired programmers, by doing so we also provide workspace for disabled people. Our testing team will communicate with elderly people to develop an app which is easily understandable and user friendly even for older users who might struggle with the platforms' conventional helping methods.

Detailed Market Analysis, Management & team & resources, Start-up team development, Responsible budgeting / Financial projections, Main risks, and the measurements for their reduction are described in Business Plan, which is available on SmartSoc Project Moodle.

PROTOTYPE



SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Societal impacts	Environmental impacts
Reduced inequalities We aim to provide a workplace for visually impaired citizens, as well as for the elder community.	Responsible consumption and production We will dismiss the use of paper as much as possible.
Gender equality We believe in gender equality, therefore we employ any gender without any restriction	Sustainable cities and communities By using our service, the user won't be in need of visiting a government office. It's a bold statement, but that's one of our goals. Every developed function will reduce the need thus lowering the frequency. Which means: • less traffic o. cleaner air • less people waiting in the line o. less waiting times • lowering the chance of a covid outbreak
Our team's power is in multinationalism.	
Decent work and economic growth We promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.	

MINIMIZING THE RISK OF SARS -COV-2VIRUS INFECTION BY ASSESSING VIRUS EXPOSURE

https://www.smartsoc.uniza.sk/cases

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HORIZON EUROPE CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Civil Security for Society

SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

TASK TO SOLVE - INNOVATION FOSTERED BY ICT

Since its outbreak to the present day, the SARS-CoV-2 virus has significantly changed the global world and human lives at the individual and the societal level. Infection with this virus can cause severe health problems and serious complications with a fatal outcome, and with all measures to protect against infection, the risk of infection depends on a person's exposure to the virus. From a spatial point of view, for example, this risk is higher in areas with higher population density and in activities that require close contacts between people. From the weather perspective, the risk of infection depends on seasonal changes in weather conditions during the year as well as on the frequency of movement of people during the day. The risk of infection also depends on immunity of each individual and the general condition of the organism. Taking into account the above spatial, temporal and personal characteristics, it is necessary to create a system that, taking into account a user's risk of infection, allows the user to assess the level of virus exposure in future and previous time intervals, generate alerts at potential increased risk, and possible recommendations which reduce the risk of virus exposure and infection. The system should be based on entered and publicly available data on the pandemic, the location of user movements and other important parameters. Available ICT approaches and technologies, including data analysis procedures, can be used to achieve the set goal.

SMART SPECIALIZATION STRATEGY TOPIC

The Case Study will focus on program Health and Quality of Life.

DESCRIPTION

TECHNICAL ASPECT

- Define spatial, timing and personal parameters which can enable efficient estimation of SARS-CoV-2 virus exposure and the risk of infection.
- Also, propose appropriate and available data sources, sets and format.
- Model, design (and optionally develop a proof of concept of) a web and mobile solution for data entry, collection and storage, an opportunity for future and past risk estimation, warnings and advice for reducing the risk of exposure to the virus.
- Select and discuss corresponding data analysis approaches which can enable efficient infection risk estimation, as well as generation of warnings and advice aimed to reduce the risk of exposure and infection.

BUSINESS ASPECT

- According to spatial, timing and personal parameters which enable SARS-CoV-2 virus exposure and infection risk estimation, propose a model of recommending points of interest which are at a lower risk level. These points of interest should be promoted among the wider population through application usage or in general.
- Define promotion channels of determined points of interest which can include the developed system/application and other available promotion channels (e.g. the Web, social networks).
- Develop a model of financial sustainability and system profitability based on the ability to promote points of interest. It can be a good prerequisite for long life of the developed system.

SOCIETAL ASPECT

- Evaluate, define and incorporate into the system a positive impact of the system on the public health, a pandemic situation, human activities and lifestyle in general.
- Explain the benefits of raising awareness that a lower level of exposure to the virus and safe places can improve the level of personal and public health and the quality of life in general.
- Discuss and disseminate the idea that similar approaches and systems can be potentially helpful in similar situations in the future.

Cobra

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM EC2022:03

STUDENTS

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SmartSoc Workhop 2022 Student presentation (Team 3):
https://youtu.be/snK2rhs-rq8

SHORT DESCRIPTION OF PRODUCT /SERVICE

Vision: Accessible gadget to protect everyone from pandemic and lockdowns

Mission: Let's live together

What makes the company unique: Interest in covid research and digital literacy of the elderly

The aim of a business plan is to reach companies or investors who share the company's goal and vision, contribute to improving the environment and would like to become investors in the company.

Our product is a connected bracelet tracking customer's surroundings and their health condition. By measuring the concentration of CO2 in a room, it determines whether the space is safe or not for the user. When it detects too high concentration, it sends a signal to warn the user. The app provides further research on staying safe and in case of positivity functions to be used for helpful tips on quarantine and getting better.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Our solution for minimizing the risk of contracting covid is using provided technologies for detecting the virus in the environment and our Cobracelet capturing so in the Cobrapp.

Firstly, the application is a simple gadget to track bracelet's records and contributes to help our customers with covid restrictions and advice on staying healthy during difficult times. It is highly user-friendly and comes up with many functionalities such as using closed captions and creating a default application set up for elderly people.

Current services in the app:

• Setting up an account with real data

O using Covid pass / ID card verification

• Risk factor at the moment / indicators of the illness

• Get tested notification

O in case of big exposure

• Notification if one of your contacts tests positive, or if some people you were very near were infected

O no names in particular

• Advice to reduce the risk of catching the virus

• External sources: calling up the doctor, government info about current situation

Cobrapp is based on machine learning model, where the bracelet gathers data from closed spaces that our customer has visited and the application stores the information. There are also other parameters to consider: amount of people in the room, size of the environment, age average of participants, public info of the country, local community and numbers of infected people, additional signal of moving in multiple places. The most important factor for the data collection is the location - it indicates risk the most - daily routes, commutes of the user, their most often visited places and people they have met. With the development of the app, the bracelet will be able to retain the location, the amount of people in the area and the covid indication in the room. Highest risk must move the user to go a covid testing facility.

Range of risk (%):

- 100 – 80 ratio too many people per m2 in a room, highest risk, likely to be infected
- 79 - 65 too many people in the room, high risk of contracting the virus
- 64 - 51 potential danger, average amount of people in a room
- 50 - 30 location is safe but smaller risk depending on people in contact
- 29 - 15 no restrictions indoors, small chance of contraction
- 14 - 0 healthy conditions, low chance of catching the virus

This range gives user the information on how much risk they are taking staying in a closed room with others based on other parameters. For example, our user is an elderly person doing grocery shopping in a very small shop. Considering restrictions in a country being 2 people per 10 m2 and the bracelet evaluates a person recently tested positive, the room being without air conditioning and the curve of infected people in the area is raising, the app will result in high risk notification,

advicing the user to leave the shop and get tested.

• It is in our company's best interest that all data must be protected and supply highest level of identity security. The users can connect with each other on the application while still having a sense of privacy. Therefore, they can choose if they want their profile visible to others. Choosing highest privacy profile means users are not being able to find the profile through searching but still providing the notification to users in proximity about being in a risky area or recently tested positive.

• User's profile contains notification history, manual input of the environment they're in, infographics on staying out of covid's reach as much as possible, system to import the test results, vaccination records, etc. External sources are contact info to call the GP and government information about the pandemic situation in the country.

• Consequentially, the bracelet is the collector of user's surroundings. It uses low level bluetooth communication between bracelets (to check if people in close proximity have been in contact with covid-positive people), then GPS to ensure the location information and an Air Sampler feature. "The device captures virus-laden aerosols that deposit on a polydimethylsiloxane (PDMS) surface. The team tested the air sampler in a rotating drum in which they generated aerosols containing a surrogate virus, a bacteriophage with similar properties to SARS-CoV-2. They detected virus on the PDMS sampler using the polymerase chain reaction (PCR) protocol, showing that the device could be used to reliably estimate airborne virus concentrations."

