INTERMODEL EU

Simulation using Building Information Modelling Methodology of Multimodal, Multipurpose and Multiproduct Freight Railway Terminal Infrastructures

Grant agreement: 690658

D1.2 – INTERNAL PROGRESS REPORT M6
Period covered by the report: from 01/09/2016 to 28/02/2017

Authors	**M. Ángel Dombriz (FGC)** **Enrique Martin (CENIT)** **Janne Porkka (VTT)** **Jarkko Sireeni (VIAN)** **Cornelis Versteegt (MAC)** **Marek Świeczkowski (ZNIK)** **Gisela Soley (IDP)**
Status	**Final version**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 690658.

Revision history:

Revision	Date	Author	Organization	Description
0.1	26/01/17	Gisela Soley	IDP	Template
0.2	27/01/17	Enrique Martín	CENIT	WP8
0.3	20/02/17	M. Ángel Dombriz Gisela Soley	FGC IDP	WP3
0.4	21/02/17	Janne Porkka	VTT	WP2
0.5	22/02/17	Marek Świeczkowski	ZNIK	WP9
0.6	23/02/17	Jarkko Sireni Gisela Soley	VIAN IDP	WP4
0.7	23/02/17	Cornelis Versteegt	MAC	WP5
1.0	24/02/17	Gisela Soley	IDP	WP1, WP10 All document

Statement of originality:

This document contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

Table of contents

1. Introduction

The present Progress Report (PR) contains the state of development of the INTERMODEL EU project, the respect of the work plan and how far project's objectives and milestones have been achieved.

The period covered by this first PR is from September 1st, 2016 to February 28th, 2017 (6 months).

2. Work carried out and overview of the progress

During the first six months of the INTERMODEL EU project the Consortium has followed the plan included in the Annex I of the Grant Agreement, and also recommendations received from the European Commission.

The tasks already initiated according to the Gantt chart of the Action during the covered period are listed below:

- Task 1.1 General consortium management
- Task 1.2 Project meetings
- Task 1.3 Project reporting
- Task 1.4 Coordination of the project with the EC
- Task 2.1 Information and requirements for terminal use cases
- Task 2.2 Integrated planning environment architecture and interface specifications
- Task 3.1 Definition of KPI and KRI
- Task 3.2 Setting of pilot cases
- Task 4.1 7thD BIM execution plan
- Task 5.1 Data collection
- Task 5.2 Ontology and conceptual modelling
- Task 8.1 Definition and description of functional, economic and environmental analysis
- WP10 Ethics requirements

The table below shows a summary of the deliverables and milestones already submitted during the covered period:

Deliverable / Milestone	Month
D1.1 Website and Intranet	M3
D3.1 Study of the state of the art and description KPI and KRI	M3
D1.2 Internal progress report	M6
D1.9 Risk and contingency plan M6	M6
D1.14 Data management plan	M6
D3.2 Pilot innovations and improvements	M6
D5.1 Data model	M6
D9.1 Communication plan	M6
D10.1 H Requirements No.1	M6
D10.2 POPD Requirement No.2	M6

3. Project progress

3.1 Project objectives for the period

From a project viewpoint and according to the project plan, the main objectives of this period are the ones stated in:

- WP1. Management:
  - Manage efficiently the project and the consortium
  - Review and assess the work being carried out
  - Ensure that all aspects of the EC requirements for communication and reporting are met
  - Creating an appropriate management framework linking together all the project components

- WP2. Integrated planning environment and decision support (research activity):
  - Analyze upcoming information requirements for terminal use cases
  - Describe architecture and specify interfaces for integrated planning environment

- WP3. Data & Indicators definitions (research activity):
  - Defining common and specific KPIs
  - Detecting common and specific PIs
  - Setting improvements and innovations to be tested in pilot cases

- WP4. BIM Intermodal Terminal (research and innovation activity):
  - Define a BIM Execution Plan that will be included into WP2 Planning Environment

- WP5. Terminal Operational Simulation:
  - Develop a data model describing all relevant data used in the simulation component library

- WP8. Functional, economic and environmental analysis:
  - Definition and description of functional, economic and environmental analysis

- WP9. Exploitation, dissemination and communication:
  - Protect the intellectual property generated during the project
  - Promote and exploit the results of the project
  - Disseminate activities beyond the consortium to a wider audience
  - Promote the action and visibility of EU funding

