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HORIZON 2020 RESEARCH & INNOVATION PROGRAMME

D4.2

Guidance towards excellence sustainability

DOCUMENT CONTROL SHEET

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FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV – Fraunhofer	Germany

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LIST OF ABBREVIATIONS

Abbreviation	Description
ALICE	Alliance for Logistics Innovation through collaboration in Europe
BMC	Business Model Canvas
BGSU	Bowling Green State University
CV	Curriculum Vitae
D	Deliverable
ECTRI	European Conference of Transport Research Institutes
e.g.	exempli gratia
ERA	European Research Area
EU	European Union
FEHRL	Forum of European National Highway Research Laboratories
Fraunhofer IFF	Fraunhofer Institute for Factory Operation and Automation IFF
GNU	General public licence
GUI	Graphical User Interface
IACUC	Institutional Animal Care and Use Committee
IBC	Institutional Biosafety Committee
ICT	Information and Communication Technologies
IFORS	International Federation of Operational Research Societies
IRB	Institutional Review Board
IT	information technology
ITF	International Transport Forum
LLE	Lifelong Education
LLLPlatform	Lifelong Learning Platform
MOOC	Massive Open Online Course
OSU	Ohio State University
OVGU	Otto von Guericke University of Magdeburg
PO	Project Officer
SCORM	Sharable Content Object Reference Model
STIP	Sustainable Transport Interchange Program
STSE	Short-Term Staff Exchanges
TG	thematic groups
TRB	Transportation Research Board
TTI	Transport and Telecommunication Institute
TTLog	Traffic, Transportation and Logistics Laboratory

UB	University of Buffalo
UDOL	The University of Derby Online Learning
UTH	University of Thessaly
VRCO	Virtual Research Compliance Office
WP	Work Package

ABSTRACT

The present deliverable is the second deliverable of Work Package 4 "Networking and Sustainability" and intends to give guidance towards excellence sustainability of ALLIANCE project on the basis of its achieved results during the lifecycle of the project. Coming from an initial amount of stakeholders, during the project period ALLIANCE developed a outstanding network and achieved visibility in European transport and logistics associations. Due to the collaborations on a scientific basis between education, research and business, a Virtual Research Compliance Office (V-RCO) was established to guarantee continuation of scientific excellence in transportation research, but also to establish an interconnection platform between education, research and business. The major outcome of the project is the "Sustainable Transport Interchanges Program" (STIP) that was developed in WP2, moreover served for knowledge transfer activities of WP3 and was converted into an e-learning program within WP4. The concept of course conversion from face-to-face lectures into online learning courses is presented in this deliverable and also a business model is drafted on how the ALLIANCE e-platform could be used in future to gain excellence sustainability in knowledge provision on a lifelong learning path.

1 Introduction

1.1 Contents of the deliverable

The scope of Deliverable 4.2, the second deliverable of Work Package 4, is to present the actions conducted in Task 4.1, 4.2 and 4.3 to establish a structural basis for the sustainability of the project outcomes and moreover to give guidance for the continuation of ALLIANCE after the completion of the project by ensuring at the same time excellence sustainability . The main structural implementations being made are the establishment of the Virtual Research Compliance Office (V-RCO) as a part of the ALLIANCE project website, the development of e-Courses on the basis of the "Sustainable Transport Interchanges Program" (STIP), developed in WP2, applied on the ALLIANCE e-platform, and the establishment of an ALLIANCE network. The guidance for ALLIANCE future excellence sustainability connects to that by putting e-learning in the frame of Lifelong Education (LLE) and drafting a business model for ALLIANCE online courses considering the requirements of LLE. As the main goal of WP4 is to harmonise access and usage policies for research and education – related infrastructures and establish an e-platform for supporting consortia of different types of public and private partners in thematic research areas, the following actions and outcomes are strongly related to WP2 and WP3, using the educational and training material of STIP and also materials developed in several knowledge sharing processes.

In the following paragraphs, the roadmap to excellence sustainability will be firstly presented covering the ALLIANCE V-RCO, network and e-learning courses as its main content. Subsequently the regulatory framework for LLE programs will be documented and the requirements of the e-platform for e-learning activities will be analysed. On that basis, finally a business model for the e-platform will be developed, considering the requirements for LLE.

1.2 ALLIANCE Project overview

ALLIANCE aims at developing advanced research and higher education institution in the field of smart interconnecting sustainable transport networks in Latvia, by linking the Transport and Telecommunication Institute – TTI with two internationally recognized research entities – University of Thessaly – UTH, Greece and Fraunhofer Institute for Factory Operation and Automation IFF – Fraunhofer IFF, Germany. Close collaboration of TTI with UTH and Fraunhofer IFF will enable the achievement of the goals through the following activities:
- Organization of young researchers' seminars.
- Organization of workshops.
- Organization of summer schools for trainers and young researchers.
- Development of educational programme for graduate and post-graduate students.
- Development of training programme for trainers and practitioners.
- Development of a Lifelong Education program (LLE) with e-learning courses
- Provision of grants for participation as authors of peer reviewed publications in conferences.
- Facilitation of Short-Term Staff Exchanges (STSE's) with the aim of international collaboration, mainly publications.

- Establishment of a guidance strategy for preparing scientific publications.
- Establishment of an Virtual Research Compliance Office (V-RCO) for guidance through the whole process of students research
- Creation of an educational forum as on-line tool for distance learning and knowledge sharing.

The overall methodology of the project is built around the analysis of the needs of Latvia and the surrounding region of the Baltic Sea (Lithuania, Estonia, Poland) on knowledge gain about intermodal transportation networks and the development of the tools to attain this knowledge, providing at the same time excellence and innovation capacity. The analysis to be conducted during the first stages of the project, steps on the overarching relations among policy makers, industry and education/research.

Structured around three main pillars, organizational/governance, operational/services and service quality/customer satisfaction, ALLIANCE will deliver a coherent educational/training program, addressed to enhancing the knowledge of current and future researchers and professionals offering their services in Latvia and the wider region.

The expected impacts on the overall research and innovation potential of TTI and Latvian research community will be of high importance and TTI will benefit from ALLIANCE by:
- Improving its knowledge in methodologies for preparing, writing and publishing scientific papers.
- Strengthening its research capacity.
- Establishing international research teams in specific areas of interest.
- Generating new innovative ideas for future research work through the project's activities.
- Setting up the fundamentals for the young generation of researchers.
- Being integrated in a number of existing international transportation research networks.
- Being incorporated in the European research system of transport and logistics.

In addition, the cooperation of TTI with UTH and Fraunhofer IFF will induce benefits into several domains of everyday life at regional, national and international scope. New bases will be established concerning knowledge transfer procedures, education and interdepartmental collaboration amongst research institutes. The innovative organizational framework, which will be structured for this purpose during the project, is expected to constitute a best practice application with tangible and well estimated progress results, which will be disseminated and communicated through social events to the research community and to the respective business sector as well.

Lastly, an important benefit will be the configuration of an integrated framework pertaining to the knowledge transfer techniques and the generic upgrading of the educational system with use of networking, staff exchange, webinars and other knowledge transfer methods and techniques based on a well-structured and well-tried schedule.

2 Roadmap to excellence sustainability

2.1 ALLIANCE Virtual Research Compliance Office

The goal of Networking is to promote TTI as a high value research entity in Europe and to raise the visibility of the ALLIANCE project activities. This goal will be achieved by integrating TTI into the European Research Area (ERA). Therefore, an initial network has been formulated of 12 regional stakeholders at the beginning of the project, which is being updated with EU member organizations as well as international partners on a regular base. The database registers about 100 stakeholders and other TWINNING projects now. Liaison between them and TTI trainees was initiated and will further be enabled by the ALLIANCE Virtual Research Compliance Office (V-RCO), which was established as a part of ALLIANCE website in July, 2018.[1] ALLIANCE V-RCO will be used as a means by which Latvian organizations and individuals will ensure the delivery of high quality research in accordance with EU standards. V-RCO will act as the facilitator for research quality assurance beyond the lifecycle of the project.

2.1.1 Definition of a Virtual Research Compliance Office (V-RCO)

There is no official definition of what is meant by a Virtual Research Compliance Office. By reviewing existing Research Compliance Offices, it can be stated, that in general they function as administrative offices in universities for supporting and promoting their ethical research practices. In general, Research Compliance Offices serve the universities' research communities by coordinating institution-wide or topic related research compliance policy and procedure development. Research Compliance Offices ensure that the universities are compliant with federal, state and local laws and regulations as well as university policies.[2] For the development of the ALLIANCE V-RCO the terms are defined as follows:

Virtual – the ALLIANCE V-RCO is established as a part of the administrative structure of the ALLIANCE website. No physical office will be established.

Research – In the framework of ALLIANCE project the term *research* relates to the specific field of sustainable transport interchanges and thus covers research aspects in all relevant topics of interest, such as intermodality, transportation policies, transportation modelling, innovative solutions, assessment and decision-making. The main research support, which the ALLIANCE V-RCO will provide, will be guidance for doctoral joint supervision to assure research excellence, research applications, collaborative research activities and training programs for good scientific practice.

Compliance – As the ALLIANCE project aims to raise visibility of TTI in Europe, ALLIANCE V-RCO will ensure compliance of the universities', throughout Germany, Greece, Latvia and more, research practices with universities', local, national and European laws and regulations. ALLIANCE V-RCO will provide compliance information and control for all students and postdoctoral researchers in the area of sustainable transport interchanges. Beyond that,

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[1] http://alliance-project.eu/category/vrco/. [last access: 18.12.2018].
[2] Ohio State University. URL: http://orc.osu.edu/. [last access: 18.12.2018].

compliance risks in research practices will be identified to ensure excellence in research practice after the end of ALLIANCE project.

Office – The Office will be mainly structured as a virtual platform, providing guidance, useful and well-organized information, links to training programs and possibilities for networking and scientific exchange. Beyond that, the office can be also understood as a coordinative entity, mediating between the internal (researchers, students, laboratories, administration, faculties, institutional boards, etc.) and external (business partners, international researchers, partner universities, licensing and commercialization organizations, local, national and European Bodies, etc.) stakeholders of TTI.

In the following paragraphs, the results of some online research work about existing Research Compliance Offices are presented to help derive a more concrete design of the ALLIANCE V-RCO on one hand and to emphasize the unique selling point of ALLIANCE V-RCO, on the other hand.[3]

2.1.2 Analysis of Best practices in V-RCO

In preparation of designing a V-RCO, it is necessary to ensure a certain standard compared to other institutions offering a similar approach to research work. Therefore, ALLIANCE has reviewed some other universities offering a V-RCO tool for their researchers. As shown in Table 1, the institution's name as well as the staff working for their Compliance Office are shown. Furthermore their mission and fields of work as stated on their official websites are summarised. Main services and the field of research are listed to enable a quick and easy comparison to other universities, along with the ALLIANCE networks draft of a V-RCO as found in this Work Package.

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[3] The examples represent the first results of google search and will be extended with further Research Compliance Office examples. Examples in the field of transport logistics and specifically in sustainable transport interchanges could not be found.

Table 1: Overview of existing Research Compliance Offices

No/AC	Institution	Staff	Mission & Fields of work	Main Services	Field of Research
1 OSU	The Ohio State University[4]	8	Supports and promotes ethical research practices at OSU. The Office of Research Compliance serves the OSU research community by coordinating institution-wide research compliance policy and procedure development, and by partnering with researchers, so that the University is compliant with federal, state, and local laws and regulations as well as University policies. Regulations and Policies: Human Gene Transfer, Chemical Security, Research Diving Oversight, General Research Policies	Provides compliance reports and trend analysis to the university´s leadership, performs evaluations of program effectiveness, conducts formal risk assessments of the university´s research enterprise	University-wide
2 UB	University at Buffalo[5]	14	Oversees policies and programmes including: financial conflicts of interest, responsible conduct of research, intellectual and creative activity, and export controls. It interacts with federal, state and other regulatory agencies and works collaboratively with the university´s safety offices.	Toolkit for Institutional Review Boards, Education and Training offers in person and online	Social and Behavioural Research, Clinical Research
3 BGSU	Bowling Green State University[6]	2	Serves as the administrative hub for the Institutional Review Board (IRB), Institutional Animal Care (IACUC) and Use Committee and the Institutional Biosafety Committee (IBC). All submissions for review by and official notifications from any of these bodies respectively come to and are issued from this office.	Assists faculty, staff, and students in conducting research, especially research projects, coordinative tasks for IRB, IBC and IACUC	Natural and human sciences
4 ICL	Imperial College London[7]	13	The Joint Research Compliance Office exists to help the College and its researchers meet the requirements of research governance, ensuring Imperial fulfils the legal, ethical and scientific obligations of the healthcare research process	Provide good clinical practice principles and courses, data protection, provide information on project planning (research protocol, sponsorship, ethics approval, regulatory approval, insurance, intellectual property, research passports, initiate	Clinical and non-clinical research (focus on health and social care research)

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[4] Ohio State University. URL: http://orc.osu.edu/. [Last access: 19.12.2018].

[5] University at Buffalo URL: http://www.buffalo.edu/research/about-us/units/ORC.html#title_0. [Last access: 19.12.2018].

[6] Bowling Green State University URL: http://www.bgsu.edu/research-economic-development/office-of-research-compliance.html. [Last access: 19.12.2018].

[7] Imperial College London URL: http://www.imperial.ac.uk/joint-research-compliance-office/about-us. [Last access: 19.12.2018].

			study, register on a public database, audit) Interactive: Education Ethics Review Process	

Table 2 presents the comparison between existing Research Compliance Offices and the planned one at TTI. As only another institution is located in Europe, the regulations which have been reviewed are mainly based on United States (US) standards. These attributes characterize the means of the Research Compliance Offices. It is visible that TTI not only meets the general norms, but introduces some exclusive additional options for the students. So, none of the other Offices is related to the topic of Logistics or Transport, which makes TTI especially tailored to the needs of researchers in this field.. Furthermore, the other offices are all acting as physically existing offices, whereas ALLIANCE V-RCO relies on web-based solutions. Hence, the ALLIANCE V-RCO offers all standardised attributes and extends the spectrum by being uniquely based on logistics and transport with specific orientation on sustainable transport interchanges. The explanations for the attributes are the following:

Table 2: Determining the unique selling point of V-RCO by comparing functions and attributes

No/AC	Research Misconduct	Export Control	Physical	Logistics and Transport	Career	Toolkit	Training	European policy
1/ OSU	■	■	■					
2/ UB	■	■	■		■	■	■	
3/ BGSU	■	■	■		■		■	
4/ ICL			■		■	■	■	■
5/ TTI	■	■		■	■	■		■

Research Misconduct: Research misconduct means fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results.