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

CUSTOMER SEGMENTS

	Description of Customer Segment
Doctors	A quick and efficient way of determining safety of the hospital environment for patients and other doctors.
Smart watch providers	The technology provided in bracelet can be developed further and implemented into other accessories such as smart watches.
Elders	An easy way to track surroundings in order to protect the health of elderly in a pandemic, as well as ensure quick medical help for those in need who are unable to contact the health services
Young adults	Ideal way of finding out whether the company they work in or the school they go to has the conditions for virus contraction.

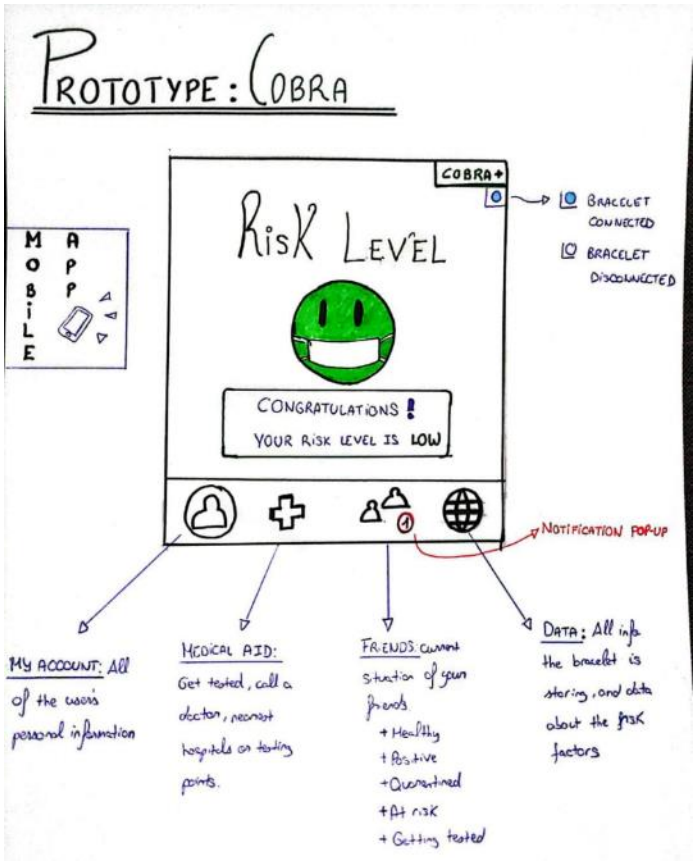
Our demographic is based in 2 categories: age and profession. Firstly, the target customers based off age are adults and elderly people, both categories include people with disabilities and health issues. Cobra is designated for the society to provide minimising the risk of transmitting the virus. The bracelets are at an affordable price to ensure most people have access to staying healthy. We focus on elderly people so they can check their health accordingly and make sure they know the virus is a smaller threat as well as their family members feeling calmer knowing they're less likely to get sick.

Secondly, 'the profession' customer segment considers doctors and smart watch providers as our main demographic towards proposing the product for more possible customers. This does not exclude them from using the product themselves, but their crucial role is recommending the product with our technology. The products will be also available to buy through the smartphone application.

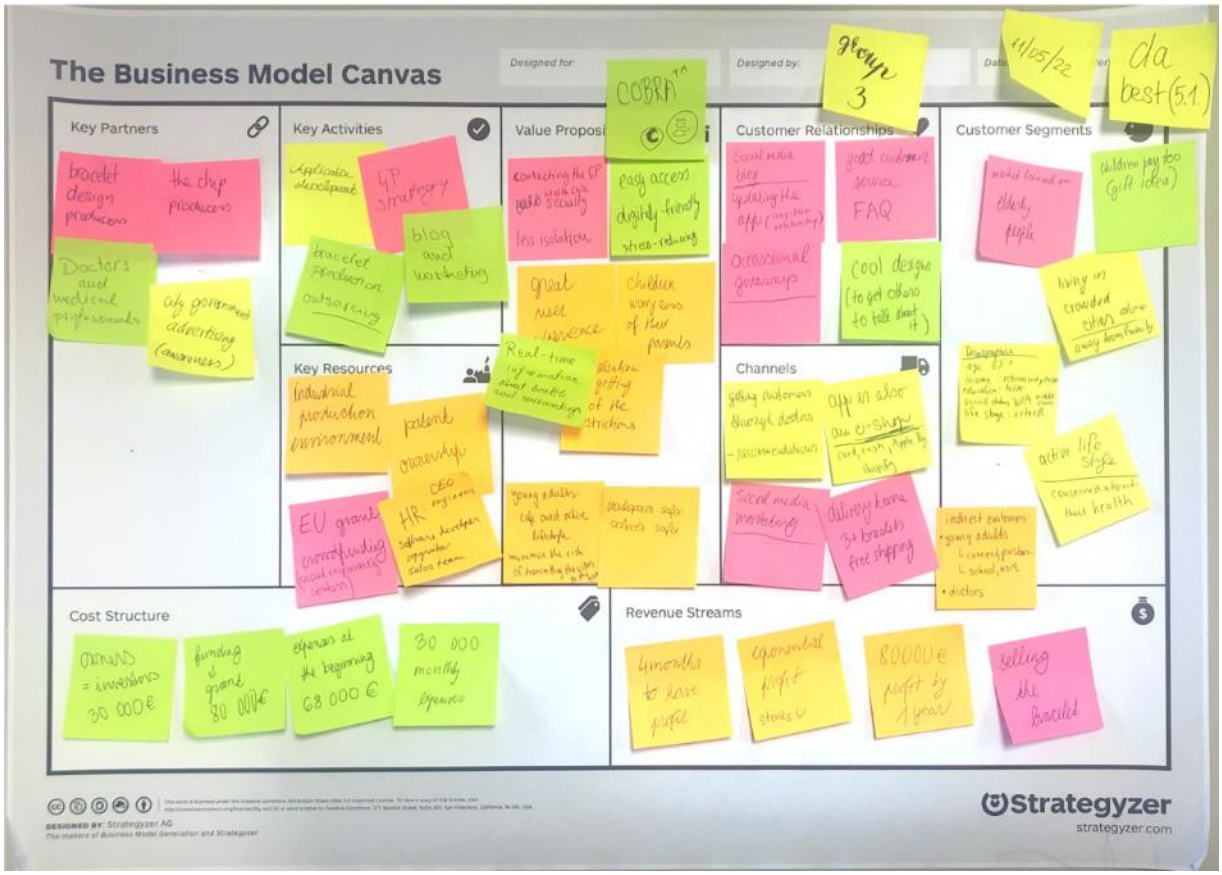
The shopping habits of the company's customers will depend on the price of the products as well as their quality. Customers' decisions whether to buy products will certainly depend on their income. The company strives for beneficial product at a good price and relies on every affected person to have enough money for quality health gadgets. Cheap and fast transport could also play a role in customers' shopping habits.

As the company is a start-up, it does not have regular customers yet, but it believes that when the company starts, it has a high chance of gaining regular customers quickly thanks to the great market prospects.

PROTOTYPE



BUSINESS MODEL CANVAS



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SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Societal impacts	*Environmental impacts*
Goal 3 (Good health and well-being): Our product will help reduce the transmission of covid-19. Indeed, our customers will be able to avoid places conducive to contamination and will drastically reduce their chance of catching the virus (and transmitting it afterwards). In particular, the most vulnerable people will be able to return to their pre-pandemic life with little risk of falling ill (and contracting a serious form of the disease)	Goal 12 (Responsible consumption and production): To minimize the impact of our products on the environment, we will use fully recyclable packaging made from recycled cardboard. On the other hand, we will avoid using bubble wrap and polystyrene balls which cannot be recycled.

Societal impacts	*Environmental impacts*
Goal 8 (Decent work and economic growth): At the height of the covid-19 epidemic, the global economy was at a standstill. Many people lost their jobs, and found themselves in a precarious situation. With lower transmission of the virus, such situations should not reoccur.	Goal 7 (Affordable and clean energy): We have chosen to integrate a rechargeable battery rather than a battery in our bracelets, because the latter have 30 times more negative impact on the environment.
Goal 5 (Gender equality): Our founding team is made up equally of women and men, and everyone's voice and work is considered the same. When recruiting, we will try to continue this strict gender distribution. We will choose our future employees solely on the basis of their skills and experience.	