- WP10. Ethics requirements:
  - Ensure compliance with the 'ethics requirements' that the project must comply with

3.2 Work progress and achievements during the period

Work package 1: Management					
WP#	**1**	**Start date:**	**M1**	**End date:**	**M36**

Objectives for the period M1-M6

The aim of this WP is twofold:

- To establish a set of Key Performance Indicators (KPIs) for the assessment of intermodal freight terminals through an ICT environment. Therefore, to define the relevant outputs of the different modulus of the decision support platform in terms of KPI and PI.
- To define the improvements and innovations that will be tested in pilot cases that will be studied using the provided assessment tool.

Description of work carried out and achievements

Task 1.1 General consortium management

This task includes the following specific tasks:

- Communication with the European Commission
- Finalizing the consortium agreement
- Organization of internal and external meetings
- Reporting
- Encouraging collaboration between partners to achieve the defined deliverables and milestones
- Management related to data used, re-used and compiled during the project

- Writing and distributing the minutes
- Organizing and submitting the project deliverables
- Organizing and submitting cost statements
- Resolving administrative, contractual and consortium coordination issues

At the beginning of the project, several templates were shared among all partners for progress reporting. All of them were explained in an online meeting, and they will be presented for the second time in the first global meeting to be held in Kiruna, to make sure that everybody understands how they must be filled in.

During the first project six-month period, some particular issues have been solved among partners, and communicated to the European Commission. These are as follows:

1. Inconsistencies in the DoA

   While revising the DoA at the beginning of the Action, some inconsistencies were found. This is why IDP prepared a document with a list of all these inconsistencies, and it was distributed among all partners for validation.

   An online general meeting was held the 12/12/2016 with all partners to discuss about it. As there were no additional comments from any partner, IDP sent the document with inconsistencies and the DoA attached with changes highlighted.

   Later on, the 21/02/2017, Macomi suggested changing the duration of some of the tasks in WP5 to be consistent with the works sequence.

   Despite all the changes proposed, the objectives and milestones of the whole project are not affected.

   The tables below show the modifications already reported to the EC.

- Inconsistencies regarding deliverables

D#	Deliverable title	WP#	Lead	Incorrect Due date	Correct due date	Justification
D1.13	Risk and contingency plan. Updated every six months. 5	WP1	IDP	36	30	Typographic error. Last Risk and Contingency Plan should be M30 not 36
D2.1	Requirements for terminal projects	WP2	VTT	6	9	According to the description of the WP, Task 2.1 'Information and requirements for terminal use cases' ends in M9, thus the deliverable should be ready for M9
D2.6	Gaming technology in interactive operational visualization	WP2	VTT	30	32	According to the description of the WP, task 2.5 'Decision support in integrated planning environment' ends in M32, , thus the deliverable should be ready for M32
D4.1	BIM execution plan guideline	WP4	VIAN	4	7	According to the description of the WP, task 4.1 '7thD BIM execution plan' ends in M7 , thus the deliverable should be ready for M7
D8.1	Definition and description of functional, economic and environmental analysis	WP8	DHL	20	28	According to the description of the WP, task 8.1 'Definition and description of functional, economic and environmental analysis' ends in M28, thus the deliverable should be ready for M28

- Inconsistencies regarding milestones

MS#	Description of the inconsistency	Incorrect Due date	Corrected due date	Justification
MS1	MS1 checks and gets the achievement of 1st reporting period. Current due date is M24 and the 1st reporting period ends in M18	24	18	Typographic error, 1st Reporting Period ends in M18.
MS2	MS2 checks and gets the achievement of 2nd year reporting period. Current due date is M36 and the 2nd year reporting period ends in M24	36	24	Typographic error, 2nd year reporting period ending in M24
MS3	MS3 checks and gets the achievement of final reporting. Current due date is M26 and the project ends in M36	26	36	Typographic error **2**6 → **3**6.
MS8	Detailed briefing of the implementation all proposed pilot innovations	18	19	Typographic error 1**8** → 1**9**.
MS18	Presentation of the conclusions derived from the assessment of the rail network resilience test	34	32	Typographic error 3**4** → 3**2** (should be at the same time than the WP7's end)