  (a) <u>Fabrication</u> is making up data or results and recording or reporting them.
  (b) <u>Falsification</u> is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.
  (c) <u>Plagiarism</u> is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit.
  (d) Research misconduct does not include honest error or differences of opinion.[8]

Export Control: Export Controls in this case regulate the transfer, by whatever means, of controlled items, knowledge, models, developed by TTI or project partners or services out of the country in question.

Physical: Physical in this case means whether there is a physical office with office hours and at least one person of contact. Physical also means that there are employees managing conflicts of interests, providing e.g. compliance reports, trend analysis or formal risks assessments, trainings, etc.

Logistics and Transport: Logistics and Transport means the focus on research specifics in the area of Logistics and Transport, but with focus on sustainable transport interchanges. It covers the three thematic areas of ALLIANCE project – Governance and Policy Development, Smart Solutions and Decision-Making.

Career: Career covers all relevant information for the entrance in working life in the area of logistics and transport. It provides orientation for career options on the European market and gives guidance for application procedure.

Toolkit: Toolkit means provision of open access instruments and/or relevant templates that help to check, review and edit scientific work and also can offer linkage to webinars for individual training to corresponding compliance topics.

Training: Training means either eLearning courses or face to face trainings in research good practice, e.g. Responsible Conduct of Research Training, Conflict of Interest Training or Good Clinical Practice Courses, as they are provided in above mentioned institutions.

European Policy: European Policy means a framework for good research practice on the one hand, taking into account up to date information about European research funding and regulatory landscapes, institutional responsibilities; scientific communication; review procedures; open access publishing; the use of repositories; the use of social media and citizen involvement in research, etc. and on the other hand European regulations on ecologically right solutions in logistics and transport.

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[8] The Office of Research Integrity. URL: https://ori.hhs.gov/definition-misconduct. [last access: 28.12.2018].

2.1.3 Concept of the ALLIANCE V-RCO

Mission

The mission of the ALLIANCE V-RCO is to create and provide young and professional researchers with a virtual platform where they will be guided through the process of their research. The different stages of scientific and scholarly research will be supported through the ALLIANCE V-RCO. Hereby, reaching scientific excellence and obtaining it should be the main aspect, whilst taking the European Policy and ethical standard regulations into account. Also, ALLIANCE V-RCO will act as a platform for networking and collaboration between ALLIANCE stakeholders of industry, education and research.

Functions

The ALLIANCE V-RCO is a virtual platform, including an official representative with a consulting function, which offers the following content, accessible via links on ALLIANCE website[9]:

European Research Policies and Regulations

- European Code of Conduct for Research Integrity
- Sustainable mobility in Europe

Women in Science

- Survey Results and Data on Improving Gender Equality in Research Organisations
- UNESCO Women in Science
- Association for women in Science

Intellectual rights and data protection

- Intellectual property and technology transfer
- Intellectual property for industries
- European Union intellectual Property Office
- European IRP Helpdesk
- Data protection in the EU
- Commission Recommendation on the management of intellectual property in knowledge transfer activities and Code of Practice for universities and other public research organizations

Research sources

Recommendation of journals

- World Review of Intermodal Transportation Research
- European Transport Research Review
- Transportation Research Part A: Policy and Practice
- Transportation Research Part B: Methodological
- Transportation Research Part C: Emerging Technologies
- Transportation Research Part D: Transport and Environment
- Transportation Research, Part E: Logistics and Transportation Review
- International Journal of Physical Distribution and Logistics Management
- International Journal of Logistics Systems and Management

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[9] http://alliance-project.eu/category/vrco/ [last access: 19.12.2018].

- International Journal of Shipping and Transport Logistics
- International Journal of Logistics Research and Applications
- EURO Journal on Transportation and Logistics
- Transport and Telecommunication Journal

List of recommended conferences

- City Logistics
- Conference on Sustainable Urban Mobility (CSUM)
- EURO-k Conferences
- European Transport Conference
- International Conference on Reliability and Statistics in Transportation and Communication (RelStat)
- Transport Research Arena (TRA)
- Transportation Research Board (TRB) Annual Meeting
- World Conference on Transport Research (WCTR)
- Winter Simulation Conference (WSC)

International and European forums and associations

- ALLIANCE Website Links
  - European Conference of Transport Research Institutes (ECTRI)
  - The urban mobility observatory (ELTIS)
  - Transport Research and Innovation Monitoring and Information System (TRIMIS)
  - European platform on mobility management (EPOMM)
  - International association of public transport (UITP)
  - ERTICO
  - POLIS
  - Community research and development information service (CORDIS)
  - Integrated Urban Development Transnational Exchange Programme works (URBACT)
  - The Association of European Operational Research Societies (EURO)
- European Logistics Association
- Association for European Transport
- European Technology Platform ALICE
- Supply Chain Movement

Open Access bibliography of ALLIANCE Sustainable Transport Interchanges Program – STIP

Online libraries, databases and search engines

- RMIT University
- Western Library – Supply Chain/Logistics
- Springer online library
- Transport Research International Documentation
- Academic Search – EBSCO
- Directory of open Access Journal
- Google Scholar
- Science Direct
- SCOPUS
- Web of Science

University's research regulations, policies and guidelines

- Promotion Council
- Guiding Principles for International Joint Supervision of Doctoral Dissertations in TTI
- Scientific misconduct
- TTI Guidelines for the Preparation of Doctor Thesis
- Information for International Students

Guidelines for scientific writing

- Dissertation
- Papers
- Proposal
- Manage long documents, tables, graphics
- Referencing styles

Guidelines for scientific presentation

- Poster
- Oral
- Visual presentation tips

Research financing

- Information on scholarships (State Education Development Agency)

Toolkit

Tools for scientific writing and presentations

- Prezi (open source presentation tool)
- Google Docs (text/chart/presentation)
- Etherpad (open source editor)
- Flaticon (free icons to use)
- SciFlow (research platform for common paper writing)

Plagiarism check and English spell and grammar check (for scientific writing)

- Grammarly (free online plagiarism and grammar check)

Webinars as virtual training programs

- TRB webinars

Career

Guidelines for career planning

- **In preparation of applying**
  - CV skills
  - How to: Reference letter
  - Test preparation for psychometric tests
- **Career options and opportunities in Europe**
- **Vacancies & researchers' mobility**
  - EURAXESS

- o ACADEMIC KEYS
  - o ENGINEEROXY.COM
  - o ERASMUS PLUS
  - o Marie Sklodowska-Curie Actions

- **Current job offers in sustainable transport logistics**
  - o Euro Supply Chain Jobs

Contact V-RCO

- **Contact details and opportunity to send messages**

Design

With these topics in mind, the most appropriate design for the platform would be a form of step by step guiding through the process of researching. From choosing a topic and meeting the official requirements to finalising the work and checking on grammar and plagiarism, the buttons on the website will help with each step. Therefore, a lifecycle of an academic work, inspired by the University of Otago[10], can be seen as the base of the structure.

Starting with *European Policies and Regulations*, the researcher can confirm whether the topic and approach is according to current regulations, also within their country and the EU. Furthermore, there is information on Women in science.

Moving on to *Research sources*, relevant journals, conferences, open access bibliography and search engines are provided for giving the young researcher an overview on possibilities for publication and on the scientific community of transport.

The *University's research regulations, policies and guidelines*, are specifically tailored on regulations and principles of TTI and the provision of soft skills for scientific writing, visualization and presentation. Also, guidelines for funding methods are suggested.

The *Toolkit* is the working support with assistance to citations, referencing and a grammar check. It offers links to webinars to deepen knowledge and gain new information.

As the next button, *Career* is focused on the professional future of the students. It offers support with the process of an application and also has a platform to show current job offers, nationally and internationally. For the process, the student is able to follow up the impact of their work for references in their CV.

With the option to *Contact*, the researcher has the opportunity to connect with supervisors and stakeholders, as well as the office of ALLIANCE to ask questions and give feedback.

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[10] University of Otago. URL: http://www.otago.ac.nz/library/modules/research_lifecycle/. [Last access: 19.12.2018].

Figure 1: Lifecycle of scientific research
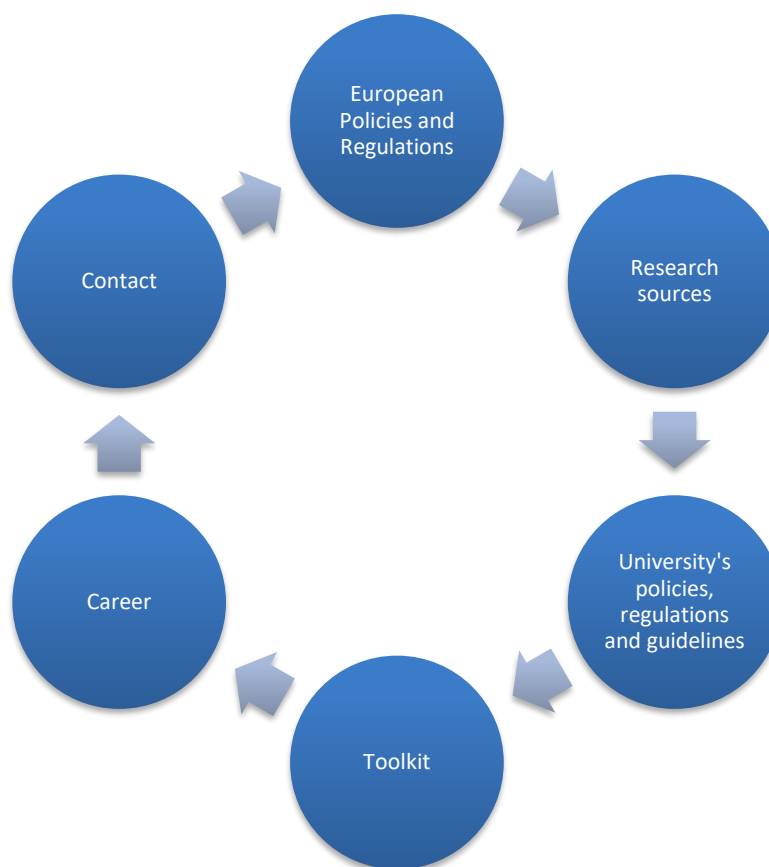
2.2 ALLIANCE Network establishment and continuation

An in-depth analysis of the European transport networks and associations ECTRI, FEHRL, IFORS, ELA, ITF, FERSI and ALICE was done by IFF, by outlining the individual benefits of the associations, listing of fees, guidance on how to become a member, important events taking place and the recommendation of actions. As TTI assessed ECTRI and IFORS suitable to join for achieving access to well-known EU research associations their profiles are presented in the following in detail together with the actions taken place, the results achieved and also an outlook on further activities foreseen beyond the end of the project. Besides the collaboration with associations, a summary of the general networking activities that were completed during the project will be given.

2.2.1 European Conference of Transport Research Institutes (ECTRI)

About ECTRI

ECTRI is an international non-profit organization that was founded in April 2003. It comprises 28 major transport research institutes or universities from 21 European countries. They represent more than 4000 European scientific and research staff members in the area of transport.[11] ECTRI

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[11] http://www.ectri.org/index.html. [last access: 19.12.2018]

is organizing working groups on mobility, freight and Logistics, Economics and policy, safety, security and risk analysis and traffic management.[12]

Furthermore, ECTRI is organising the following thematic groups (TG) to define research topics of interest for supporting European policies and programmes, increase successful participation in European projects and to provide a platform for networking and scientific exchanges:

- TG Urban Mobility: understanding travel behaviour, Inter-modal aspects of urban mobility, land-use and transport interaction;
- TG Freight and logistics : E-freight, Door-to-door freight transport and supply chains, urban logistics, Terminals;
- TG Economics and policy: Policy analyses e.g. scenarios, foresights, Cost benefit analyses, Public Private Partnership, Pricing and externalities;
- TG Safety: Behavioural adaption and change, Fitness to drive, Evaluation of policy initiatives, Ageing society, Injury data;
- TG Security and risks analysis: Risk Analysis and Management, Critical infrastructures, Needs of users/ operators/ owners/ emergency services;
- TG Traffic Management: Traffic modelling, Traffic control, Communication and positioning technologies, Cooperative systems;

Furthermore, ECTRI provides a network of research centres between its members as well as a platform for the foundation of further research networks and exchanging ideas on emerging transport research topics. Therefore, ECTRI enables by organizing networks of mobility, trainings and studies on research infrastructures involved organisations to engage in the transport European Research Area.

Actions completed in ECTRI

Table 3: List of activities in ECTRI

Date	Partner	Type of Activity	Impact	Link
2016	TTI	ECTRI Assembly with TTI hosting representatives of Latvian transport industry reviewed the recent developments in transport area in Latvia, presentation of ALLIANCE project	Visibility of current state of intermodality in Riga, Latvia – problems, visions, activities also on ministerial level	http://www.tsi.lv/en /content/first-time-latvia-assembly-members-european-conference-transport-research-institutes-ectri
2016	TTI	Prof. Yatskiv was elected in ECTRI Board (position from 27 January 2017)	Visibility of TTI	https://www.ectri.o rg/About/Members .htm
2017	IFF	In-depth analysis of ECTRI members for further collaboration opportunities in thematic areas: Governance, Smart Solutions, Decision-making	Overview of suitable partners for further project acquisition and conferences`particip ation	ANNEX A

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[12] http://www.ectri.org/Activities/ECTRI-Thematic-Groups.html. [last access: 19.12.2018]

2017	TTI	Prof. Igor Kabashkin & Prof. Irina Yatskiv joined TWG Urban Mobility	Participation on European initiatives development for passenger and freight transport in urban areas Policy influence of TTI acitivities	https://www.ectri.org/Activities/WGsTWGs/TWGA.htm
2017	TTI	Dr.sc.ing. Mihails Savrasovs took part in section "Traffic Modelling" of Young Reserchers' seminar by ECTRI, FEHRL, FERSI	Excellence in scientific presentation	http://www.ectri.org/YRS17/ http://alliance-project.eu/alliance-participation-in-young-researchers-seminar-2017-by-ectri/
2018	TTI	Prof. Yatskiv was elected as Vice-President in ECTRI (position from 27 January 2019)	Visibility of TTI	N/A

As main results of active participation in ECTRI can be addressed the policy influence of TTI activities and the overall visibility and excellence of TTI. In Latvia TTI provides independent and evidence-based advice to decision makers and provide them relevant consultations in the field of transport research.