CREATIVE LEARNING AND TEAM BUILDING WITH 3D PRINTING

https://www.smartsoc.uniza.sk/cases

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SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

HORIZON EUROPE CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Culture, Creativity and Inclusive Society

TASK TO SOLVE – INNOVATION FOSTERED BY ICT

We are different in many ways, but there are some demands and requirements that hold for everyone. We should learn and understand some maths, geography, physics, chemistry, etc. But our learning curves can differ from each other. Why not organize special creative workshops, where the participants can design and 3D print objects that help them to understand what they just read in textbooks. For children with different disabilities, these 3D printed models could be of higher importance. But creative workshops can be organized for adults as well where the time spent by special teamwork can result in better collaboration and higher efficiency at work.

SMART SPECIALIZATION STRATEGY TOPIC

Debrecen's Smart City strategy aims to enhance the competitiveness of the population. This can be achieved by developing the digital skills of teachers, and educators, as well as by developing young people's digital competencies on all levels of education. People with disabilities have to be integrated into this process, and these activities can take place outside the school system as well. Creative workshops (with various final goals) are perfect occasions to achieve these goals. Improving the digital competency of people can result in finding a (higher quality) job, thus increasing the quality of their life.

DESCRIPTION

TECHNICAL ASPECT

- Which 3D printing technologies match the need of the company?
- What materials could you use?
- What models could be designed and 3D printed in the frame of different creative workshops depending on the composition of the audience?
- Discover the types of post-processing you may need. What kind of data types and how can it be turned into a 3D model?

BUSINESS ASPECT

- Can you use free software products and models in the workshops?
- Investigate licensing options. How can you access your customer segments?
- How can you keep the interest of your ex-clients?

SOCIETAL ASPECT

- Is the technology your company uses sustainable?
- If yes, then to what extent? How can people with disabilities profit from participating in the workshops?
- How safe are the raw materials and the post-processing itself?

FEELPRINT

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM EC2022:04

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SmartSoc Workhop 2022 Student presentation (Team 4):
https://youtu.be/LD98iDNp1mc

SHORT DESCRIPTION OF PRODUCT /SERVICE

The product itself would consist of a service that at the final instance would be delivered to a physical person. This service of organising 3D printing consists in workshops for teambuilding and its main purpose is to encourage people to make friends or fortify co-workers' collaboration by means of 3D printing technology.

Based on the results of the survey, there is a need for a small, movable 3D printer, which can be used in a variety of places.

Our service must feature the following characteristics:

- It must be inclusive:
  - Print Braille letters on the for partially blind or completely blind people, the specific designs could be developed for describing phenomena like colours.
- The technical features:
  - Width x height x depth= 180x180x180 mm aprox.
  - Automatic calibration
  - LCD display – there could be integration for blind people with remote control equipped with Braille letters and sound control.
  - Internet/wifi conncetion or SD card, USB sockets.
  - Safety features
  - 200 Gbytes of memory aprox.
  - Max temp. Of printing 280 ºC aprox.
  - Mass of printer: 5 kg aprox.
- How does it meet customer needs?
  - Our customer needs a small movable 3D printer which can be used on various workshops.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

The technology, and especially ICT, is in focus of the SMARTSOC project. Please describe relevant technical aspects of the service/product proposed as the "solution" of the Entrepreneurial Case challenge, such as technology used, knowledge/skills/expertise of people within the (start-up) engineering team that should work on the technical solution, etc.

After reviewing several 3D compact printers available on the market, the decision was made, and the chosen 3D printer is "Original Prusa MINI+ Semi-assembled 3D Printer"

Prusa MINI. https://www.prusa3d.com/product/original-prusa-mini-kit-2/

1. Its features:
    a. Width x height x depth= 180x180x180 mm
    b. Nozzle: 0.4 mm default.
    c. Filament diameter: 1.75 mm.
    d. Max nozzle temperature: 280 °C
    e. Max heatbed temperature: 100 °C
    f. Ethernet RJ45 port
    g. Fast preheat
    h. Mass of printer: 4.5 kg

2. Filament
    a) Supports wide range of thermoplastics, including PLA, PETG, ASA, ABS, PC, etc. However, the aim is to use PLA as it is one of the eco-friendliest options for 3D printers, polyastic acid is sourced from natural products like sugar cane and corn starch and is therefore biodegradable. Available in soft and hard forms, plastics made from polyastic acid are expected to dominate the 3D printing industry in the coming years. Hard PLA is the stronger and therefore more ideal material for a broader range of products.
    b) There are other "green" filaments that can be used such as "Filamentum NonOilen", filament that is 100% biodegradable after industrial handling, decomposing around three times as quickly as PLA It is also stronger and tougher than PLA and can be used by most 3D printers, thanks to its low temperature requirements. NonOilen is also food safe and can be cleaned in a dishwasher as it possesses high temperature resistance, making it a material that can be reused repeatedly. NonOilen filament is made from a blend of polylactic acid and polyhydroxy butyrate (PLA/PHB).

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

CUSTOMER SEGMENTS

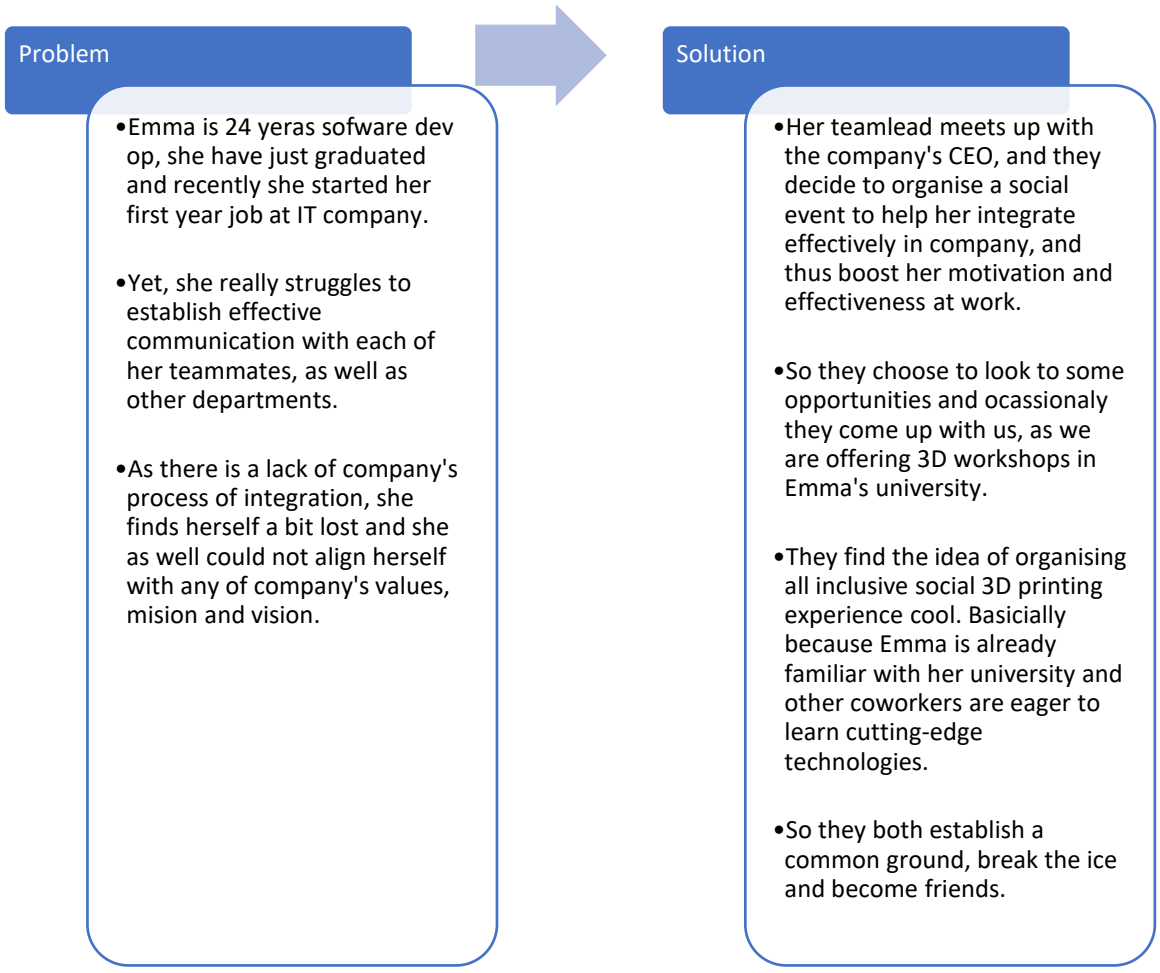
	Description of Customer Segment
Young people (students, interns, junior positions in the organisation)	Their needs are consisting of continuous search for information about certain subject, their desire to learn more and more, team integration. Their wishes are consisting of more accessible educational resources (like open-source websites, YouTube, etc.), the experience must be practical and tangible, also the workspace should be enjoyable, and the experience should be fun. Their frustrations are that the printer may cost a lot to possess, that it might be enormous in size, it takes a lot of effort to design and learn designing tools, the lack of interest of society about the subject. Demographic: 20-40 years, higher education mainly Geographic: worldwide Psychographic information: hectic big city's lifestyle, learn faster and assimilate bigger volumes of information with little detail, multitasking. Shopping behavior: they mainly rent things, don't buy it or own it, long-term thinking.
Students from academical institutions (primary school, secondary school)	University's last year students (which might be also our interns) who doesn't have to have previous experience with 3D printing or teambuilding. The schools' students could be also company's clients.