- Other inconsistencies

Description of the inconsistency	Correction & Justification
In the tables, VIAS appears as WP3 leader. The description of WP3 shows that the WP leader is FGC.	Typographic error, FGC should appear as WP3 leader.
Task 3.1 description. The acronym KRI is defined as Key Risk Indicator.	Typographic error as the correct meaning is Key Result Indicator.
Task 2.1 duration: from M0 to M9. It should finish in M1.	Typographic error M**0** → M**1**
Task 4.2 duration from M8 to M19, and it should end in M18, as due date for D4.2.	Typographic error M**19** → M**18**
Task 4.3 duration from M8 to M19, and it should end in M18, as due date for D4.3.	Typographic error M**19** → M**18**
Task 5.2 duration from M3 to M7 and D5.2 due date is M9.	Typographic error M**7** → M**9**
Deliverable D3.2 Pilot innovations and improvements should be a report and not a demonstrator.	Typographic error, D3.2 should appear as report type deliverable.
Task 5.3 duration from M4 to M7, and it should be from M7 to M17 to be consistent with the sequence of work to be done under WP5.	Typographic error Duration M**4-7** → Duration M**7-17**
Task 5.4 duration from M5 to M8, and it should be from M7 to M14 to be consistent with the sequence of work to be done under WP5.	Typographic error Duration M**5-8** → Duration M**7-14**
Task 5.5 duration from M8 to M10, and it should be from M10 to M14 to be consistent with the sequence of work to be done under WP5.	Typographic error Duration M**8-10** → Duration M**10-14**

Annex I includes the document presented to the PO and the DoA with changes highlighted. In addition, the updated Gantt chart is also included.

2. Risk activation plan

One of the project partners, DHL, reported at the beginning of November 2016 the possible activation of Risk 6 'Under resourced Partner/task/WP' due to

critical changes in the business environment occurred after the approval of the proposal which will require DHL Freight to adjust its organization.

After analyzing the situation communicated by DHL which included several communications with the project coordinator and with German NCPs, a report elaborated by DHL was sent to the consortium and discussed during the first online meeting, held the 12th December 2016 to deal with the situation.

Against this background, DHL proposed three different solutions, and consortium partners agreed the handover of research tasks to a consortium partner. Based on that, DHL together with CENIT redistributed their efforts associated with some of the tasks they are involved in. The final table with the redistribution of effort is shown below:

Task	Transferred Effort (PM)	DHL Updated Effort (PM)	CENIT Updated Effort (PM)
4.4 Optimization of first 7D static KPIs (...)	3	0.5	4
7.3 Network operational testing in pilot cases	1	0.5	2
7.4 Network Resilience testing	1	0.5	2
8.1 Definition and description of functional (...)	2	0.4	2.3
8.2 Assessment of current transportation (...)	2	0.5	2.2
8.3 Validation and reconciliation of results at (...)	2	1.5	2.2
8.4 Integration of the key results	3	0.5	3.2
TOTAL TRANSFERRED EFFORT*			14 PM

The risk activation plan in Annex I was sent to the PO together with the Risk and Contingency Plan. New roles and redistribution of effort were both accepted by the EC.

In January 25th, 2017, an online follow-up meeting was held in order to review the work done and on-going activities and agenda. Each on-going task was reported and presented by its leader. At the end of the meeting, IDP explained how to fill the progress report and it was discussed where the first global meeting would be held.

Several online meetings have been held to discuss about exploitation and dissemination activities, and a discussion was started on possible conference papers that could be written.

Task 1.2 Project meetings

The objective of this task is to ensure good collaboration and exchange of ideas and results in the project. For that purpose, the first meeting, the kick-off, was held in Barcelona at the beginning of the project.

After this 6-month period, the first global meeting will take place in Kiruna at the beginning of April, as agreed by the entire consortium.

Currently, Kiruna Wagon and IDP are elaborating the agenda which will be closed in the next days. The objectives will be mainly discuss the process, explain well how to report financial issues, check if financial and technical targets are being met, and undertake remedial actions, if required. There will be the opportunity also to do some workshops in order to discuss technical issues under different work packages.

Task 1.3 Project reporting

The present document is the integrated report done every six months to keep inform the EC and partners about the project progress.