One of the results as a direct effect of ECTRI membership was in 2018 the participation of Prof. Irina Yatskiv in 6th EU-US Transportation Research Symposium JUNE 26-27, 2018 (Brussels) "Socio-economic Impacts of Automated and Connected Vehicles". Prof. Yatskiv represented the Baltic countries.

Next steps

- Foster cooperation with European Transport Research Institutes in researchers' mobility, collaboration
- Making use of the membership for initialisation of new projects
- Participation in preparing of position papers (https://www.ectri.org/publications/position-papers/)

2.2.2 International Federation of Operational Research Societies (IFORS)

About IFORS

The International Federation of Operational Research Societies (IFORS) is an umbrella organization set up in 1959, representing approximately 50 societies and kindred societies. In all, it represents some 30,000 individual members.[13]

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[13] www.ifors.org. [last access: 18.12.2018].

IFORS exists to: Promote the development of operational research (O.R.) worldwide, both in methodology and practice, and **link the member societies and regional grouping.**

These objectives are achieved through
- Publications
- Conferences
- Website and Newsletter
- Special programs for developing countries
- Educational initiatives
- Distinguished Lectures[14]

The benefits for TTI of becoming a member of IFORS is the accessibility of the **Regional Group EURO** and its **working groups** as well as **Journals.**

About Regional Group: EURO

Within IFORS, there is an association especially for European Researchers. **EURO** "is the '*Association of European Operational Research Societies'* within IFORS, the *'International Federation of Operational Research Societies'.*" Its aim is to promote 'Operational Research' throughout Europe.[15]

Latvian Operational Research Society[16], submitted an application for membership in IFORS.

Actions completed in IFORS

Table 4: List of activities for becoming a member of IFORS

Date	Partner	Type of Activity	Impact
2018	IFF	Guidance on how to become a member of IFORS	Overview of benefits and conditions of IFORS
2018 (July)	TTI	Prof. Irina Yatskiv participated on Euro2018 in Valencia with presentation	Direct contact to IFORS
2018 (September)	TTI	Preparation of application on membership	Latvian Operational Research Society submitted an application for membership in IFORS

Latvian Operational Research Society exists since 2005 with the next goals:

1. Theoretical and practical research development in the field of operational research;
2. Development of informational society in Latvia in the field of operations research;
3. Support of Latvian scientists and experts working in the field of operational research;
4. Cooperation with national and international organizations in the field of operational research;
5. Raising the prestige of operational research.

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[14] http://ifors.org/history/. [last access: 18.12.2018].
[15] https://www.euro-online.org/web/pages/1/home [last access: 14.12.2018].
[16] lators.lv [last access: 14.12.2018].

Next steps

- Foster cooperation with other European Operation Research Societies
- Cooperation with other members in Research Conference organizations
- Participation in Euro-k Conferences
- Participation in IFORS Education Resources Project

2.2.3 Overview of ALLIANCE networking activities

Initially, the project has started with about 50 stakeholders and grew up to over 100 stakeholders by now. During the lifecycle of the project, there were several actions taken place by all partners to widen the impact of ALLIANCE. Amongst others, there were several conferences visited, seminars held, project presentations shown, project applications developed and new cooperations established. Table 5 shows the list of most important networking activities completed during the project.

Table 5: List of general networking activities

Date	Partner	Type of Activity	Impact	Link
2016	TTI	"Science Night" and seminar "Building Information Modelling"	-regional impact on research to business	N/A
2016	TTI/IFF	Seminar: "How You Can Bring INDUSTRY 4.0 Technologies to Logistic Networks"	-regional impact on research to business	http://www.tsi.lv/en/content/professor-michael-schenk-tsi-implementation-concept-industry-40
2016	TTI	Seminar "Sustainable Urban Mobility Plan: Information Gathering & Analysis Tools" organised by Jasper and TTI for municipalities	-regional impact on research to business	N/A
2016	TTI	2nd Workshop "Social and physical safety of passengers on public transport and transport infrastructure"	- familiarizing the participants with the current situation in the field of passengers' safety in public transport in Latvia	http://www.tsi.lv/en/content/seminar-social-and-physical-safety-passengers-public-transport-and-transport-infrastructure
2017	TTI/IFF	Cooperation with Otto von Guericke University Magdeburg (OVGU): Participation of TTI students in International Spring School in Logistics	-Establishment of scientific collaboration teams	https://www.ilm.ovgu.de/spring+school+logistics-path-26,452.html
2017	UTH/TTI	Transportation Research Board (TRB) 96th Annual Meeting	- presenting "Developing an educational program for transportation across regions: The case of intermodal	http://alliance-project.eu/alliance-presence-at-trb2017/

2017	TTI	Meeting with industry representatives	- exploring opportunities of potential financing from ERDF for realizing collaborative research	http://alliance-project.eu/meeting-with-industry-representatives/
			connections for Latvia and the region"	
2017	TTI/ UTH	20th International Conference Transbaltica 2017: Transportation Science and Technology	- uniting decision-makers, industry representatives, public sectors and academia to discuss significant issues of the transportation in the Baltic Sea region	http://transbaltica.vgtu.lt/index.php/about2019/Transbaltica2019
2017	TTI	Seminar regarding TWINNING projects' implementation and proposal preparation with Riga Stradiņš University (RSU) RSU Twinning project: "Twinning on DNA-based cancer vaccines (VACTRAIN)"	- Strategical considerations of TWINNING impact on institutions and the Latvian research community - challenges in TWINNING projects' implementation, possibilities to support activities of TWINNING projects by implementing national level projects	http://alliance-project.eu/participation-of-alliance-in-seminar-organized-by-rsu-and-tti/
2017	UTH	CIVITAS ANNUAL CONFERENCE 2017	- connecting developers of new tools, methods, and approaches with potential interested entities and users	https://civitas.eu/forum2017/exhibitors-list
2017	TTI/UTH	HORIZON2020 workshop regarding WIDENING activities	- The scope of ALLIANCE team's participation in the workshop was to present the ALLIANCE project and provide some insight to the participants, regarding successful application and implementation of the Twinning project in Latvia	http://alliance-project.eu/alliance-participation-in-workshop-regarding-widening-activities-in-frame-of-horizon2020/
2017	TTI/UTH	THE WIDENING CONFERENCE: Towards the Creation of a Widening Community	- bringing together all coordinators of the three widening actions ERA CHAIRS and to create a WIDENING COMMUNITY, in order to exchange best practices, experiences and create new links for future synergies	http://alliance-project.eu/paricipation-of-alliance-in-the-widening-conference/
2017	TTI	RIGA COMM 2017 exhibition	- IT and business event for entrepreneurs of service and manufacturing fields, multi-level executives of state institutions and organizations and professionals that represent multiple fields of operation	https://rigacomm.com/lv/ http://alliance-project.eu/participation-of-alliance-in-riga-comm-2017-exhibition/

2017	TTI/IFF	TWINNING meeting with H2020 project UMiTWINN Grant agreement no.: 691942	-Participation of University of Miskolc on RelStat'18 and ALLIANCE Final Conference	N/A
2017	IFF	ALLIANCE Project presentation on meeting with Mr. Barrie Louw from University of Hull in Magdeburg	-Contact to TTI, Invitation to RelStat-2018	N/A
2017	IFF	ALLIANCE Project presentation on meeting with Prof. Tauno Otto from Tallinn University of Technology in Magdeburg	-Inclusion of Tallinn University of Technology in project application "Sci-Bi"	N/A
2017 /2018	TTI/IFF	Cooperation with OVGU in 10th and 11th International Doctoral Students Workshop in Logistics	-Establishment of scientific collaboration teams -development of project application "Sci-Bi"	http://alliance-project.eu/11th-international-doctoral-students-workshop-on-logistics-on-june-18-2018-in-magdeburg-germany/ http://alliance-project.eu/10th-international-doctoral-students-workshop-on-logistics-on-june-20-2017-in-magdeburg-germany/
2017	TTI	Workshop "From data to added value: points of view and solutions"	- Data Science application in business: from theory to practice - Data Lake – Member of Data Science Team in Accenture - Spatial Data Science: when locations matter	N/A
2018	TTI/IFF	Collaboration of TTI, IFF, OVGU and other Baltic Universities in project "Sci-Bi: Digitization in Logistics and Transport"	-PhD Seminar in Riga with a new format: discussion tables, linkage between research and business -over 60 researchers and stakeholders participating in open workshop "Sci-Bi"	http://www.hochschulkontor.lv/en/26-en-articles/617-sci-bi-digitalization-in-logistics-and-transport
2018	TTI	Participation of ALLIANCE in the XXI International conference "TransBaltica 2018"	- key issues were the EU Development of Trans-European Transport Networks (TEN-T) corridors and related challenges: digitalization, alternative fuels availability and the place of Latvia in these processes	http://www.rmsforum.lv/en/event/158
2018	TTI	Project: Access and Safety in European Cities "Discussion on road safety governance in Riga"	- level of road safety in Riga - identify specific governance arrangements, policies and actions taken at a local level to	N/A

			improve road safety performance	
2018	TTI	6th EU-US Transportation Research Symposium JUNE 26-27, 2018 (Brussels) "Socio-economic Impacts of Automated and Connected Vehicles".	The Transportation Research Board (TRB), in collaboration with the European Commission (EC) and U.S. Department of Transportation (USDOT), is sponsoring a two day symposium and it was the scene for the discussions: A White Paper on "Synthesis of the Socio-Economic Effects of Connected and Automated Vehicles and Shared Mobility" A Briefing paper with the description of four Scenarios.	N/A
2018	TTI	15th Anniversary of the Association of Pan-European Coach Terminals - workshop "Innovations in passenger transport with bus and coach and terminal development in the future"	- possible effects of connected and automated driving on the economy, employment and skills - economic viability of converted diesel city bus into electric bus	http://alliance-project.eu/alliance-participation-in-the-15th-anniversary-of-the-association-of-pan-european-coach-terminals-apc/
2018	TTI	Workshop "From data to added value'	- Data Science. Case Studies (presented representatives of Deloitte Latvia and TTI).	N/A

2.3 ALLIANCE e-learning courses meeting Lifelong Education goals

The content of the online courses was developed in WP2 activities; aprobated in WP3 activities and must be restructured for meeting the requirements of online courses oriented on self-learning. The digitalization approach covers guidelines for lecturers of TTI, UTH and Fraunhofer IFF for the development of e-courses and e-metadata based on the ALLIANCE courses of Sustainable Transport Interchanges Programme (STIP).

2.3.1 State of practice review of e-learning and lifelong education

Definition of e-learning and Lifelong education

According to the Lifelong Learning Platform (LLLPlatform) the European Union addresses "e-learning" as a generic expression for all learning involving the uses of Information and Communication Technologies (ICT) to support both learning and teaching "Its meaning is normally synonymous with ICT-based learning. The term may refer to the use of various technologies and tools to support learning in different contexts, including face-to-face settings and distance learning, separately or in combination, in which case e-learning is usually called blended learning."[17] In ALLIANCE we concentrate the term "e-learning" on distance learning only, based on the

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[17] http://lllplatform.eu/resources/lexicon/ [last access: 13.12.2018].

development and provision of e-Courses generated from STIP. There are two approaches of e-learning: self-paced and facilitated/instructor-led. Self-paced e-learning means, learners work completely independent without being supervised or following a pre-planned course program. They follow their own learning path by having access to courses via platform or CD-ROM and getting supplemental access to self-assessments and learning resources. Facilitated/instructor-led e-learning means, the course is scheduled and led by an instructor through an e-learning platform. In this model, a linear curriculum is developed that integrates several content elements and activities into a chronological course or syllabus.[18] According to literature, a combination of both approaches is usual. Within ALLIANCE project the first approach, the self-paced e-learning, was realized by the establishment of the e-platform in Task 4.1, the development of e-Courses on the interface of WP2 and WP4 and their upload on the e-platform with open access availability, realized in Task 4.1 and documented in D4.1. The combined variant of both e-learning approaches is conceptionalized only and a part of the excellence sustainability guidance of the present deliverable (Chapter 5: Business Model, Certification Paths).

Lifelong learning is 'the on-going access to the renewing of skills and the acquisition of knowledge"[19]. It can be differentiated into three types of learning:

- Formal – offered by educational institutions;
- Non-formal – happening outside educational institutions;
- Informal – not planned, accidental learning.[20]

Informal learning includes all activities pursuing a learning goal and usually happens outside teaching and learning settings. Non-formal learning also takes place outside formal learning settings, like educational institutes, but still within an organizational framework. It covers courses, seminars, conferences, distance learning and private lessons. It also comprises any kind of pre-planned training and learning at the workplace, e.g. in circumstances where supervisors act as tutors, also forms part of non-formal learning.[21] By the development of ALLIANCE e-Courses we primarily address the categories of formal and non-formal learning, as the distance learning courses are offered from TTI as educational institution within their curricula, but also can be accessed by any individual and professionals within their work environment. Furthermore it can be practiced at any place.

The definition of the LLLPlatform of the European Union complements that lifelong learning "[…] shall enable citizen's emancipation and full participation in society in its civic, social and economic dimensions. Its objective should not only be described in terms of employability or economic growth but also as a framework for personal development."[22]

While lifelong learning is a personal process following personal goals, lifelong education is an institutional fact, arising from educational offers and experiences.[23] So, to intentionally enable lifelong learning in form of distance learning offers, besides technical conditions the learning

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[18] http://www.fao.org/docrep/015/i2516e/i2516e.pdf. P. 10-11. [last access: 20.12.2018].
[19] The European Commission´s white paper: Teaching and learning towards the learning society [COM(1995) 590 final]
[20] Behringer/Schönfeld 2014; Bilger/Behringer/Kuper 2013; Eurostat 2006, pp. 9 ff.
[21] Behringer/Schönfeld 2014; Bilger/Behringer/Kuper 2013; Eurostat 2006, pp. 9 ff.
[22] http://lllplatform.eu/resources/lexicon/ [last access: 13.12.2018].
[23] Searle, J. R. (1995). The construction of social reality. London, UK: Penguin Books.

content needs to be organised and provided in a suitable format. The most common format for organising e-learning content are MOOCs.