Although in the previous table it is stated that our clients are physical persons, as a matter of fact the service of teambuilding via 3D printing workshop is a B2B service. It means that our company would contact directly with the head of academical institution to sale our services or in case of private business, with the CEO.

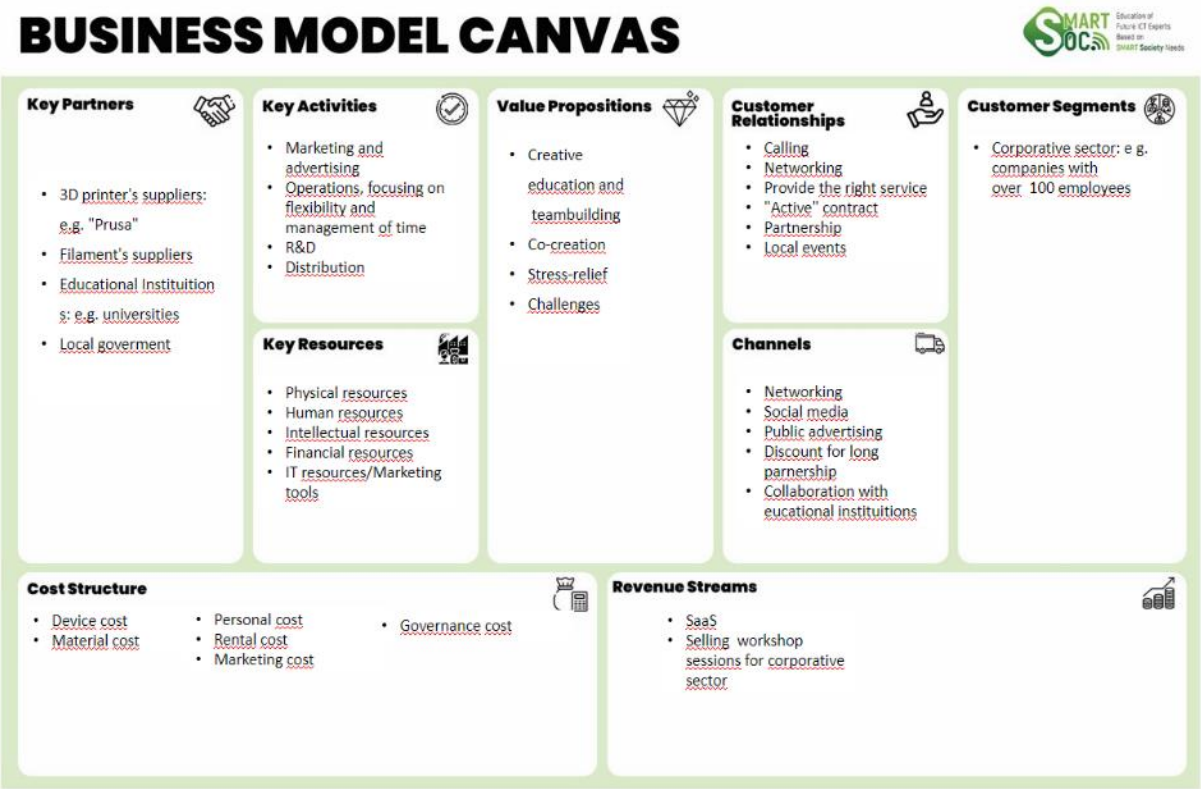
VALUE

Problem	Solution
Lack of time	Sessions organized by goals (like companies' employees getting to know each other, which could take half a day). Sessions could be grouped by a goal.
Informal education based on experience	Easy and well-structured incremental designs, modular designs (like making a car from small details, or a mobile phone). Designs which explain unseen phenomena like colors for blind people.
Challenges	Rewards for achieving course or session's goals.
Teambuilding	Inclusive work environment based on interests and likes of all participants.

PROTOTYPE



BUSINESS MODEL CANVAS



Detailed Market Analysis, Management & team & resources, Start-up team development, Responsible budgeting/Financial projections, Main risks, and the measurements for their reduction are described in Business Plan, which is available on SmartSoc Project Moodle.

SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Societal impacts	Environmental impacts
Other SDG which we are concerned is Quality Education, by making our sessions inclusive for people with disabilities we contribute to this SDG.	"Goal n.12 of the 2030 Agenda for Sustainable Development aims to ensure sustainable consumption and production patterns." PLA is one of the biodegradable plastics and it could be used to reduce carbon footprint (Mitsubishi Chemical Holdings Group, 2022).
"Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all." This is what presents Goal n.4. Our project would help several youth and adults do improve their thinking, learning, and designing skills.	Through our project, people could learn more about biodegradable materials used while designing, about recycling and re-using materials instead of throwing them.

Societal impacts	Environmental impacts
Goal 9 "Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation ". We aim to provide the tools for innovation that can be later used to shape tomorrow's society. 3D printing brings ideas and thoughts to concrete tangible elements that be visualised and modelled.	Providing digital tools to help build society, we can carefully test, monitor and assess different environmental issues and challenges related to each project or theme. For example, with 3D printing used in infrastructure building, we can retest for example how buildings can be improved for example their temperature/air conditioning, needed building materials etc.
Replace the broken parts of devices with 3D printed and as well spread awareness to society. Provide the knowledge that 3D printing service could solve clients' problems. As well costs. Goal 12.	Blue prints, and less carbon footprint.

SMART GOOGLE STREET MAP-BASED ROUTE ANALYSIS FOR PEOPLE WITH SPECIAL NEEDS

https://www.smartsoc.uniza.sk/cases

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HORIZON EUROPE CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Culture, Creativity and Inclusive Society

SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

TASK TO SOLVE – INNOVATION IN ICT

Using ICT, this entrepreneurial case proposal seeks to benefit the respective end-users with automatic tools that rely on internet and smartphone technology to improve urban mobility. In particular, building on top of a navigation system (Google Street View) and using computer vision techniques, analyse and propose paths/routes that satisfy more exquisite user criteria. Of particular interest are people with impaired vision or walking capability.

SMART SPECIALIZATION STRATEGY TOPIC

The entrepreneurial case study is linked to the Smart Specialization Strategy of Brittany D3, Secure and responsible digital economy, 3-6 : Simple and responsible digital technologies. By using ICT to facilitate the mobility of people with specific needs, our case means to raise the security of most people. This is another step to responsible local economy.