Task 1.4 Coordination of the project with the EC

IDP as INTERMODEL EU coordinator, has coordinated and followed-up with respect to all measures taken for the purpose that all the commitments agreed upon with the Commission are met, ensuring also the good progress, financial and technical, of all the tasks and requirements of the Commission.

Deviation from work plan & remedial action

No deviation is foreseen.

Inconsistencies found in the DoA regarding this WP are as follows:

- D1.13 Risk and contingency plan: due date M30 instead of M36
- MS1: To be achieved in M18 instead of M24
- MS2: To be achieved in M24 instead of M36
- MS3: To be achieved in M36 instead of M26

Work package 2: Integrated planning environment and decision support

WP#	2	Start date:	M1	End date:	M32

Objectives for the period M1-M6

The aim of work package is to develop a holistic integrated planning environment that enables technical management of modelled terminal projects and supports making decisions on assets throughout the life cycle. The environment will extend utilization of various building and infrastructure models (BIM and infraBIM) from planning, design and construction towards the operational economic and environmental performance analyses in freight terminals. The outcome aims at increased interaction between participants and enhanced processes for making decisions. Work is necessary for the

whole project, and is closely connected with indicators to be developed (WP3), pilot modelling (WP4) and operational simulation (WP5).

The objectives of this WP have been:

- Task 2.1: Analyze upcoming information and requirements for terminal use cases
- Task 2.2: Describe architecture and specify interfaces for integrated planning environment

Description of work carried out and achievements

T2.1 "Information and requirements for terminal use cases" M1-M6 (Deadline M9 for D2.1)

Overview of the activities within Task 2.1

- Preliminary version prepared for D2.1 "Integrated planning environment architecture and interface specifications". Considers information needs for terminals and their derived requirements, formulated to model-based approach to enhance performance, economy and reduce risk over life cycle.
- Terminals have been analyzed, based on their functional areas. Target is to have a general breakdown structure for terminals, applicable for model-based planning.
- Starting point for work has been key performance indicators developed in WP3 (D3.1). Their importance and characteristics have been considered through on-line meetings. We have also identified how indicators can be visualized in model based planning, through e.g. highlighting objects or areas from terminal visualization.
- Terminal operational simulation has been considered regarding information needs, and considered in relation to planning through on-line meetings.

T2.2 "Integrated planning environment architecture and interface specifications" (Deadline M12 for D2.2)

Overview of the activities within Task 2.2

- Draft from D2.2 "Integrated planning environment architecture and interface specifications" has been prepared, introduces document structure. Approach enables solution optimization with integrated planning where individual segment and discipline models (buildings, logistics etc.) are combined and used to enhance decision making.
- We have considered a software architecture that allows models form different planning software to be utilized, and visualized into same integrative planning environment.
- The planning architecture has several data interfaces to bring together various technologies. We have discussed in on-line meetings on integrating platform to operative simulations and indicator data.

- Review of open standards in order to their applicability to be used in terminal projects to improve interoperability across countries. Several formats have been identified, such as geographic elements (LandInfraGML, CityGML), buildings (IFC), and infrastructure data (LandXML, RailML).

Deviation from work plan & remedial action

No deviation is foreseen.

Inconsistencies found in the DoA regarding this WP are as follows:

- D2.1 Requirements for terminal projects: due date M9 instead of M6
- D2.6: Gaming technology in interactive operational visualization: due date M32 instead of M30
- Task 2.1 duration from M1 to M9 (instead from M0 to M9)

Work package 3: Data and Indicators definitions

WP#	3	Start date:	M1	End date:	M12

Objectives for the period M1-M6

The aim of this WP is twofold:

- To establish a set of Key Performance Indicators (KPIs) for the assessment of intermodal freight terminals through an ICT environment. Therefore, to define the relevant outputs of the different modulus of the decision support platform in terms of KPI and PI.;
- To define the improvements and innovations that will be tested in pilot cases that will be studied using the provided assessment tool.

Description of work carried out and achievements

Task 3.1 Definition of KPI and KRI

Within T3.1 and deliverable D3.1, the following work has been done:

The work carried out in order to develop the deliverable D3.1 provides a complete set of KPI and PI. These KPI and PI have been selected after a wide revision of the state of the art and a discussion among partners in a workshop held in Melzo and La Spezia.