A Massive Open Online Course (MOOC) "[…] is an online course with the option of free and open registration, a publicly-shared curriculum, and open-ended outcomes. MOOCs integrate social networking, accessible online resources, and are facilitated by leading practitioners in the field of study. Most significantly, MOOCs build on the engagement of learners who self-organize their participation according to learning goals, prior knowledge and skills, and common interests."[24] MOOCs are oriented on a huge number of learners (normally at least 150 participants) that technically can register on an e-learning platform and the courses didactical approaches also can be scaled without additional effort.[25] MOOCs are usually free of cost and accessible without restrictions. Normally MOOCs are offered as several week courses' with a fixed starting and ending date.[26] There are different types of MOOCs, the best known are cMOOCs (connectivist MOOC) and xMOOCs (extended MOOC). cMOOCs are offered decentralized without an own platform and are mostly provided from private persons for small initiatives, whereas xMOOCs are offered via an online-platform from educational institutions and are characterized by being video lectures, supplemented with quizzes, tasks and forums for exchange.[27] ALLIANCE project focusses on xMOOCs.

Before developing the ALLIANCE e-learning approach, there was a state of practice review done to get an overview of existing e-learning approaches at well-known or partner universities from ALLIANCE consortium as well as universities, who received EU-funding for the development of distance learning offers. The analysis results are presented in Table 6.

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[24] https://oerknowledgecloud.org/sites/oerknowledgecloud.org/files/MOOC_Final.pdf. p. 10. [last access: 13.12.2018].
[25] Grainger (2013), p. 7, Hollands/Tirthali (2014), p. 27.
[26] Treeck/Himpsl-Gutermann/Robes (2013), p. 291 and Eichler et al. (2016), p. 3.
[27] Bremer (2013), pp. 34–35.

Table 6: State of practice review of e-learning approaches

University	e-learning approach	Management board for e-learning	Resources	Funding
Boston University – online education[28] (USA)	- bring world-class faculty and highly ranked programs to undergraduate and graduate students around the nation and the globe - offering degree programs - updating professional skills with certification programs - exploring topics in individual courses Approach - students study with the same BU faculty who teach on campus, and benefit from easy access to recorded lectures from professors and visiting experts, readings, support material, case studies, student services, and other resources - most of which are available any time, day or night - it's high quality, rigorous academic content, designed for students who seek to learn on their own terms and on their schedule	29 staff members[29] - Administration (5) - Faculty and Student Support (11) - Instructional Design (11) - Media production (2)	Online tutor service called 'Smart thinking'[30] own online bookstore own online library system edX	Partner agency 'mindmax'[31] government agencies sponsoring
E learning University of Athens[32] (Greece)	- e-learning programmes combine innovative teaching techniques and interaction with your personal tutor through a friendly online educational platform	7 staff members[33]: - Marketing (2) - Project Manager (1) - IT (1) - Education (1)	user-friendly educational platform adjusted to the Distance Learning Principles	European Commission 'Epale'[34]

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[28] Boston University, 2018
[29] Boston University, 2018
[30] Boston University, 2018
[31] MindMax, 2018
[32] E-learning University of Athens, 2018
[33] E-learning University of Athens, 2018
[34] European Commission Epale, 2018

	- successful completion of the courses leads to a Certificate of Training or Specialized Training Approach - work and study with faculty members of the University of Athens, as well as with renowned European experts, and enjoy the flexibility, accessing anytime and anywhere learning - online courses are offered through flexible and blended learning sessions, matching both the specific industry and professions' needs as well as the individuals' availability - programmes are conducted solely via the Internet and are addressed to all age groups	- Development (1) - Administrative (1)		
The University of Derby Online Learning[35] (UK)	- offer high quality, value-for-money study options with a learner-oriented approach that is always personal - online distance learning degrees continue to match the high academic standards you would expect on campus in any British university - vocational online distance learning courses are particularly suited to busy, working professionals Approach - providing high quality, accredited online learning opportunities, and all of the support required for successful graduation, to learners in the UK and internationally who wish to enhance their career and earning potential	12 staff members - Marketing (2) - Business Development (1) - Support during studies (4) - Administrative (5)	Blackboard[36] MOOC platforms	Different companies in the private sectors Partnership with organisation offering professional and regulated qualifications

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[35] University of Derby, 2018
[36] Blackboard, 2018

	- The University of Derby Online Learning (UDOL) is the thriving distance learning division of the University of Derby			
SRH Fernhochschule – The Mobile University[37]	Didactical: Following the CORE principle (Competence Oriented Research and Education) Organisation of the learning content: the courses and the curricula are organised in the sense of "constructive alignment" – means, forms of teaching and examination are oriented on the learning outcomes.	<u>120 staff members</u> - professorial council (43) - employees (77)	20 study centres e-campus with user-friendly educational platform adjusted to the Distance Learning Principles	Charitable foundation company SRH

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[37] SRH Fernhochschule – The Mobile University. https://www.mobile-university.de/ [last access: 21.12.2018].

2.3.2 Development of ALLIANCE E-learning approach and requirements

Among the listed e-learning focused universities in Table 6, there is a wide range of distance learning course offerings, distance learning degrees, a mix of face-to-face and online learning possibilities ("blended learning") and vocational training opportunities pictured. The most information on didactical approaches and e-learning requirements was given by the "SRH Fernhochschule – The Mobile University". Their competence oriented framework goes in line with the EU requirements on competence based lifelong learning.[38] That´s why their approach in combination with additional scientific literature on that topic will be presented as it primarily gave orientation for the ALLIANCE e-learning course development guidelines, presented in 2.3.3.

Following the "constructive alignment" principle of SRH, the lecture is to be developed originating from the intended learning outcome, its consequential type of examination and in line with the corresponding students' activities.[39] Respectively, the development of an e-learning course should keep the following order:

1. Definition of learning outcomes
2. Definition of competence levels within the competence fields following the theory of Pfäffli[40]: selfcompetence, professional competence, methodical competence, social competency, capacity to act
3. Specification of the competence levels oriented on Bloom´s taxonomy[41]
4. Choice of the types of examination corresponding to the learning outcomes and the respective competences
5. Choice of teaching and learning methods, i. a. self-assessments
6. Evaluation of the students' competence development after the first run of the course (e.g. implementation of a questionnaire for competence measurement.[42]

A learning outcome or a learning objective […] is a statement describing a competency or performance capability to be acquired by the learner. Objectives should be specified for the course as well as for each single activity.[43]

- Learning objectives define the expected outcome of each learning unit
- According to the revised Bloom's taxonomy of the cognitive domain, leaning objectives can imply six different types of cognitive performance, shown in Table 7[44]

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[38] European Commission. (2018, 05 18). Education. Retrieved from
https://ec.europa.eu/education/sites/education/files/swd-recommendation-key-competences-lifelong-learning.pdf. [last access 20.12.2018].
[39] BIGGS, 1996, S. 347ff.
[40] PFÄFFLI, 2005, S. 65. See also: Rózsa, Julia; Edinger, Susanne; Schöler, Stefanie; Kling, Petra; Gusset-Bährer, Sinikka (2017): CORE-gerechte Modulkonzeption. Ein Leitfaden. 1. Auflage. Heidelberg: Heidelberger Hochschulverlag (Good practice in CORE-teaching, Band 3).
[41] BLOOM, 1976. See for revised version: Anderson, L.W., Krathwohl, D.R. (Eds.).
[42] Jaroschinsky, A., Rózsa, J. (2015).
[43] E-learning methodologies - A guide for designing and developing e-learning courses (2011). Food and Agriculture Organization of the United Nations. Rome. p. 34. [last access: 20.12.2018].
[44] BLOOM, 1976. See for revised version: Anderson, L.W., Krathwohl, D.R. (Eds.). See also: E-learning methodologies - A guide for designing and developing e-learning courses (2011). Food and Agriculture Organization of the United Nations. Rome. p 35. [last access: 20.12.2018].

Table 7: Performance levels according to Bloom's taxonomy

Peformance levels for the cognitive domain	
Remember	The learner is able to recognize or memorize information.
Understand	The learner is able to reformulate a concept.
Apply	The learner is able to use information in a new way.
Analyse	The learner is able to decompose and define relationships among components.
Evaluate	The learner is able to justify a decision according to a criterion or standard.
Create	The learner is able to realize a new product or approach.

Besides the competence fields of Pfäffli, described above, the EU commission has developed a proposal for a council recommendation on key competences for lifelong learning.[45] These are listed below:

- Communication competences
- Mathematical competence and basis competences in science and technology
- Digital competence
- Learning to learn
- Social and civic competence
- Sense of initiative and entrepreneurship
- Cultural awareness and expression
- Transversal elements (e.g. decision making)

The achievement of this competences and/or the competence fields of Pfäffli should be taken into account while the formulation of e-learning objectives and the development of the learning assessments.

As the ALLIANCE e-learning material addresses the approach of self-paced learning, the teaching and learning methods to be developed must be self-learning oriented and so are the assessments. To keep the learners motivated on their self-learning path the courses should be divided into easy manageable units, which are to be supplemented with learning activities, i. a. self-assessments.[46]

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[45] Commission staff working document. Accompanying the document: Proposal for a council recommendation on key competences for lifelong learning. Brussels, 17.01.2018. URL:
https://ec.europa.eu/education/sites/education/files/swd-recommendation-key-competences-lifelong-learning.pdf. Pp. 33-35. [last access: 18.12.2018].
[46] E-learning methodologies - A guide for designing and developing e-learning courses (2011). Food and Agriculture Organization of the United Nations. Rome. p. 38 [last access: 20.12.2018].

A recommended format for self-assessments are questions. There exist different types of questions, which have various characteristics. The question formats with its definition and characteristics are listed in Table 8[47] below.

Table 8: Recommended question formats and their characteristics for self-assessments

Question format	Definition	Pros	Cons
True or false	A statement with two options (true/false or yes/no), where only one is correct.	Easy to create Can differentiate feedback for each option	Learners have a 50 percent chance of selecting the right option The answer is not created by the learner
Multiple Choice	A statement that provides different options; only one is correct. This type of interaction allows for providing different feedback for each selected option.	Very flexible (can be used for several purposes) Can differentiate feedback for each option	Difficult to create (you have to develop credible wrong options and write different feedback for each of them) The answer is not created by the learner
Multiple Responses	The correct answer consists of more than one option, all of which must be selected.	Very flexible (can be used for several purposes)	Quite difficult to create (you have to D evelop credible wrong options) The answer is not created by the learner
Matching	This type of interaction presents two series of elements. The learner must associate each element of the first series with an element of the second. The example shows a drag-and-drop exercise.	Quite easy to create	Risk of being too easy for learners The answer is not created by the learner
Ordering	The learner has to order several elements in a sequence, e.g. the logical sequence of several phases,	Quite easy to create	The answer is not created by the learner

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[47] E-learning methodologies - A guide for designing and developing e-learning courses (2011). Food and Agriculture Organization of the United Nations. Rome. pp. 84-87. [last access: 20.12.2018].

	steps or operations to be performed.		
Fill-in the blanks	This can be an incomplete statement to be completed by learners; or a sentence with one or more missing words or numbers. The learner must fill in the blank spaces with the appropriate terms. The response is checked by the system which provides relevant feedback.	Easy to create	Rarely appropriate Difficult to measure
Short answer/short essay	The learner is free to choose his/her own words to formulate the response to the question. This makes it more difficult to check the learner's output as it is impossible to foresee all the possible answers. However, an answer developed by an expert can be proposed for comparison (see the example) or the essay can be saved and submitted to an online tutor.	The answer is created by the learner	Very difficult to measure

Creating an e-learning course in the type of self-paced learning also requires a specific organization and a descriptive mediation of the learning content. Some general tips on language style, usage of audio narrations and content presentation are listed in the following[48]:

- Write directly, simply and clearly. Avoid sentences longer than 25 words

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[48] E-learning methodologies. A guide for designing and developing e-learning courses. FAO 2011. URL: http://www.fao.org/docrep/015/i2516e/i2516e.pdf. [last access: 18.12.2018].

- Avoid too much text. Use pictures, icons, videos and podcasts for a better understanding of the content
- Use instructive formulations for the introduction into the topics
- Provide information material in addition to your e-learning content for the contextualization of the slide content. (All the information that might be useful to better understand the course content, but doesn´t fit on the slides)

Use of audio narrations[49]:

- Use audio narrations to explain visuals, but keep the explanation brief
- Words should be spoken at the same time, they are graphically represented
- Visually direct the learner to salient visual content during narration
- Avoid text on screen that is identical to narration

Reference information should be available as text.

These requirements for e-learning course development had now to be adjusted to ALLIANCE training courses, framed in STIP. As the courses existed already as face-to-face training and lecture material, the target groups of e-learning had to be identified firstly and guidelines were developed for the course authors for a standardized adjustment of all courses on self-paced e-learning courses. The steps of STIP digitization are presented in the following sub-chapter.

[49] Nemesh, Ann: 7 Tips to use audio narration in online training: URL: https://elearningindustry.com/audio-narration-online-training-7-tips-use. [last access: 07.12.2018].

2.3.3 Steps of STIP digitalization

The digitization guidelines for course authors of STIP cover standardized specifications and a recommended procedure for step by step adaptation of the lectures' content, considering both, the didactical requirements, described in the sub-chapter above and the technical restrictions of moodle e-learning platform, which is provided by TTI.

As the e-learning courses intend to support lifelong learning, they address any interested individual in the first place, but also have to fulfil the requirements of professionals, who are primarily practical oriented. For that purpose there was a selection made of the STIP courses suitable for e-learning, considering a balanced mix of all course classifications (core, passenger, freight) and thematic areas (governance, smart solutions, decision-making). In the following Tables the courses classifications are presented (table 9[50]) and the selection that was made for digitization purpose (Table 10).

Table 9: Core, Freight and Passenger STIP courses

STIP			
Course	**Core**	**Passenger transport**	**Freight transport**
C0. Research methodology and teamwork setup	X		
C1. The European policy on intermodal transportation	X		
C2. Building business models for intermodal transport interchanges	X		
C3. Sustainable development and transportation planning		X	X
C4. Operation and management of intermodal transport systems		X	X
C5. Optimization of intermodal transport systems	X		
C6. Intelligent services for passenger transportation		X	
C7. Smart information technologies in freight transport logistics			X
C8. Design of passenger transport interchanges		X	
C9. Design of freight transport interchanges			X
C10. Smart equipment for freight transhipment			X
C11. Decision making methodologies	X		
C12a. Data collection methods: Surveys		X	X
C12b. Data collection methods: Historical and observed data		X	X

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[50] ALLIANCE, 2018a.