DESCRIPTION

TECHNICAL ASPECT

- Identify the actors (users, application, web-page, etc) that will interact as well as the content and the types of interactions for your technical solution using Unified Modeling Language (UML) diagrams, in particular, use case and activity diagrams.
- Assess the feasibility of the EC using already existing tools from https://developers.google.com/maps, https://developers.google.com/streetview and by reviewing earlier uses (cf. Rzotkiewicz et al. and Biljecki et al.) -Identify the new/extra functionalities that will be necessary for your technical solution (e.g. advanced image classification, access to other datasets, etc) and suggest possible solutions.
- Define a set of tests to use as indicators for the performance of your system in real conditions.

BUSINESS ASPECT

- Customer segmentation
- What does the term "urban mobility" cover according to your business model?
- Who would benefit most from such application?
- Companies/institutions/individuals
- What country/countries or cities would you initially consider for the development of this application?
- Added value
- Why would people / organization benefit from such application?
- How could they leverage this application in their business development?
- How would you customize this application easily from one country/city to another?
- Financial aspects How would you finance the application development?
- What sustainable business model would you propose to the different identified customers?

SOCIETAL ASPECT

- Are current and future transportation means readily equipped to welcome people with special needs? What impact would this application have on society inequalities?
- Which UN goals does this application help achieving?
- How could this application become an important criteria for companies or institutions' sustainable strategies?
- Could this application be certified at a national, international, or local level?

Mireia

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM EC2022:05

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SHORT DESCRIPTION OF PRODUCT /SERVICE

- Standalone application, for disabled people (visually impaired).

By using the Google Maps Platform we create our paths. A route is created with the Routes-directions API and then the route is analysed using the Maps-Street view imagery and computer vision to check the route conditions. The conditions are favourable if disabled people can take it and it is not favourable if they cannot take it (can take it/cannot take it refers to if there is an obstacle (an obstacle is an object, thing, action or situation that causes an obstruction) that prevents them from getting from the source to the destination by themselves). In case of unfavourable conditions, a new route is calculated and analysed. The process is repeated until a route is found.

- What are its features?

Audio navigation (audio answering, operated with voice), standard navigation, details about places (reviews, how convenient it is for them to go to the bathroom); food delivery service; taxi calling service only for disabled people, upon installing a tutorial will follow where our app will calibrate to the user(if the user is visually impaired, the application will adjust to the user); guiding to places(to hospitals, monuments, the police; if you are in a new place, it is easier for people as they do not know themselves where to look for those places)

- How does it meet customer needs?
  - Audio navigation
    - Navigating visually impaired people
    - The application is used both through the graphical user interface and by voice
    - Intelligent personal audio assistant for people who have visual disability
    - Open the app through voice activation

SHORT DESCRIPTION OF PRODUCT /SERVICE

- Standard navigation
  - Navigating disabled people
  - For people who have trouble with hearing to give the detailed video with indication
  - Video details only for main places that our customers visit (hospitals....)
- Review section
  - Information about the friendliness of the place for disabled people (how easy is it to navigate the place, to use the restroom...)
  - Not just text reviews but also video/photo/audio reviews, information about the place
- Food delivery service
  - Usual apps are not friendly for disabled people, that is where our app comes in

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Simple activities like talking on the phone, walking downstairs, or even checking the expiration date of milk can become challenging for people with disabilities. However, some of these problems can be successfully dealt with using a smartphone.

The main question of the technical aspect of our product is: how to create an application for people with disabilities for navigation?

The main criteria and decisions when creating applications are the following points:

- application availability
- visually impaired users sound accessibility to compensate for the lack of visual information
- accessibility for people with learning disabilities such as (functional) illiteracy and (functional) digital illiteracy
- testing the software product to ensure their quality
- application availability on all Android and iOS platforms, user-friendly interface and design
- application needs to use users' location, related to security and privacy issues. In order to protect personal data and reputation, this part of the technical solution needs special attention from developers and engineers.

Useful digital technologies offered as solutions to problems exclusively in our product:

Using the built-in screen access program in smartphones that allows you to control the device using voice to launch our application for people with visual impairment. To do this, you need to set up an on-screen access call by pressing the home button for seven seconds or pressing three times. As a rule, it is located at the bottom in the middle and can be both physical and sensory. With the help of a mobile application, a blind or visually impaired person can find a stop and use public transport, walk through important urban objects or confidently cross the road at a green traffic light.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

How does this system work?

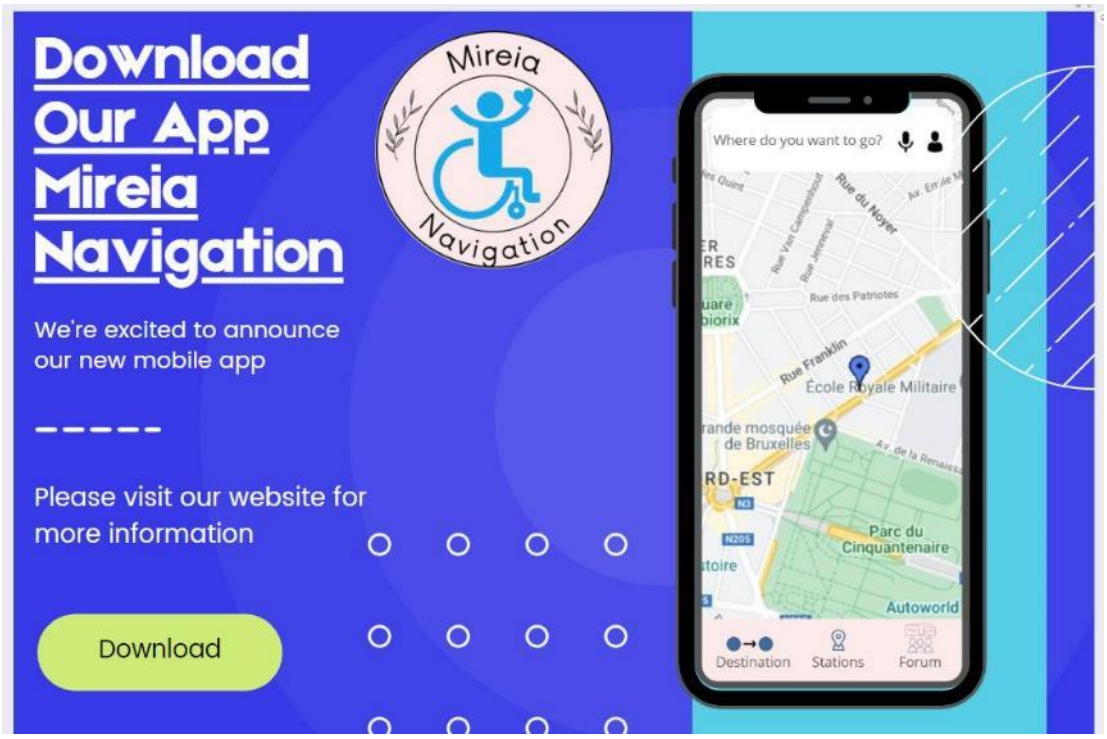
The idea is simple: using our app that tracks where the device is located. GPS, mobile operator data and Wi-Fi help him in this. The client can order a taxi or find the fastest route to a certain address. In addition, users with visual impairment simply receive a signal in the form of a voice message, in which all the data is spoken as accurately as possible. Thanks to GPS technology, geotags and photo video data can be added to the application for the best overview of facilities for the disabled.

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

CUSTOMER SEGMENTS

	Description of Customer Segment
Handicapped Person	This person could for example have a permanent mobility or hearing impairment.
Rehabilitation Specialist/ Parent	Lives or works with a person with one or various disabilities. Helps them in their daily lives.
Disability Services/ Local Institutions	They usually offer basic health services. For example, rehabilitation, community or home care services and others.