On the one hand, a state of the art review was carried out, and a large list of KPIs was developed according to the information gathered. On the other hand, all partners involved in this task, made a list of the most important performance indicators in compliance with their interests and objectives in their daily activities (operators, public bodies, haulers, etc.). Thus creating a new list of KPIs to be discussed during the

workshop held in Melzo and La Spezia, together with the list obtained from the state of the art review.
In addition, after some discussions among FGC, CENIT and IDP, a methodology for choosing KPIs was defined. In such context, taking inputs from previous approaches, the method of KPI and PI selection proposed for the INTERMODEL EU project is introduced as follows:

- Identification of the strategy and mission of the organization;
- Identification of stakeholders involved;
- Identification of the different perspectives that should be considered in the performance system;
- Identification of particular strategic goals;
- Selection of effectiveness criteria and feasible KPIs and PIs set.

The working meeting was held at Contship Italia and Autorità Portuale della Spezia during the 20th and 21st of October 2016, had the following objectives:

- Obtain information of the intermodal terminals and its daily operations. Contship Italia and La Spezia added their feedback according to the specific features of their inland and seaport terminals;
- Explain the proposed methodology for KPI definition and review about the state of the art of KPI;
- Show a list of indicators used by other research projects and scientific community.
- Start the discussion about appropriate KPI that should be used for the assessment of the terminals and that should be obtained from the models developed.

The meetings held throughout this task are:

- 18/10/2016 → Internal meeting FGC + CENIT + IDP (FGC headquearters), to share findings from the three partners and define the methodology to select the most appropriate performance indicators.
- 25/10/2016 → Internal meeting CENIT + IDP (CENIT headquarters), to discuss about main conclusions from the working meeting in Italy, and create the matrix to be distributed among partners and get an approval in order to set the KPI list for the deliverable D3.1.

The list of KPI is useful to:

- Analyze the state of the art in application of KPI and KRI in intermodal freight terminals
- Split the terminal operation into different processes and transport modes
- Choose an adequate aggregation level of the relevant variables for each dimension (productivity, service quality, financial costs, sustainability, etc.)

Others:

Additional review of the set of KPIs included in D3.1 has been carried out once the deliverable was submitted, in alignment with the Task 2.1 objectives.
The meetings held in order to discuss if the project should keep all the list as presented in the D3.1 or if a short list of strategic KPIs should be added into the information requirements deliverable D2.1 are described below:

- 02/02/2017 → On-line meeting between VTT (WP2 leader) and CENIT+IDP (involved in Task 3.1, WP3), to discuss about the need of including/not including the long list of KPIs.
- 07/02/2017 → Internal meeting FGC + CENIT + IDP (FGC headquarters) to justify the need of maintaining the long list as included in the deliverable D3.1 and also confirm if they can be obtained from terminal simulations, traffic simulation models and BIM models.

Task 3.2 Setting of pilot cases

Subtask 3.2.1 Pilot innovations and improvements

Within T3.2 and deliverable D3.2, the following work has been done:

The work carried out in order to develop the deliverable D3.2 is focused on firstly, analyzing the tendencies in logistics, and secondly, on selecting a number of technological and operative innovations to be implemented into the four pilot terminals (La Spezia container seaport terminal; Milan-Melzo container dry port; Virtual bulk-container seaport terminal; and Virtual bulk-container inland terminal).

After analyzing main tendencies, FGC and IDP created a questionnaire that was distributed among Consortium partners and stakeholders (operators, constructors, operators, etc.) in order to know innovations foreseen in the design and management of intermodal terminals. The answers and information received have been gathered and analyzed, coming up with the main improvements to be considered within the project.

Most relevant innovative solutions that should be taken into consideration when modeling the terminal cases are the following:

- Internet of things
- Intelligent traffic guidance systems and Intelligent freight cars which will constrain the layout design
- Alternative container design
- Liquefied Natural Gas (LNG)

In addition, improvements developed within OPTIRAIL and WiderMOS projects will be considered when modelling the real terminals, and also projects that both Contship Italia and Autorità Portuaria della Spezia are going to implement in the short/mid-term.