Table 10: STIP course selection for digitization purpose

Governance		Smart solutions		Decision-making	
Passenger transport	**Freight transport**	**Passenger transport**	**Freight transport**	**Passenger transport**	**Freight transport**
C1		C6		C11	
C2		C8	C9	C12a	C12a
C4	C4		C10	C12b	C12b
C0					
Overview					
Core	4	Passenger transport	5	Freight transport	5
			Total number of courses		14

The recommended procedure for the digitization of each course cover the following steps:

1. Target group oriented simplification of the lecture content
2. Splitting of the courses into thematic units (themes)
3. Development of competence based learning outcomes for every theme
4. Development of at least three self-assessments for every theme in accordance to the learning outcomes
5. Recording of audio narrations for every theme, by not exceeding a total course duration of 45 to 60 minutes
6. The self-assessments of every theme will be put together to a final exam after successfully passing all themes of the course
7. The learner will be offered an automatically generated confirmation of course completion

To also give the learners standardized instructions to the specific courses and themes a template to be filled from the course authors was developed for provision of e-metadata. The standardized content structure of the courses, themes and the respective metadata is pictured in Table 11.

Table 11: Standardized content structure of e-courses, e-themes and e-metadata

e-course	e-metadata
Splitting in: theme 1 theme 2 theme 3 theme n Total length of about 45 to 60 minutes Final exam, consisting of all self-assessments from all themes	General information about: course title, id, course author, thematic area, passenger/transport classification, key words, aim and scope, learning objectives, recommended learning sources, course duration, number of themes
Theme n	Theme data n
- Content of approx. 6 slides with added audio narrations - At least three self-assessments	- Learning outcomes and addressed competences - Graded reviews - References - Recommended learning resources (video, links, files)
Confirmation on successful course completion	

After the conversion of the ALLIANCE training courses into self-paced e-courses, there is also the ambition to transfer STIP into a LLE program to guarantee sustainability of the e-learning approach within a coherent course program meeting the demands of Lativa and the wider region by also taking into account European standards. Therefore the regulatory framework of LLE programs on EU level and on the level of educational institutions was analysed and will be presented in the following chapter. The regulations and policies in addition with the characteristics of the ALLIANCE courses build the basis for the business model of the ALLIANCE e-platform as a whole, presented in chapter 5.

3 Regulatory framework for LLE programs

3.1 European policy and regulations

In 2000, the Lisbon European Council set the strategic goal that the European Union becomes the most competitive and dynamic knowledge-based society in the world.[51] This goal was asserted again strongly at the Stockholm European Council in 2001. Key components of the Lisbon strategy were[52]:

- the adaptation of education and training to offer tailored learning opportunities to individual citizens at all stages of their lives
- the promotion of employability and social inclusion through investment in citizens' knowledge and competences
- the creation of an information society and
- the fostering of mobility.

As a follow-up to the Lisbon meeting, the European Council met again in 2000 in Santa Maria da Feira. The conclusions of this meeting highlighted lifelong learning, pointing out that it is an essential policy for the development of citizenship, social cohesion and employment. The Council invited the member states to promote lifelong learning in cooperation with social partners, taking into consideration possible private and public financing. Another important outcome of this meeting was the incorporation of higher education into lifelong learning projects[53]. The focus on economy and employment was further addressed by the European Council in 2002 in Barcelona, where these two terms were added in the concept of lifelong learning[54].

The European Commission is also paying attention to lifelong education. Such an example is the publication of the working paper "A Memorandum of Lifelong Learning", aiming at introducing a debate on lifelong learning, based on the conclusions of the meetings of the European Council in Lisbon and Santa Maria da Feira. A well-structured and coherent strategy on putting lifelong learning into practice should include the following principles[55]:

- New basic skills for all
- More investment in human resources
- Innovation in teaching and learning
- Valuing learning
- Rethinking guidance and counselling
- Bringing learning closer to home.

In 2001, the Communication from the European Commission "Making a European Area of Lifelong Learning a Reality", contributed to the establishment of a European area of lifelong learning, which should aim at: a) empowering citizens to move freely between learning settings, jobs, regions and countries, addressing their knowledge and competences, and b) meeting the goals of the

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[51] EC, 2000a
[52] EC, 2000a
[53] EC, 2000b
[54] EC, 2002
[55] CEC, 2000

European Union and the candidate countries to be more prosperous, inclusive, tolerant and democratic[56]. In 2002, the European Commission communicated 15 quality indicators for lifelong learning related to four areas[57]:

- Skills, competencies and attitudes (i.e. new skills for the learning society)
- Access and participation
- Resources for lifelong learning (i.e. ICT in learning)
- Strategies and system development.

In 2008, the European Parliament and the Council of the European Union formulated the Regulation No. 452/2009 concerning the production and development of statistics on education and lifelong learning. The third domain of this Regulation applies to statistics on education and lifelong learning, i.e. statistics on the benefits of social and economic benefits of education[58]. The same year, the European Parliament developed the Resolution on adult learning "It is never too late to learn", which urged Member States to promote the acquisition of knowledge and the development of a culture of lifelong learning that makes education more attractive, accessible and effective[59]. European Council conclusions of 2009 on a strategic framework for European cooperation in education and training[60], set, among other, the strategic objective "making lifelong learning and mobility a reality". In order to achieve this goal, further progress is required, mainly focusing on the implementation of coherent and comprehensive lifelong learning strategies, i.e. linkage of national qualifications frameworks to the European Qualifications Framework.

In addition, the European Council conclusions of May 2009, established a strategic framework for European cooperation in education and training[61] that is fully consistent with the Europe 2020 strategy. This strategy addresses four common European Union objectives: a) make lifelong learning and mobility a reality, b) improve the quality and efficiency of education and training, c) promote equity, social cohesion and active citizenship, and d) enhance creativity and innovation, including entrepreneurship at all levels of education and training[62]. Lastly, the European Council Resolution on a renewed European agenda for adult learning (2011) recognized that due to the short and long-term consequences of the economic crisis, it is important that adults regularly enhance their personal and professional skills and consequences. These findings may apply mainly to low skilled and low qualified persons, but those who are highly qualified can also benefit significantly from lifelong learning programs[63].

Representative European Union Regulations, Decisions, Recommendations, Communications and Resolutions on lifelong learning and vocational training can be summarized chronologically to the following[64]:

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[56] CEC, 2001
[57] CEC, 2002
[58] EC, 2009
[59] 2007/2114(INI)
[60] 2009/C 111/02
[61] ET 2020
[62] http://ec.europa.eu/education/policies/european-policy-cooperation/et2020-framework_en. [last access: 21.12.2018]
[63] Council of the European Union, 2011
[64] https://eur-lex.europa.eu/homepage.html. [last access: 21.12.2018]

- 95/431/EC: Decision No 2493/95/EC of the European Parliament and of the Council of 23 October 1995 establishing 1996 as the "European year of lifelong learning".

- Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning.

- European Parliament legislative resolution of 24 October 2007 on the proposal for a recommendation of the European Parliament and of the Council on the establishment of the European Qualifications Framework for lifelong learning[65].

- Resolution of the Council and of the Representatives of the Governments of the Member States, meeting within the Council of 21 November 2008 on better integrating lifelong guidance into lifelong learning strategies.

- Regulation (EC) No 452/2008 of the European Parliament and of the Council of 23 April 2008 concerning the production and development of statistics on education and lifelong learning.

- Lifelong learning for knowledge, creativity and innovation — Education and Training 2010 work programme European Parliament resolution of 18 December 2008 on delivering lifelong learning for knowledge, creativity and innovation — implementation of the Education and Training 2010 work programme[66].

- Regulation (EU) No 1288/2013 of the European Parliament and of the Council of 11 December 2013 establishing "Erasmus+": the Union programme for education, training, youth and sport and repealing Decisions No 1719/2006/EC, No 1720/2006/EC and No 1298/2008/EC.

- Commission Regulation (EU) No 1175/2014 of 30 October 2014 implementing Regulation (EC) No 452/2008 of the European Parliament and of the Council concerning the production and development of statistics on education and lifelong learning, as regards statistics on the participation of adults in lifelong learning and repealing Commission Regulation (EU) No 823/2010.

- Council recommendation of 22 May 2017 on the European Qualifications Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning.

- Decision (EU) 2018/646 of the European Parliament and of the Council of 18 April 2018 on a common framework for the provision of better services for skills and qualifications (Europass) and repealing Decision No 2241/2004/EC.

3.2 Regulations of educational institutions

Understanding lifelong education as an institutional fact, enabling lifelong learning with the help of universities' offers and experiences, universities have the role of lifelong learning providers. As lifelong learning sets a shift in a new understanding of teaching and learning, the success of lifelong learning will depend on the efficiency of communication and collaboration between all stakeholders in LLE context. These are:

- Employers – to define learning needs and the required skillset in the organization;
- Professional bodies and research institutions to contribute to the advanced content which reflects current and emerging technologies;

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[65] COM(2006)0479-C6-0294/2006-2006/0163(COD)
[66] 2008/2102(INI)

- Academic institutions responsible for the development of programs and courses according to the industry trends and developments;
- Lifelong learning providers (in many cases, this role is taken by educational institutions);
- Lifelong learners with their personal learning goals.

An isolated learning solution developed by each individual stakeholder will not produce the desired outcome. So, it is expected that educational institutions have a special role to play in developing, establishing, and supporting lifelong learning projects. But this is also seen as a major challenge for educational institutions, because of the necessity to adjust traditional educational processes to a new interpretation of learning:

- Open access to learning opportunities;
- Recognition of learning in diverse forms;
- Learning throughout the lifetime;
- A diversity of modes and methods of teaching and learning;
- A shift from teaching to learning, and
- Strong emphasis on learning on demand. [67]

Another challenging task is related to the necessity to change the program structures and curriculum design to meet the specific requirements of lifelong learners. Lifelong learning opens more learning opportunities for different categories of learners from different social, cultural, and educational backgrounds. It also means that lifelong learners can learn from a variety of resources and diverse fields of studies, including personal work experience.The important question is how to evaluate informal learning and what is the basis for exemption of students from the certain parts of the degree program. It is still an open task to develop a common methodology for the evaluation of informal learning, in best case overall Europe. On many occasions, industry representatives pointed out that universities need to replace traditional approaches to dissemination of knowledge with multidisciplinary, dynamic, and temporary forms, which include the recognition of work-based and experiential learning by awarding credit points and exemptions. It also leads to building a close collaboration between academia and industry to ensure the success of lifelong learning projects. It will also help to produce educational programs for all categories of learners which will meet the requirements of the fast-changing economic environment. In conclusion, besides the pedagogical approach presented in chapter 2.3, there is also the necessity of providing an infrastructural solution to enable on-going open access to the renewing of skills and the acquisition of knowledge as also to provide methods for quality measurement to evaluate informal learning and make the own progress measurable for learners and understandable for the education market and labour market. In chapter 4 the requirements for e-platforms providing LLE will be presented, as there are efforts to convert ALLIANCE e-platform to LLE in order to ensure sustainability and further development of STIP not only in TTI, but also accessible by all other interested parties, especially in Latvia and the wider region.

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[67] Lifelong Learning Support – A New Challenge for Higher Education. Available at: www.onlinelearningandtraining.com. [last access: 29.12.2018].

4 Analysis of e-platform requirements for LLE

Currently there are a number of platforms available for organising online education or training and even for supporting LLE. Among them, as the most popular platforms can be mentioned: *Moodle, Blackboard, Kenexa, digitalCHALK, Sakai, Brightspace, Acatar, Canvas, +CMS, Atutor, Claroline, Dokeos, Drupal, Ilias* etc. There are many reviews, comparing these e-platforms by means of their special features[68].

Figure 2: Features of available platforms

No.	e-learning platform	Ease of content generation	Ease of use	Cost/pricing
1	Moodle	4.5	Hard	Free
2	Blackboard	4	Medium	Custom/Pricey
3	Kenexa	3.5	Medium	Custom/Pricey
4	digitalCHALK	3	Medium	$399-$1095
5	efront	2.5	Hard	Monthly $85-1200
6	Sakai			Free
7	Brightspace (D2L – Desire2Learn)	?	Easy	$10.20 enterprise cost per user
8	Acatar		Medium	?
9	Canvas	4	Easy	$4.82 hosted cost per user

Figure 2 demonstrates a comparison of the mentioned e-platforms, regarding the attributes *ease of content generation*, *ease of use* and *cost/pricing*. As a result, it can be seen that most of the mentioned platforms are delivered on cost/pricing basis, while Moodle and few others are free of cost. Among the free of cost variants, Moodle is one of the most frequently used platforms for e-learning. According to official statistics of Moodle, there are 106213 currently active sites that have registered from 229 countries[69]. The following benefits of Moodle are usually mentioned[70]:

1. The solution is easy to learn and use as it offers a simple interface, drag-and-drop tools, well-documented learning materials, and ongoing usability enhancements.

2. You can effortlessly localize your Moodle site as the software has been translated into over 95 languages.

3. It is a flexible program that supports both 100% online courses and blended learning.

4. Moodle constantly updates its security controls to ensure your data is protected from loss, misuse, and unauthorized access.

5. It offers cross-browser compatibility and a default mobile-compatible interface. Hence, the solution is consistent and easily accessible on all popular devices and web browsers.

6. You get access to user forums and extensive documentation in multiple languages as well as free courses and hundreds of plug-ins and add-ons contributed by the active global user community.

For selecting the right e-platform for ALLIANCE project purposes, there are subjective and objective factors to be considered. Among the subjective factors the following can be mentioned as decisive:

- TTI uses Moodle platform already more than 6 years and has experiences with its installation, maintenance and update

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[68] Dodun et al., 2015.
[69] https://moodle.net/stats/. [last access: 29.12.2019].
[70] https://financesonline.com/top-10-alternatives-to-moodle-popular-lms-solutions-to-consider/. [last access: 29.12.2019].