PROTOTYPE



SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Societal impacts	*Environmental impacts*
- Less money needlessly spent on expensive and uncomfortable traveling. Thanks to the quality-of-life improvements, that the app brings with itself, people will be able to see what options they have and to be able to make the right choice according to them.	- Focuses on the state of the place we live and how to get the maximum comfort it can give us.
- Better focus on the mental health of the individual, thanks to the option to anonymously share on the forum.	- If thanks to the distributed app information, the users learn about better public transportation options, that are comfortable to use daily for them, this can reduce our global carbon footprint and ultimately increase life expectancy by providing not only healthier living conditions, but also better healthcare in general.
- The development of the app will be ethical and thanks to the collection and the compilation of the data, the customers will be able to accurately make decisions and plans, improving their everyday life and their mental health in general.	-Given that we are using devices that our potential customers possess, we are minimizing the digital pollution of our app

IT'S FAKE NEWS. DETECTION OF (UN)RELIABLE INFORMATION

https://www.smartsoc.uniza.sk/cases

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SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

HORIZON EUROPE CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Digital, Industry and Space

TASK TO SOLVE – INNOVATION FOSTERED BY ICT

With the advent of social online platforms, putting information into the public domain has gotten easier than ever. Social networks such as Facebook, social news aggregation networks like Reddit, comment sections on news portals, and others allow us to easily post different types of content online. Information has never been as accessible as today; it has brought the world together – different perspectives are one click away. While this at a first glance seems rather positive, mind-opening, and facilitating critical thinking, not all content is published with good intentions. The efficiency of social networks at spreading information has also been used for siphoning political messages, spreading fear and anger, and social manipulation in general (e.g., hybrid warfare). Examples include subtle, by the general public often unnoticeable, manipulation of opinions with respect to elections, and casting doubts on authority. The presentation of fake news is often such that it causes an immediate emotional (and less rational) response, due to the topics being very essential to human beings – health and safety. In the midst of the COVID 19 pandemic, misinformation being spread online is having direct consequences on people's mental and physical health, as well as it is causing riots across the globe. Fake news thus poses security risks for EU countries (and beyond) and is one of the critical concerns that need to be dealt with in order to ensure the health, well-being, and safety of the citizens. While bigger social platforms are trying to act responsibly and invest in fact-checking, many services do not have the resources to do the same.

Comment sections may include fake news, deep fake content, cheap fakes, etc. On the consumer's side, checking the reliability of published information often requires research and effort many are not willing to put into it, thus blindly trusting provided information. Services that offer fact-checking (e.g., Facebook), on the other hand, commonly do it in a binary fashion and without sufficiently informing the users on the reasoning behind their decisions whether something is marked as fake content. Detection of such content is a lively research topic and literature suggests that machine learning could be utilized to determine reliability and truthfulness. Students are encouraged to look into available research and solutions developed to date and propose an external solution for both services offering the publication of the content and consumers. The concrete goal is to design a service that checks and grades the trustworthiness of content published online. Students should also consider the potential social effects of different fake content labeling practices, to design a solution that is informative and indicative rather than censoring.

SMART SPECIALIZATION STRATEGY TOPIC

The smart specialization strategy of the Republic of Croatia includes five key topics, two of which are closely related to the specified case study, namely "Health and quality of life" and "Security". The topics of the strategy are elaborated from the perspective of relevant technological and production fields, with ICT being listed as a horizontal topic, adding value to production, and building towards a more efficient and sustainable economy. From the security standpoint, the proposed case is highly motivated by the strategy's goal to address the integration and interpretation of information from social networks and other mass data sources. The strategy also indicates the relevance of machine learning methods in the context of cyber-security. Indirectly, the case can also be motivated from a health and well-being point of view. In these challenging times of uncertainty and social isolation, the spread of misinformation can lead to loss of trust, anxiety, and depression. Moreover, fake news spread amid the pandemic does not only influence mental health but can also lead to making choices that put a risk on physical health (e.g., refusing to follow recommendations given by health professionals). Given that it addresses topics of the strategy that are most fundamental to humanity – safety and well-being – the case is highly relevant to Croatia, the EU, and beyond.

DESCRIPTION

TECHNICAL ASPECT

- Which methods can be used to detect fake content?
- How would these methods be utilized in your solution?
- Which information would the solution show to the end users consuming the content?
- In which form is the solution distributed to the content providers (services publishing the content?
- In which form is the solution distributed to the consumers interested in checking online content?

BUSINESS ASPECT

- Student team will need to identify potential customer segments for smart products/services they will develop/offer as the result of "solving" the proposed entrepreneurial case, such as local governments (an entrepreneurial case dealing with smart city´s solutions), developers (an entrepreneurial case dealing with smart buildings), etc.

SOCIETAL ASPECT

- Which features of your solution support and encourage consumers to critically evaluate published content?
- How to design a solution that is non-intrusive but rather subtle and informative?

Fake-X-News

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM EC2022:06

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SmartSoc Workhop 2022 Student presentation (Team 6):
https://youtu.be/E25eciy_nNY

SHORT DESCRIPTION OF PRODUCT /SERVICE

Our product is a browser extension app that scans each page that user opens and tries to figure out if the data on the page makes sense with our machine learning algorithm that was trained on a huge set of confirmed correct data and a set of auto-generated fake information.
The app will remain silent unless its algorithms find out that something looks strange and thinks that it is fake, than a popup warning will emerge onto users screen. The customer needs to detect and filter fake news, and the app does just that.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

In our product we use different programs such as:

- Backend – Node.js
- Frontend - Angular
- Database – PostgreSQL

The professional profile that the company is looking for are journalists or people working in communication and experts in TICs (machine learning, database,...)

The work will be organized on two levels. On one hand journalists will be responsible for cross-checking and verifying the data to be used in the databases. This will be organised in groups according to their topic (politics, sports,...).

In the other hand, the experts in TICs are the ones who provide technical support. They create the databases, update them, solve any possible errors that may appear...

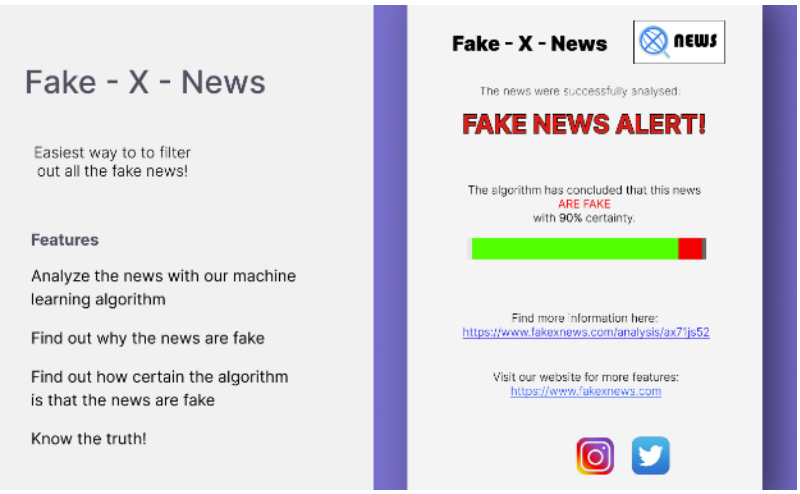
In the database that we designed there will also be a list of trusted sources, fact checking websites, so customers can use then to check the veracity of the news.