- Moodle is the main platform used by TTI for providing e-learning services to the students - in the last years more than 100 e-learning courses were developed by TTI teaching staff

- Moodle is used in TTI not only as a platform for e-learning, but also as a supporting tool for full-time students and training.

- TTI has a special department, entitled "Distance Learning Department", which staff is experienced in Moodle management, courses development, interaction with users using Moodle.

- Internal surveys for students about Moodle platform shows high level of satisfaction by this tool.

The objective factors should include requirements necessary to adapt Moodle to LLE. The following list was generated based on ALLIANCE partners' discussions and literature review, so the platform should:

- be free of payment, and ideally based on open source concept, as it provides additional flexibility in customization;

- be device-friendly;

- be installed locally on TTI servers, not to depend from 3rd parties, as TTI should maintain the e-platform for at least 5 years after the end of the project;

- support integration with social network accounts and TTI user's management system, which is based on Microsoft Active Directory;

- support the ability to integrate SCORM packages[71], as SCORM packages are an universal model for online content delivery. In the same time the platform should support deep integration, meaning that the platform should receive the output data from SCORM packages and use it in internal analytics;

- support self-enrolment approach for the courses, without involving TTI staff;

- provide opportunities for communication and collaboration between students and teachers;

- should provide opportunities for team-work;

- provide opportunities for students' assessment and self-assessment, based on different kind of tests;

- support gamification[72] and automatic certification generation;

- provide the opportunity to follow the study process, by setting completion conditions for each activity;

- provide the opportunity to organize the competence-based learning approach;

- allow to grade students work and provide them feedback;

- be intuitive in using and have user-friendly interface;

- support in user interface, provide at least three languages (English, Latvian, Russian).

The list above contents the requirements to the platform's functionality necessary to organize ALLIANCE STIP program in a digitalized way. To note, some of the requirements are setup for perspective and for future development and will not be implemented in the initial version of the e-courses, but still they are important for a sustainable development of the e-platform. The analysis of the above mentioned requirements with reference to the Moodle platform is presented in Table 12 below.

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[71] https://scorm.com/scorm-explained/. [last access: 29.12.2018].
[72] Under gamification we do understand at least badges granting concept.

Table 12: Evaluation of e-platform requirements

Requirements	Comments	Relevance of Moodle
Be free of payment, and ideally based on open source concept, as it provides additional flexibility in customization	According to official website of Moodle, the platform is free of payment, is open source and is distributed under GNU (General public licence)	**HIGH**
Be device-friendly	According official website Moodle supports all types of devices, like PC, mobile devices, smartphones, but in the same time several issues regarding GUI (Graphical User Interface) are reported, also some limitation in functionality are foreseen as stated in http://cuebuildtechnologies.com/blog/moodle-mobile-pros-and-cons/	**AVERAGE**
Be installed locally on TTI servers	Supports standalone installation	**HIGH**
Support integration with social network accounts and TTI user management system	Moodle has significant number of plugins, which supports integration with social network accounts: Facebook, Google +, Twitter, LinkedIn etc	**HIGH**
Support ability to integrate SCORM packages	Supports SCORM and also Moodle is SCORM-ADL compliant	**HIGH**
Support self-enrolment approach	Self-enrolment is possible in Moodle, by configuration of the access	**HIGH**
Provide opportunities for communication and collaboration between students and teachers	Moodle has several ways of interaction, like forums, chats, private messengers etc.	**HIGH**
Should provide opportunities for team work	It was identified only one activity, which useful for team work - workshop, but with high probably additional plugins could be installed, like at example Team Assignment plugin	**AVERAGE**
Provide opportunities for students' assessment and self-assessment, based on different kind of tests	Moodle has a number different tests types, which could be implemented using Moodle standard tools. Also import and export of tests is supported, like as example GIFT, Aiken format	**HIGH**
Support gamification and automatic certification	Moodle supports badges concept and is part of Mozilla's Open Badges project. But currently badges functionality is limited, as example it is not possible now to share badges in social networks. Moodle has a certification plugin, which provides the opportunity to automatically grant certificate, but some limitation is observed.	**AVERAGE**
Provide the opportunity to follow the study process, by setting completion conditions for each activity	Moodle has a significant number of tools and reports to follow the study process	**AVERAGE**

Requirements	Comments	Relevance of Moodle
Provide the opportunity to organize the competence-based learning approach.	Moodle supports competence-based learning approach.	**HIGH**
Allow to grade students work and provide them the feedback	This functionality is core for Moodle	**HIGH**
Be intuitive in using and have user-friendly interface	Hard to evaluate, but most of the users agree, that the interface of standard Moodle installation of overloaded by element, so deep customization is important.	**HIGH**
Support in user interface, at least three languages (English, Latvian, Russian)	Over 100 languages packs are available, including mentioned	**HIGH**

In conclusion, Moodle is very suitable to be used for LLE purpose. Based on that, a business model needs to be drafted for ALLIANCE e-platform to guarantee the acceptance and usage of the platform by a wider range of target groups and sustainability in STIP impact for at least 5 years after the end of the project.

5 Development of a Business model for ALLIANCE e-platform

5.1 Analysis of scope and needs of TTI and the Latvian region in LLE

According to the Statistical Bureau of Latvia[73], transportation and warehousing area is one of key drivers of national economics (12% in 2015). The main goal of the Latvian Transport Policy Guidelines 2014 – 2020[74] is to develop the competitive, sustainable co-modal transport system that provides high quality mobility, at the same time effectively using resources. Latvia is an attractive transit country and its geographical location remains central to strategically relevant transportation flows connecting major world economies like the United States, European Union, Russia, the Commonwealth of Independent States and the Far East. The transit sector is one of the strongest industrial sectors in Latvia: nearly 90% of turnover in Latvian ports, more than 80% of rail cargo, and the major proportion of oil and oil products transported via trunk pipeline systems is transit. More than 8% of Latvia's employees are engaged in the transportation and servicing of transit cargo. The importance of the transport, transit and storage sector in terms of GDP contribution is substantial at around 9.5% in 2015 as stated by Investment and Development Agency of Latvia[75].

To ensure a sustained response to the continuous growing mobility demand, the Latvian transport sector needs to be developed in a dynamic way and incorporated into the European transport system. The main goal for the sustainable development of Latvia's transport system is to fully integrate Latvia's transport infrastructure with the Trans-European multi-modal transport system. In the National Development Plan 2014–2020[76] there are noted the following objectives for public transport: improvement of accessibility of public transport services and organizing of a single bus and rail route network to provide possibilities for inhabitants of rural areas to access regional significance centres and national significance centres and the capital.

All these priorities form the core strategies in moving Latvia towards meeting the needs of human resource development, and create a pool of highly competent knowledgeable specialists. According to article 82 of the NDP2020 (2012), the main required significant aspects in order to improve the competitiveness of Latvian products and services are "a close cooperation with the scientific sector on a commercial basis, encouraging the interest of the private sector to invest in research and innovation" and "an outstanding business environment: predictable, reasonable and supportive to every entrepreneur". Moreover, one of the strategic objectives is to provide advanced research and innovation and higher education, which can be achieved by attracting human resources, developing innovative ideas, improving the research infrastructure, facilitating cooperation between higher education, science and the private sector, as well as by transferring research and innovation to business.

To assess the current knowledge level of Latvian stakeholders (policy makers, industry, academia/research and students) on transport interchange design and operation and identify gaps to be met by LLE, a research was conducted by I. Yatskiv (Jackiva) et al.[77] It has highlighted

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[73] CSB, 2017.
[74] OECD, 2017.
[75] LIAA, 2017
[76] NDP2020, 2012
[77] Yatskiv (Jackiva), I. et al., 2018

several aspects interesting for the understanding of the current needs of different stakeholder groups. In this context, two questions are decisive:

- University skills development on STIP topics (Q3 in Figure 3 and 4)
- Importance of knowledge on STIP topics for career development (Q4 in Figure 3 and 4).

The most interesting findings are related to the responses on the first question. Specifically, Policy makers pointed out that they gained low skills in Governance and Smart solutions, as compared to the rest, who indicated higher rating to skills and knowledge in all areas. However, it should be indicated, that rating on skills is below 3.5 for all stakeholder categories and thematic areas, with Decision Making receiving the highest rating by all stakeholders. The low rating of the skills in Governance and Smart solutions by the Policy makers can be related with their older ages, so it means that their studies in the university did not focus on the field of transport intermodality and interchanges. To better demonstrate the differences in rating level of skills gained per stakeholder category and thematic area, a radar chat was constructed and is presented in Figure 3.

Figure 3: Rating of the level of developed skills
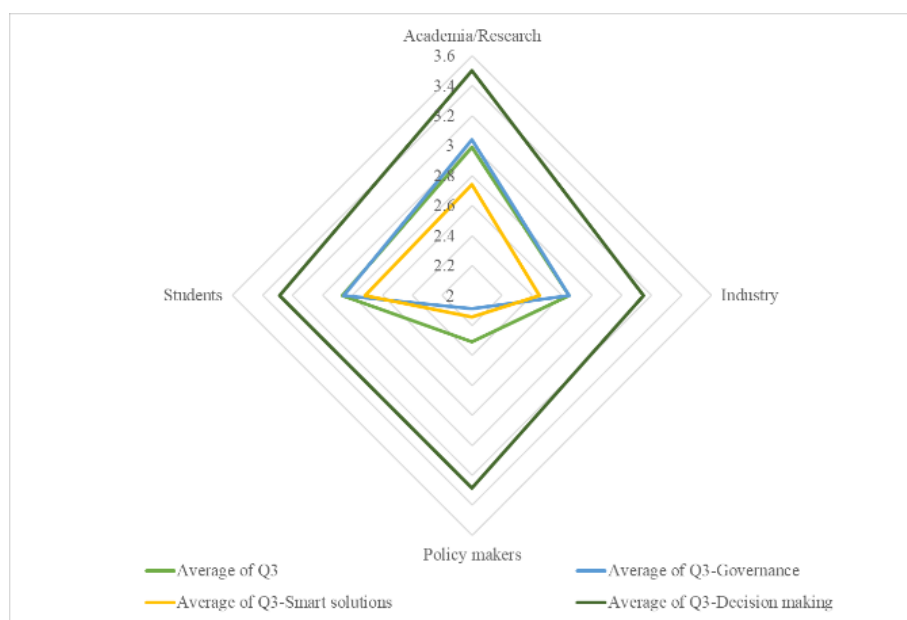
The answers on question two regarding the importance of knowledge of STIP topics in career development indicated that students consider it of lower importance as compared to the other stakeholder categories. This is understandable, as students are the least exposed to real applications in a business domain, where skills play a role in career development as compared to the other categories. On the contrary, the other three stakeholder categories believe that knowledge is important, and especially in Decision making (Figure 4).

Figure 4: Rating of the importance of knowledge in career development
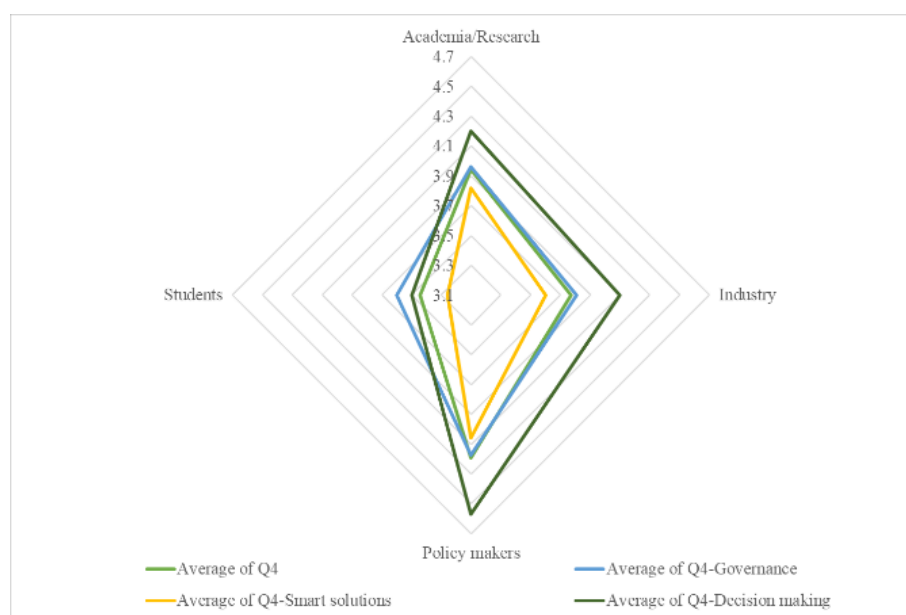
To sum-up the findings of I. Yatskiv (Jackiva) et al.[78], the following conclusions can be drawn:

- The research analysed the dependence of the existing knowledge, importance and requirements for skills and competence on job on different stakeholder categories: Policy Makers, Industry, Academia/Research and Students; and the differences in the average rating of stakeholders between different topics (i.e. Governance, Smart solutions, Decision-making). The gaps identified in research were used for focusing on current and future needs in knowledge of Latvian stakeholders and developing the new variant of STIP for lifelong education to provide support to business and public authorities.

- Development of (vocational) training programs to transform research results and findings into (good) practice should be delivered to students, post-doctoral fellows, professional practitioners and general staff from the domains of science, market and industry as well as to general public, to help them promote impact and prominence of research.

- The offered for Academia STIP will deliver services addressed to research, development and innovation for enhancing transport for professionals, who work or/and collaborate with stakeholders in the region of Latvia. It will also cover the needs of those who study both at undergraduate and post graduate level transport and ICT-related courses by providing opportunities for exchanges and short-term training with partner countries.

- Knowledge, experience and best practice transfer from academia to industry through academic and lifelong education and training will raise the R&I&D capacity of Latvia in the domain of advanced technologies application in transportation field in order to make Latvia competitive in the global market and enable strength of economy development, which is in line with national development policy of Latvian and strategy of Transport and Telecommunication Institute.[79]

Having the existent technical and organizational infrastructure of TTI (Moodle platform, Distance Learning Department) in mind and also the identified needs in LLE to the specific topic of STIP in

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[78] Yatskiv (Jackiva), I. et al., 2018
[79] Yatskiv (Jackiva), I. et al., 2018.

Latvia and the wider region a business model for offering the courses and STIP as a whole needs to be drafted.