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

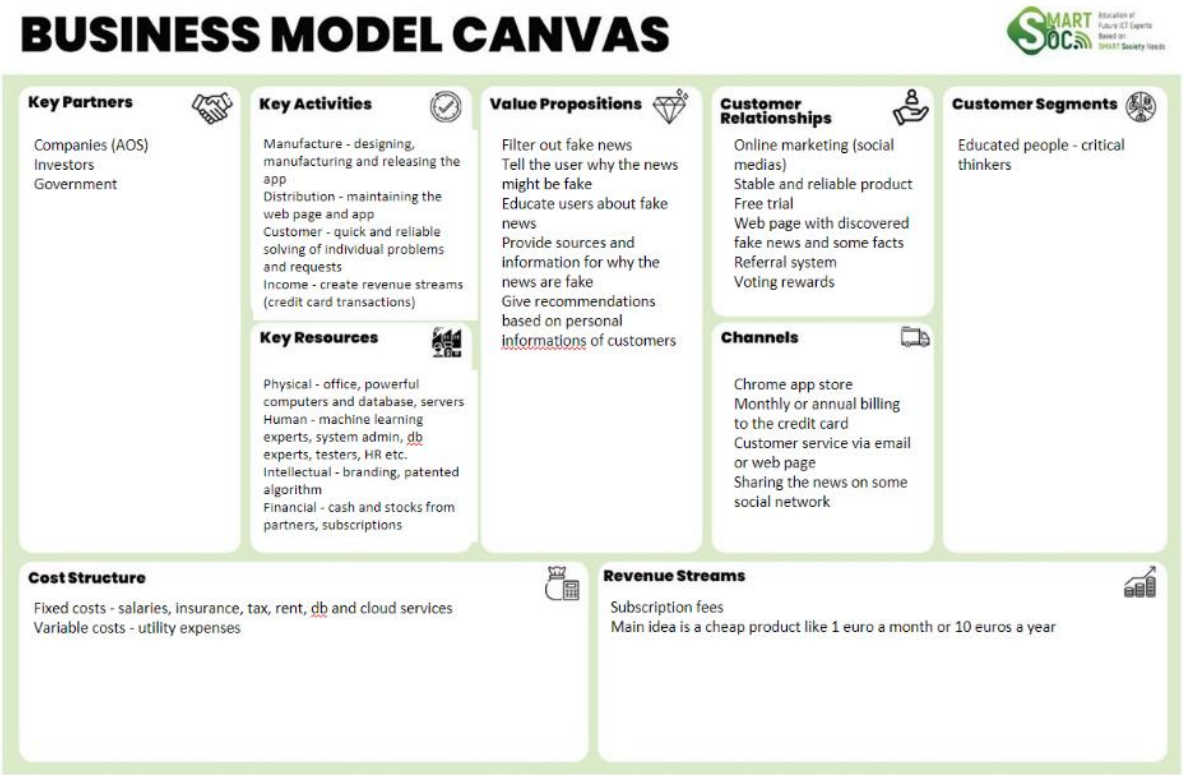
CUSTOMER SEGMENTS

	Description of Customer Segment
College students	This group of people will spend a lot of time surfing the Internet every day, and some fake news will cause great distress to them. On the one hand, due to some curriculum or academic needs, they need to search for some information on the Internet. If the searched information is untrue, it will have a great impact on their learning. aspect. On the other hand, college students often talk about some news in the social process, ensuring the accuracy of the information can easily open the topic with friends. This young group is willing to spend some money on their hobbies, such as music, travel, photography, etc. For things that can get a lot of satisfaction with a small investment. They generally won't refuse, such as buying a Spotify, Netflix membership.
Internet worker	These people often search for news on the Internet because of work needs. Fake news will mislead them and reduce work efficiency.

PROTOTYPE



BUSINESS MODEL CANVAS



Detailed Market Analysis, Management & team & resources, Start-up team development, Responsible budgeting/Financial projections, Main risks, and the measurements for their reduction are described in Business Plan, which is available on SmartSoc Project Moodle.

SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Societal impacts	Environmental impacts
Avoid people wasting time and energy because of fake news and improve work efficiency	This product detects fake news, avoids the waste of manpower and resources, and is beneficial to the ecological protection of the environment
Strengthen the sense of trust between people, and promote social harmony	
For enterprises, accurate information is conducive to making correct business decisions and expanding productivity, which can bring huge economic benefits to society.	

NOMO-FOWA NO MORE FOOD WASTE, DIGITALIZATION AGAINST FOOD WASTE PRO CIRCULAR

https://www.smartsoc.uniza.sk/cases

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HORIZON EUROPE CHALLENGE ADDRESSED BY THE ENTREPRENEURIAL CASE

Digital, Industry and Space

SUSTAINABILITY DEVELOPMENT GOALS 2030 ADDRESSED BY THE ENTREPRENEURIAL CASE

TASK TO SOLVE - INNOVATION FOSTERED BY ICT

NoMoFoW (No More Food Waste) - Leveraging the power of "Digital Society" x "Circular Economy", research the technology, the societal/economical needs/impact, and the business use-cases for a digital platform (Apps, Databases, APIs) to enable/incentivize higher rate of information and therefore consumption of discount-stickered food products that are about to past their best-before/due-by dates – instead they can be more efficiently promoted via the proposed platform hence save everything (money, economy, ecology).

DESCRIPTION

TECHNICAL ASPECT

- A digital platform (prototype/proof-of-concept for this call)
- To collect, centralize, analyse and distribute relevant data about food products that are discount-stickered (e.g., -30%, -50%) including
- Location of the product (geo or shop identification)
- Type/category, name, barcode, photo, price, expiry date, type of discount, and quantity of discounted items left An app (prototype/proof-of-concept for this call)
- To help users/citizens
- Browse or be notified when food products of interest are discount-stickered
- Share frictionless info about interesting food products that are discount- stickered
- Save: money, the products, the ecology
- To help our platform to collect the data in real-time from various users (at the same time incentivizing them in a sustainable way)

BUSINESS ASPECT

Students should identify:

- business opportunities – partners, market segments, monetization models, etc.

SOCIETAL ASPECT

- Leveraging the power of "Digital Society" x "Circular Economy" => "Sustainable Growth" and address EU's "Societal Challenges"
- Improve the welfare of the society – e.g., by increasing household savings by up to 1000 EUR/year, or 30%, for Finnish household s which are spending about 3000-3500 EUR/year for food (Circular-)Economic impact
- Decrease economic loses (retail/producers) and food waste by several percents – at EU level 143 billion EUR are the associated costs with food waste! Ecology impact
- Decrease the pollution (due to food waste) by several percents – at EU level there 88 million tons of food waste generated annually, responsible for 8% of greenhouse gas emissions!

Nutifi

SOLUTION OF THE ENTERPRENEURIAL CASE - TEAM EC2022:07

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https://youtu.be/KU7a4-67fwI

SHORT DESCRIPTION OF PRODUCT /SERVICE

Website that contains food discounts per shop with exact location and delivery service integrated (provided by business partners) and Optimized for Mobile.

Features:

- For the homepage:
  - Search Bar
  - Logo
  - Description
  - CTAs
  - Product images internal links.
  - Testimonials
  - Live Chat
  - Discounted food by store and timing
  - Healthy food section
  - Meal planning section:
    - Customer can enter to the section write the meal components they need for their food and we can how the discounted products for the requested meal
    - Option to subscribe in the newsletter where we can send them an email when 90% of the products for the meal is provided.
- For the footer:
  - Tabs and Options.
  - Social Media Icons

SHORT DESCRIPTION OF PRODUCT /SERVICE

- About us page
- Blog
    - Comments
- Knowledge Base or FAQ
- Wishlist.

Services provided:

- Cheap delivery service (provided by business partners).
- Subscription
- Premium package.
- Notification bar.