5.2 Guidance on how to convert e-learning platform to LLE

To remember, in Task 4.1 the ALLIANCE e-platform was established to ensure sustainability of ALLIANCE results after the end of the project. This goal will be achieved by offering online courses and setting up a business model to guarantee sustainability. The content of the online courses was developed in WP2 activities; aprobated in WP3 activities and was – also in Task 4.1 - restructured for meeting the requirements of online courses oriented on self-paced learning. In order to fulfil the requirement of a longlasting usage of the e-learning platform, a conversion of the platform to LLE is advised. One possibility for a promising business model is presented by the platform strategy, which is also used by the biggest e-learning provider *edX*, *coursera* and *Udacity*. In the following the characterization of this well-known platform providers will be drafted using Business Model Canvas methodology[80] and on that basis a strategy for ALLIANCE e-platform business model presented.

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[80] Osterwalder, A.; Pigneur, Y. (2010), Osterwalder, A. (2004).

5.2.1 Analysis of existing Business Models using Business Model Canvas

Table 13: Analysis results of well-known MOOC providers

No/AC	Customer Segments	Value Propositions	Channels	Customer Relationships	Revenue Streams	Cost Structure	Key Partnerships	Key Activities	Key resources
1 edX[81]	Broad B2C segment, specifically for entrants	offering high-quality courses from the world's best universities and institutions to learners everywhere; specialisation on degree courses for students	Social media like youtube, Instagram, facebook, etc.; Email newsletter; news blog	Help center with information to frequently asked questions, full payment of course fees, only in case of successful passing[82]	Add-on-model. Courses are accessible for free, verified certificates against payment of $50-$300. Premium products: $200-1400$[83] Funding: MIT, Harvard, Bill and Melinda Gates Foundation.[84]	N/A	Harvard University, MIT	university education; platform operator	Technical maintenance, IT-infrastructure, qualified personnel for ongoing support
2 Udacity [85]	Broad B2C segment, specifically for professionals Also B2B with special course offers for companies	democratizing education through the offering of world-class higher education opportunities that are accessible, flexible, and economical; focus on professionals	Social media like youtube, Instagram, facebook, etc.; Email newsletter; news blog	Help center with information to frequently asked questions, in frame of nanodegree plus programme in 2017: job guarantee after passing the programme within 6 month[86]	Course: For free Nondegree: $400 - $2000	N/A	Leading companies in different industries	Business relationships with leading companies; focusing on professionals; platform operator;	Technical maintenance, IT-infrastructure, qualified personnel for ongoing support

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[81] https://www.edx.org/ [last access 21.12.2018]
[82] Epelboin (2017), S. 255.
[83] edX (2018b)
[84] Epelboin (2017), S. 252
[85] https://eu.udacity.com/ [last access 21.12.2018]
[86] Thrun (2016), Udacity (2017)

3 Coursera[87]	Broad B2C segment, specifications: Refugees, Business B2B: Government and Organizations	35 languages, courses, specilizations, online degrees, certificates, accredited masters degree, B2B: customized solutions, flexible pricing	Coursera Blog, Social Media	Help center with information to frequently asked questions, academic and technical support, Coursera Blog, discussion forum, courser stories	Only against payment. Courses: about $29-$99 Specilizations: $39-$79 per month Online degrees: $15-$25,000	N/A	University of Illinois. 120 partner institutions and companies, Mentors, Developers, Translators.	university education; platform operator	Technical maintenance, IT-infrastructure, qualified personnel for ongoing support

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[87] Coursera (2018) URL: https://learner.coursera.help/hc/en-us, https://about.coursera.org/ [last access: 17.12.2018].

5.2.2 Business Model Canvas for ALLIANCE e-platform

The business model canvas (BMC) concept is a descriptive approach to show all business structures at one glance and furthermore think them through. It is ideal for the development or documentation of business ideas. Also, hence the neat design it is predestined to optimise the business outcomes. There are nine core dimensions under which an idea or business is analysed. Starting with the *customer segments*, the next step will be deciding which *value propositions* the business can offer. Which *channels* will be used and how will the *customer relationships* be maintained? The customer will now reward the business with *revenue streams*. The *key resources* needed by the business to provide their service are closely related to the *key activities* which are necessary to do so. These resources can also be provided by partners, which means *key partners* are playing a role in the BMC. Finally, the *cost structure* is shown to ensure liquidity and provide an overview on the profit and possible financial loss made.[88]

In the following, the BMC for the ALLIANCE E-learning platform is provided in the order of appearance in the abstract above.

1. **Customer Segments**

In general the business model for ALLIANCE E-Learning platform follows the Business to Customer (B2C) approach. There are three main target groups for the ALLIANCE E-learning Platform. Firstly, *any interested individual* can take part in these online courses to enrich their knowledge in the scientific field of sustainable transport interchanges with the possibility on specification in freight and passenger transportation. As a second group, the *students of TTI*, in their masters or PhD level are considered as target group. Thirdly, *external academics as well as business professionals* are targeted to take part in the e-learning courses provided by ALLIANCE.

2. **Value Propositions**

The service provided by the ALLIANCE e-platform is professional development in the field of sustainable transport interchanges with focus on freight transport and passenger transport. In general, the ALLIANCE e-learning courses are provided with open access. In this sense, the participants can choose their path of learning. They all have access to a course providing the basis of scientific work, a core module of sustainable transport interchanges and furthermore can specialise in either freight or passenger transport direction. There are tailored benefits to each customer segment. For the first target group, any interested individual can benefit from the course itself to enhance their knowledge in ALLIANCE Sustainable Transport Interchanges Program (STIP). These participants have also access to self-assessments, which are scheduled within each learning theme of the course. Furthermore, they will get the opportunity to test themselves through a final assessment in the end of the course, after they have run through all themes. As a proof of participation, they will get an automatically generated confirmation on successful course completion. This path can be named the *unrevised path* as there will be no direct interaction nor correction through a lecturer. Also any interested individual will be offered access to a discussion and also a news forum, to get in fruitful exchange with other learners to the course topics and be up to date on news of the domain.[89] For the second target group, students of TTI, there is the

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[88] Osterwalder, A.; Pigneur, Y. (2010), Osterwalder, A. (2004).
[89] ALLIANCE, 2018b.

opportunity for an additional certification and also ECTS (credit points for their studies) as an outcome of the e-learning course. The third group, consisting of business professionals, will also get a certification to broaden their professional skill set and use for their further professional life. It is suggested that after a period of 5 years providing a fully cost free open access structure, there will be also a paying variant implemented and in that sense also a further education program developed. Besides students of TTI, also paying professionals and all other interested parties will have the opportunity to choose a *supervised path* through the lecturers as well as exams directly revised by their lecturer.

For all paying parties, there are a full time and part time option provision suggested, the full time being four weeks and the part time being six weeks generally. This regulation connects with TTI standards. Furthermore, a virtual research compliance office (V-RCO) is implemented on ALLIANCE website and directly linked to the e-platform to present guidance to scientific excellence and a networking opportunity for all target groups free of cost.

3. Channels

As forms of distribution of the ALLIANCE e-learning platform the following channels are recommended: E-mail and newsletter, notifications on the ALLIANCE partners' websites, direct contact to the students of TTI during face-to-face lessons and selected e-learning multipliers on EU level, like the platform "Open Education Europa" [90] for example**.** The contacts to be reached via e-mail have been collected through the project phase of ALLIANCE within the stakeholders' list, which contents about 100 contacts by now to universities, research institutes, transport companies, public authorities and others. This opportunity especially makes sense, as the stakeholders' list represents the specialist audience of sustainable transport interchanges. In general, the strategy of media mix is recommended, using a mix of online and offline media channels, besides the direct contact to the students, also scientific events, seminars and networks.[91]

4. Customer Relationships

The relationships to the customers are built through the provision of helpful information about the overall structure of the courses and guidance on how to run through the courses and course themes. That especially helps the customers to start interaction with the lecturers in form of final course tests and final exams to make sure, the course participant is up to date with their learning level. Also the ALLIANCE discussion forum can serve for direct exchange possibility between learners and other interested parties. The customer relationship has already been highly pushed through the ALLIANCE project impacts. Not only have students collaborated within WP3 through common paper writing, but also has the ALLIANCE project strong relationships to their meanwhile over 100 stakeholders, according to ALLIANCE stakeholder database. Also TTI is a member of the leading European research association for sustainable and multimodal mobility ECTRI and therefore can acquire customers. Furthermore, through the direct involvement of lecturers,

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[90] https://openeducationeuropa.eu/ The main goal of the platform is to offer access to all existing European Open Educational Resources in different languages in order to be able to present them to learners**,** teachers and researchers. [last access: 13.12.2018].
[91] Aschemann et al. (2017), S. 22–23.

generally in theses' supervision, specifically in the supervised learning path this can be seen as motivation for completing the course at an excellent level.

5. Revenue Streams

There are monetary and non-monetary solutions to organise returns on MOOCs. The non-monetary advantages are an increase of reputation for the university as well as a higher visibility and awareness level.[92] In frame of a survey among 168 European and Canadian universities, of which 35% already offer MOOCs and further 32% plan to provide MOOCs, the visibility of the own institution was indicated as the most important reason for the provision of MOOCs.[93] For TTI that could mean that the higher their visibility, the more students potentially enrol and in long term partly or up to fully study master courses online. In general, it is recommended to choose the add-on-principle just like edX and to provide all courses totally access free, but with additional possibility to achieve verified certificates against payment. This option is a long term recommendation and won´t be implemented in the next step. But since STIP had developed in WP2 a logical framework for the relation between its courses, certification paths are drafted in the Tables 14 and 15 of 5.2.3 below.

6. Key Resources

The technical key resources are a Moodle infrastructure, being already in use of TTI for their own online courses, and the iSpring licence for MOOC development. Furthermore, personnel at TTI for technical maintenance and ongoing support is a key resource. TTI also has a Distance Learning Department implemented, which staff is experienced in Moodle management, courses development and interaction with users using Moodle. The further resources are intellectual, as the know-how provided through the partners. Also, the lecturers coming from an international background have strong skills in their field of expertise. IFF can provide special knowledge in the field of applied research as well as partnerships with international businesses. UTH and the team of "Traffic, Transportation and Logistics Laboratory" (TTLog) has strong research and project skills as well as an excellent approach to international collaborations on a research level.

7. Key Activities

The key activities are the development, the provision and the updating of the MOOCs and being up to date with the platform itself. That also includes ensuring smooth operation and the improvement of handling. In addition, the lectures have to be created by professionals and especially designed for e-learning. Furthermore, for improvement in the future, evaluation is a key factor to implement customer suggestions. Therefore, customer reviews should be automatically asked for after completing the course.[94] Future key activities could be also the common, demand oriented MOOC development with business or governmental partners of ALLIANCE network (B2B), like Riga Airport or the Riga Coach terminal. This activity would accompany the expanding strategy of the e-platform towards customized further education programs in collaboration with practice partners, just like Coursera offers.

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[92] Patru/Balaji (2016), S. 75
[93] Jansen/Goes-Daniels (2016), S. 10–22
[94] Kulmer 2018, p. 22

8. Key Partnerships

The key partnerships are between TTI, IFF and UTH as provider of course content and e-learning material on an international and excellent level. Having the possibility in mind to potentially develop the e-platform to an "e-learning hub" on transportation topic in the Baltic Region, future partners could be also practice partners from transportation business and municipalities developing MOOCs in tight collaboration with TTI. The European Commission as funding partner of ALLIANCE project is a key partner, but also for further dissemination of the MOOCs. Future financers of the platform, such as ministries, could be also considered as a strategical key partnership.

9. Cost Structure

The development of MOOCs involve high costs. The analysis of existing mobile universities (Table 6) shows the high variance in personnel deployment for MOOC development and maintenance. These could be reduced by replacing a part of the classroom training by online courses. By increasing the number of learners the reduction of costs per learner can be achieved.[95] As soon as TTI begin to offer supervision, costs could be reduced by involving learners in taking over the task of peer-to-peer assessment or peer-to-peer monitoring for example. This option also has didactical value in expanding the mentoring skills of learners and to teach them in assumption of responsibility.[96] Still, supervisors need to expand their work in also teaching learners in mentoring tasks, but as soon as a system of peer-to-peer assessment is grown, this could lead to an overall relief.

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[95] Hollands/Tirthali (2014), S. 75
[96] Patru/Balaji (2016), p. 71

5.2.3 ALLIANCE certification paths

In order to transfer the tailored STIP on e-learning into a LLE program providing recognized certification in future, both in passenger and freight transport, certification paths were developed, showing the weighting of the students' performances on the course classifications. Also, the following certifications paths can maybe serve as a basis for degree programs offered at TTI on the basis of ALLIANCE course development.

Table 14: Certification path for "passenger transport"

Course	Contribution towards the final mark
Introducing research-based course: C0	10%
Core block courses: C1, C2, C11	60%
Passenger transport block courses: C4, C6, C8, C12a, C12b	30%
Total score of self-assessment/partial performance	50%
Final exam	50%

Table 15: Certification path for "freight transport"

Course	Contribution towards the final mark
Introducing research-based course: C0	10%
Core block courses: C1, C2, C11	60%
Freight transport block courses: C4, C8, C10, C12a, C12b	30%
Total score of self-assessment/partial performance	50%
Final exam	50%

6 Synopsis

One of the main objectives of the ALLIANCE project is to establish the internal and external environment of Transport and Telecommunication Institute to be able continuously raise the quality of academia and research. All events completed in frame of the ALLIANCE project were targeted on creating a basis for sustainable development in the future. The research is playing one of the key roles of TTI strategy, therefore it was important to establish the network of partners in research during ALLIANCE, but also to improve the internal environment and the processes of TTI. The department responsible for managing project and research activities in TTI is a Research and Development Department. To raise the quality of the processes and by this improve TTI research capacity in Nov, 2018 TTI has extended already existed ISO 9001:2015 certificate to the research activity. A successful certification is tangible proof of the RD Department lasting "ability to consistently provide products and services that meet customer and applicable statutory and regulatory requirements" by effectively applying a comprehensive quality control system. A still remaining task is to develop a standardized instrument for quality measurement of e-learning in LLE to evaluate informal learning on 1) the level of individual learning progress (as competence balancing for example), by also taking into account 2) the course content level, 3) the level of grouped courses into programs (as STIP for example, see certification paths of Table 14 and 15) and for 4) the technical level (Moodle infrastructure). The quality indicators for LLE, inspired by European Union indicators, as mentioned above in 3.1, could serve as a basis for that.