TECHNICAL ASPECT OF DEVELOPED PRODUCT /SERVICE

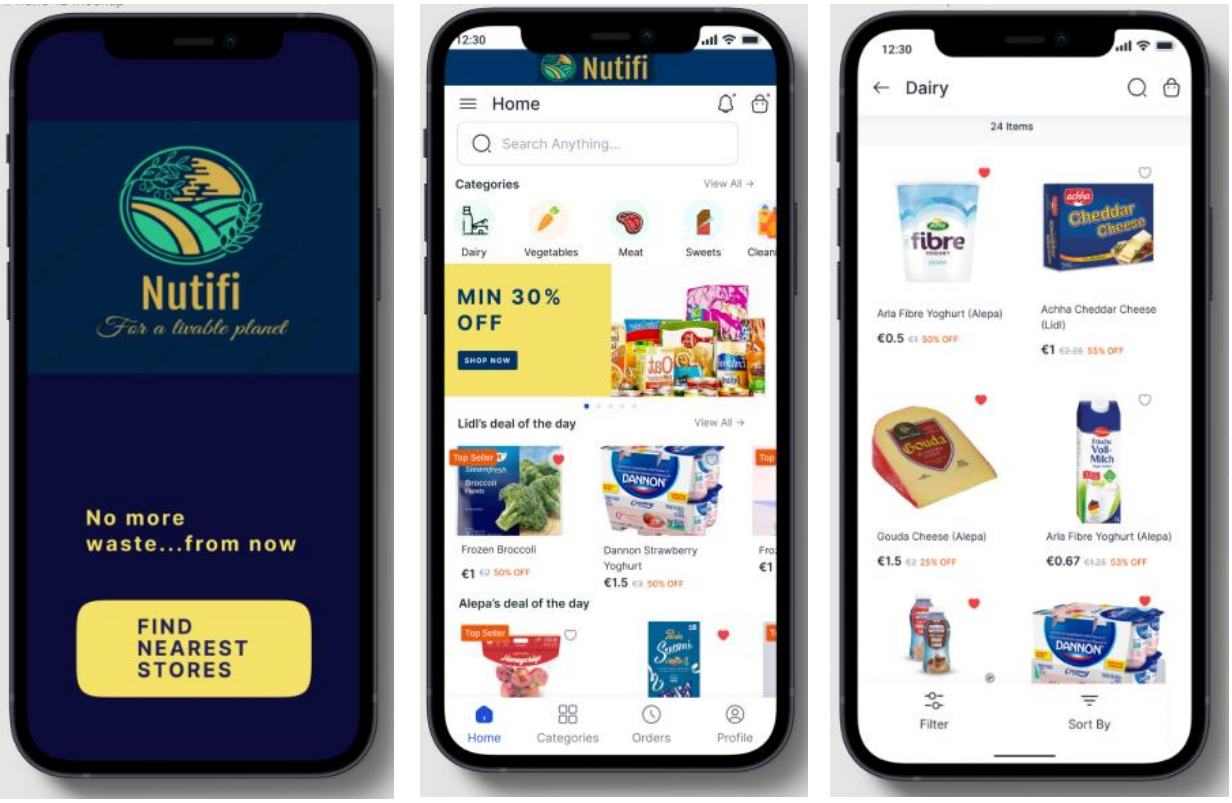
	Technology	Fee
Website	React framework	Free
Backend	Spring Framework	Free
Server & database hosting	Google Cloud	Paid
Mobile App frontend	Flutter	Free

BUSINESS ASPECT OF DEVELOPED PRODUCT/SERVICE

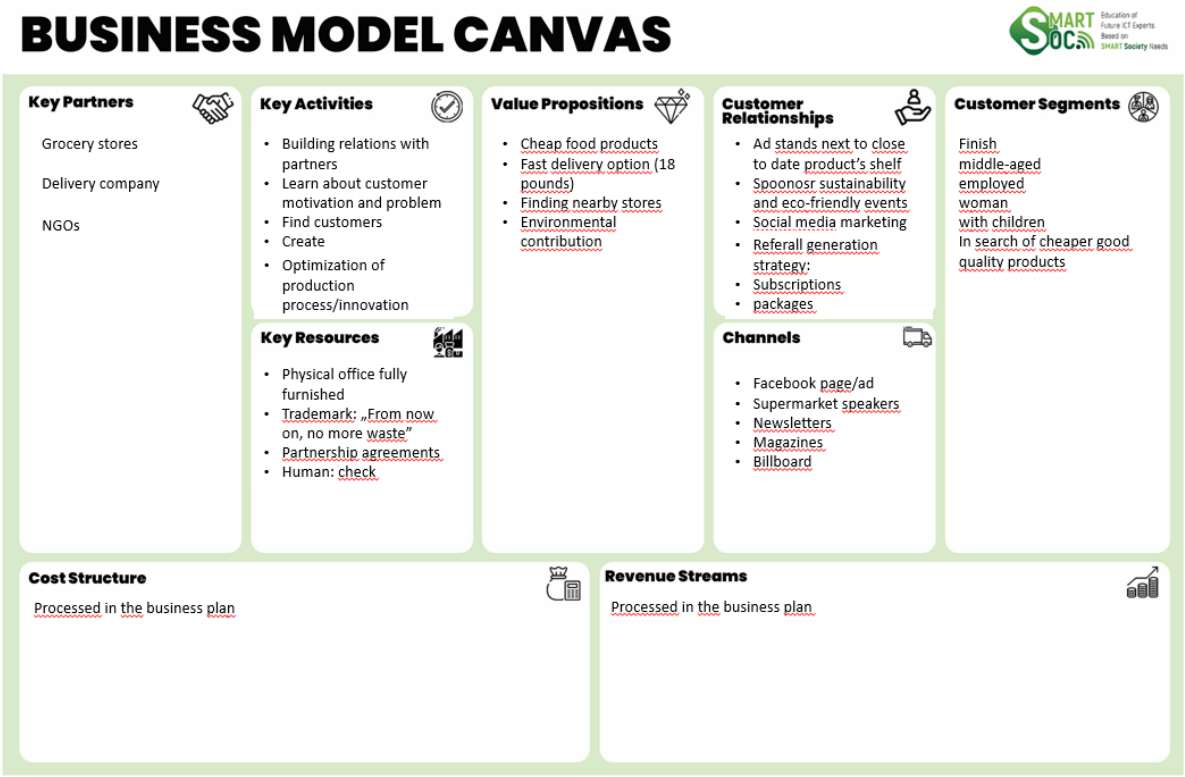
CUSTOMER SEGMENTS

	Description of Customer Segment
Middle aged woman	• Age: 40-60 • Geography: EU based. Starting point: Finland. • Urbanization: City • Income: 3000-4000 euros. • Relationship status: Married • Family: With kids • Job type: Worker/householder.
Young adults	• Age: 20-30 • Geography: EU based. Starting point: Finland. • Urbanization: City • Income: 1000-1500euros. • Relationship status: Single/ in a relationship. • Family: living alone or with friends. • Job type: Part time worker or getting monthly allowance.
Store owners	• Age: Over 18 • Geography: EU based. Starting point: Finland. • Urbanization: City • Job type: Manager.

PROTOTYPE



BUSINESS MODEL CANVAS



Detailed Market Analysis, Management & team & resources, Start-up team development, Responsible budgeting/Financial projections, Main risks, and the measurements for their reduction are described in Business Plan, which is available on SmartSoc Project Moodle.

SOCIETAL AND ENVIRONMENTAL ASPECT OF DEVELOPED PRODUCT /SERVICE

Societal impacts	*Environmental impacts*
Goal 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development Make partnership with NGOs to provide close-to-date products for free under an occasional event form titled: 'TO FIGHT FAMINE'. (Nutifi will buy close-to-date products and donate them to an NGO to be distributed to people in need)	**Goals 12: Ensure sustainable consumption and production patterns** The website will provide an easier, more accessible and faster way to find close-to-date products per shop per country, so the number of wasted products will be reduced.
Goals 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture Allow the millions of people that can't afford the usual priced food to get a quality meal with the cheapest prices.	**Goals 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all** Advertise for sustainability events, and challenges.

CONCLUSION

The main objective of the SmartSoc project was to create and implement an intensive interdisciplinary course in the field of ICT-based entrepreneurship considering the transnational and intercultural context. This intellectual output shows how the ICT student teams were enforced to deal with economic, societal and environmental challenges defined by strategic documents 'Transforming our world: the 2030 Agenda for Sustainable Development' and 'Horizon Europe' programmes. This intellectual output includes an important message about smart specialisation strategies and their importance for regional development in the EU.

Blended intensive programmes (BIP) were introduced in the frame of the new Erasmus+ programme period (2022-2029). Blended mobilities support was moved from the KA2 action directly to the KA1 actions to be part of different options for individual mobilities of students and teachers. The SmartSoc project consortium prepared a well-developed basis for future cooperation in or out of the current consortium. We are sure that this intellectual output could be useful when implementing it in the new BIPs.

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