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Annexes

Annex A: Analysis of ECTRI members

Annex A: Analysis of ECTRI members - Universities

No.	Members	Country	Agreement or experience in applications	Horizon 2020: Number of Projects	Number of employees	Number of scopus ranked publications	Scientific cooperation fields in governance, smart solutions, decision-making in sustainable transport interchanges	Running Projects in the field of transport logistics	Events suitable for collaboration 2017	Features	Contact
1	Politecnico di Torino (POLITO)	Italy	0	432	890	32677	Department of Environment, Land and Infrastructure Engineering Research Areas: TRANSPORTATION ROADS, RAILWAYS AND AIRPORTS (ITA)	SUPPORTING URBAN INTEGRATED TRANSPORT SYSTEMS	0	0	http://www.polito.it/index.php?lang=en
2	Vrije Universiteit Brussel (VUB)	Belgium	0	287	3000	28988	**Master programme**: Urban studies, which includes urban planning and mobility, economic, social and geographical aspects **Mobility, Logistics and Automotive Technology Research Centre (MOBI)**: MOBI is leader in electromobility and socio-economic evaluations for sustainable mobility and logistics. Socio-Economic: MOBI is defining the state-of-the-art in socio-economic evaluations. Methods and models are developed and then translated into practical tools that are tailor made for the transport sector.	0	0	**H2020 support**: The mission of VUB Tech Transfer towards EU-support is to develop a unique support for the VUB research groups, resulting in an increase in strategic value, number of submitted proposals and approved projects.	http://www.vub.ac.be/
3	Technical University of Denmark (DTU)	Denmark	Joint COST Action	180	Academic staff 2000 Administrative staff 1540	65783	Research group: Transport DTU (Transport and Logistics) Subjects: Mobility, Transport models, Transport behaviour, Transport economy, Transport safety -analyze the development of freight transport and logistics -intermodal solutions with focus on the interplay between transport modes	SCANDRIA2ACT: Sustainable and Multimodal Transport Actions in the Scandinavian-Adriatic Corridor (SCANDRIA2ACT)	Danish Rail Conference 2017 May 15th, 2017	0	http://www.dtu.dk/english
4	Universitat de Valencia (UVEG)	Spain	0	184	5000	46245	"Planning and Logistics" Research Group: Distribution and Routes	0	0	0	http://www.uv.es/uvweb/college/en/university-valencia-1285845048380.html
5	Budapest University of technology and Economics (BME)	Hungary	0	77	1500 (1100 lecturers, 400 researchers)	26828	Faculty of Transportation Engineering Department of Control for Transportation and Vehicle Systems Research Area - **vehicle technology, transport and logistics:** -Vehicle technologies by improving energy efficiency and minimising environmental load -Intelligent vehicle technologies (evaluation and optimization of multimodal travel chains) -Intelligent transport systems (planning and development of urban, road, railway transportation system elements) -Efficient transport operation and management systems -Integrated logistics systems	0	0	Laboratories: Vehicle mechatronics lab Control and Air-Traffic lab Road transportation lab Railway automation lab	https://www.bme.hu/?language=en
6	Vilnius Gediminas Technical University (VGTU)	Lithuania	Cooperation Agreement, ERASMUS+ Agreement, cooperation in InterREG projects (TransBaltic, InLoc etc.) mutual participation in PhD defences committee	19	1787	5784	Research Areas: Sustainable transport	0	**10th International Conference „Environmental Engineering"** 27 - 28 April , 2017 (http://enviro.vgtu.lt/index.php/enviro 2017/2017) **10th International Scientific Conference "Transbaltica 2017:** Transportation Science and Technology" 4 -5 Mai, 2017 (http://transbaltica.vgtu.lt/index.php/about/Transbaltica2017)	0	http://ti.vgtu.lt/?lang=2
7	Universidad de Deusto (DEUSTO)	Spain	ERASMUS+ Agreement, cooperation in project proposal, joint COST Action1306	13	581	2448	Research team: Industrial Management and Logistics Research area: Optimisation of production processes and logistics Sustainable supply chain management Research team: Deusto Smart Mobility Areas: 1. Intelligent Transport Systems (ITS) 2. Vehicular communication 3. Antenna design for vehicular environments 4. Merchandise tracking and logistics	http://www.deusto.es/cs/Satellite/deustoresearch/en/home/centres-teams-and-researchers/research-teams/industrial-management-and-logistics/equipoinvestiga?idPest=5	0	0	http://www.deusto.es/cs/Satellite/deusto/en/university-deusto?cambioidioma=si&_ga=1.22263738.1911302681.1492015101
8	University of Žilina (UNIZA)	Slovakia	ERASMUS+ Agreement, cross participation in Scientific Conference	10	1450	4263	CETRA - Centre of Transport Research, Centre of Excellence recognized and supported by the European Commission research divisions: 1) Transport equipment, means of transport 2) Transport Network 3) Transport Technology 4) Modelling and optimisation of transport processes 5) Information technology in transport 6) Safety of transport 7) Quality and efficiency in transport 8) Environmental, social and human aspects Topics: Transport and communications policies, searching for the optimum level of public services. Transport and communications systems, intermodality of transport modes. Efficiency and quality in transport and communications.	0	Symposium for railway transport: EURO-Zel 2017 Recent challenges for European railways 30-31 Mai, 2017 TRANSCOM 2017 - International scientific conference on sustainable, modern and safe transport 30 Mai-02 June, 2017	0	https://www.uniza.sk/menu/inc.php?ver=en
9	Newcastle University (UNEW)	UK	no	1	Academic staff 2430 Administrative staff 1049	59968	- Urban and Regional Development Studies - Railway research centre "NewRail" -->Rail Freight and Logistics specialised areas: intermodal rail freight and rail operations issues innovative rail freight vehicle concepts port centric logistics telematic control and monitoring of freight regulatory framework relating to freight and urban freight issues	EU funded projects: CAPACITY4RAIL NOVELOG CAPITAL FOSTER RAIL	0	0	http://www.ncl.ac.uk/
10	University of Ljubljana (UL)	Slovenia	no	0	5000	38781	Research group for Transport Logistics				https://www.uni-lj.si/eng/
11	Transport and Telecommunication institute (TTI)	Latvia		3	80		Department of Transportation and Logistics Research Activities Main Directions: Integrated Transport Information System Intelligent Transport Systems Intermodal Transport Networks	Smart Logistics and Freight Villages Initiative (SmartLog) COST Action TU1408 Air Transport and Regional Development (ATARD)	TSI Research and Academic Conference Research and Technology – Step into the Future: 21 April 2017 (Topics of interest: ...Transport and Logistics ...) International Multidisciplinary Conference "Reliability and Statistics in Transportation and Communication" (RelStat-2017) 18-21 October 2017		https://www.tsi.lv/en

Annex A: Analysis of ECTRI members - Research Institutes

No.	Members	Country	Agreement or experience in applications	Horizon 2020: Number of Projects	Number of employees	Number of scopus ranked publications	Scientific cooperation fields in governance, smart solutions, decision-making in sustainable transport interchanges	Running Projects in the field of transport logistics	Events suitable for collaboration	Features	Contact
1	The French Institute of Science and Technology for Transport, Development and Networks (IFSTTAR)	France	Joint COST Action	88	1000	3472	**Transport and mobility** goals: To observe and analyze the transport and mobility practices of persons and goods To manage, optimize and evaluate transport systems To develop innovative transport and mobility policies, solutions and services **Production Systems, Logistics, Transport Organization and Work** - main areas of research: sea ports, airports, inland ports, rail terminals and logistics hubs – contribute to the operation and competitiveness of different regions, especially metropolitan regions the issue of city logistics and urban freight transport	http://www.ifsttar.fr/en/europe-international/european-projects/framework-programme-fp6-fp7/	0 - all in french	Has developed a range of laboratory and in-situ testing devices	http://www.ifsttar.fr/en/welcome/
2	Centre of Excellence for Future Tansport (TRL) = TRL LIMITED	UK	0	69	unknown	429	Sectors: Cities and Urban (Individual or multi-modal expertise, Impartial evaluation of transport planning proposals), Government Policy and Standards, Rail, Strategic and Local Roads Solutions: Intelligent Transport Systems (ITS); Transport Safety; Infrastructure Asset Management	Low Emission Zone Feasibility And Concept Desgin Study	0	Participates in Horizon 2020 as an independent research organisation, has an own TRL Academy	https://trl.co.uk/
3	The Institute of Transport Economics (TØI)	Norway	0	14	100	498	Research areas Department of Economics and Logistics: Economic Models, Transport Models, Industry and Freight, Logistics and Innovation, Travel behaviour and Mobility Sustainable Urban Development and Mobility	not specified	"Big Data in Transportation Research" - Symposium in Oslo on June 15, 2017	0	https://www.toi.no/?lang=en_GB
4	Swedish National Road and Transport Research Institute (VTI)	Sweden	0	14	>200	260	Research fields: Infrastructure maintenance, Transport system, Mobility management, Traffic simulation, Traffic analysis, Transport economics, Planning and decision-making processes, people in the transport system	not specified	International conference on Electric Road Systems on June 14-15, 2017	0	https://www.vti.se/en/
5	Transport Research Centre (CDV)	Czech republic	Cooperation Agreement (12/2016), cooperation in projects POLITE (InterREG), Endurance etc.	7	150	100	Thematic areas: - transport development (development of the transport sector, road, integrated and combined transport, transport informatics and telematics, non-motor transport and cross-sectional issues in transportation) -transport infrastructure and the environment -road safety and traffic engineering -human factor in transport and transport modelling	not specified	0	0	http://www.cdv.cz/en/
6	Institute for Transport Science (KTI)	Hungary	0	16	180	0	Specialist areas: Modernisation of local and point-to-point, public transport, Transport economics reports Traffic recording, Allocation of bus stations, Improving economy and optimisation of operations, Pre-planning of logistics centres, preparation of realisation studies, Preparation of tender material, Research and databases related to combined transport, Planning and analysis of fee -scheduling systems for infrastructure use Measurement and analysis of traffic flow	RAILHUC: the project aims to improve Centreal Europe´s interconnectivity by an intermodal integration of rail hubs at 3 different levels	0	0	http://www.kti.hu/index.php/home
7	Federal Highway Research Institute (BASt)	Germany	0	7	400	0	Scientific field: Road engineering. As BASt is involved on a worldwide basis in drawing up regulations and standards it can be assigned to GOVERNANCE.	**Traffic Engineering**: Highway Design, Traffic Flow, Traffic Control, Traffic Statistics, BISStra, Environmental Protection, Highway Equipment, Traffic Management and Road Maintenance Services			http://www.bast.de/EN
8	Austrian Institute of Technology (AIT)	Austria	0	1	1300	3235	Innovation systems & Policy, Intelligent vision systems, Rail and road infrastructure, Multi modal mobility systems	Transport Optimisation and Logistics: 4 Projects, Road condition monitoring & Assesments Projects: 4, Project "Smart eye TDS - Traffic data sensor", Project: "Mobility, quality of life and demographic change", Human centered mobility projects: 18, Mobility data aquisition and analysis: 4	**TRA 2018 - 7th European Transport Research Arena in Vienna** (16-19 April): http://www.ait.ac.at/news-events/single-view/detail/4387/ **UITP Global Public Transport Summit 2017 in Montreal** (15-17 May): http://www.ait.ac.at/news-events/single-view/detail/4735/	Laboratories in the field of Rail and road infrastructure	http://www.ait.ac.at/
9	Railway Scientific and Technical Centre (ITS&IK)	Poland	0	1	unknown	0	Railway Track and Operation Division Passenger and freight operation services	CAPACITY4RAIL	0	0	http://www.ikolej.pl/en/
10	Aeronautics and space research centre (DLR)	Germany	Joint COST Action	1	8000 employees at 20 locations	28435	Transport Research topics: Terrestrial Vehicles Traffic Management Transport System.	0	Traffic simulation conference "SUMO 2017" 8 - 10. Mai 2017	0	http://www.dlr.de
11	Laboratório Nacional de Engenharia Civil, I.P. (LNEC)	Portugal	0	1	600	1598	Transport Infrastructures Unit and the Planning, Traffic and Safety Unit	0	0	0	http://www.lnec.pt/pt/
12	Fraunhofer Transport Alliance	Germany	Cooperation in project T_Trans (FP7)	0	16 member institutes	0	Logistics structures and processes (Distribution systems, Tour planning systems, handling systems) innovative mobility and traffic systems (alternative intermodal modes of transport and transport systems) Smart and resilient traffic infrastructure (utilization optimization and efficiency enhancement of traffic infrastructures)	0	Munich / 9.5.2017 - 12.5.2017 transport logistic 2017	0	http://www.verkehr.fraunhofer.de/
13	Technical Research Centre of Finland (VTT)	Finland	0	0	2470 (VTT GROUP)	16887	Services: Sustainable and smart city --> Transport solutions--> Logistics Smart sustainable mobility	0	The 12th European ITS Congress, Strasbourg 19 - 22 June, 2017 (VTT: at Finnish Pavilion, Booth S1)	0	http://www.vttresearch.com/
14	Hellenic Institute of Transport (HIT)	Greece	Cooperation in 2 project proposals, joint COST Action	0	60	0	Department: Smart sustainable Mobility - Freight Transport - Land Transport Networks (all surface transportation systems (road, railway and maritime transport) as well as air transport) Laboratory B4: **Intelligent intermodal Freight transport and logistics**	0	8th International Congress on Transportation Research 27-29 September 2017 Thessaloniki	Partnership: ETRA -The European Transport Research Alliance ECTRI - EUROPEAN CONFERENCE OF TRANSPORT RESEARCH INSTITUTES	http://www.imet.gr/
15	Centre for Innovation in Transport (CENIT)	Spain	0	0	20	0	Research areas: URBAN MOBILITY. Public Transport, Travel behavior, Transport Economics, Urban Freight Distribution, Electromobility and Traffic Modeling. PORT LOGISTICS AND MARITIME TRANSPORT. Demand analysis, Transport Economics, Operational Research at Terminals and Port Management. TRANSPORT INFRASTRUCTURE MANAGEMENT. Transport Economics, Public– Private partnership.	INTERMODEL - Simulation using Building Information Modeling Methodology of Multimodal, Multipurpose and Multiproduct Freight Railway Terminal Infraestructures	0	0	http://lamp.upcnet.es/www-cenit/

Table 2: Analysis of ECTRI members - Research Institutes