La Spezia Port Authority provided information about the improvements planned for the port terminal. They will be taken into consideration when modelling and simulating the real seaport terminals throughout the project.
The two main improvements and innovations related to the future development of the project are:

- New railway terminal design, together with a shunting software tool that will support the shunting operation within the port;
- Extension and improvement of the Corridor Management Platform, in relation with the tool developed within the WiderMoS project.

Contship Italia provided some information about the projects they are about to implement in order to enhance the overall terminal performance:

- Conversion of F3 warehouse into temperature controlled warehouse;
- Implementation of a third gantry crane;
- Four new shunting rail trucks.

All this information will be used as input data together with the test scenarios defined in the following subtask. This will allow to correctly defining the four pilot cases using the BIM methodology.

The meetings held throughout this task were:

- 16/12/2016 → Internal meeting FGC + IDP (FGC headquearters), to start working on this task and defining the questionnaire.
- 20/12/2016 → Meeting with a partner involved in the WiderMOS project who explained main project findings to FGC and IDP (FGC headquarters).
- 03/02/2017 → Internal meeting FGC + IDP (FGC headquarters) to analyze the information gathered from the questionnaires received from partners and stakeholders, and deciding what to include in the definition of the models.

Deviation from work plan & remedial action

No deviation is foreseen.

Inconsistencies found in the DoA regarding this WP are as follows:

- FGC should appear as WP3 leader instead of VIAS
- The acronym KRI is defined as Key Risk Indicator, and should be Key Result Indicator
- D3.2 Pilot innovations and improvements is a report and not a demonstrator activity

Work package 4: BIM Intermodal Terminal

WP#	4	Start date:	M4	End date:	M19

Objectives for the period M4-M6

The main objective of this WP during the first two months is defining a BIM Execution Plan (BEP) that must be included into WP1 Planning environment.

Description of work carried out and achievements

Task 4.1 7thD BIM Execution Plan (BEP)

Within T4.1 and deliverable D4.1, the following work has been done:

During the first two months, the work done has been mainly focused on:

- Elaborating a checklist with main sections that must be covered by the BIM Execution Plan and initial contents;
- BEP document structure has been presented to the involved partners according to initial checklist and will be used for content development.
- BEP checklist will record BIM and Data requirements identified by each partner. Some partners have already integrated their suggestions.
- Previous list with data requirements in order to develop the BIM models of the real and virtual terminals. This list has been organized according to the following information typology: design parameters (layout, differentiating among seaport terminal/inland terminal/railway connection/road connection), equipment, operational parameters, boundary conditions, operations classification (per areas, per activities, etc.), and measures with regard to production/productivity/utilization/service/performance.
- Online discussions on how project KPI's and simulation requirements affect BEP.

Participants in this task have agreed to meet in Barcelona for a 2-day workshop in order to finalize the BEP by the end of March (23rd and 24th).

Deviation from work plan & remedial action

No deviation is foreseen.

Inconsistencies found in the DoA regarding this WP are as follows:

- D4.1 BIM Execution Plan: due date M7 instead of M4
- Task 4.2 duration from M8 to M18 (instead of ending in M19)
- Task 4.3 duration from M8 to M18 (instead of ending in M19)
- MS8: To be achieved in M19 instead of M18

Work package 5: Terminals operational simulations

WP#	5	Start date:	M1	End date:	M17

Objectives for the period M1-M6

The objectives of this work package during the reporting period are:

- Developing a data model that describes all relevant data used in the simulation component library.
- Developing a simulation component library (the decision support environment) for the operational simulation of all sorts of freight terminals.

The completion of the data model and simulation component library will allow afterwards building a decision support environment that will support the optimization of the design and the operational performance of freight terminals.

Description of work carried out and achievements

Task 5.1 Data collection

Within T5.4 and deliverable D5.1, the following work has been done:

The deliverable consists of two parts:

- Data model.
- Data requirements document.

A data model and data requirement document have been developed based on:

- Earlier simulation studies that have been conducted by Macomi in 2015-2016. These include terminals and rail simulation studies in Europe, USA and Asia.
- Kick-off meeting Intermodel project (September 2016, Barcelona).
- Internal meetings within Macomi.
- Internal online project meetings between Macomi, VTT, VIASYS and IDP.

The data model is the (together with the conceptual modelling) the basis of the library of simulation components.

Deliverable 5.1 (part 1 and part 2) is finished and has been submitted within the deadline.

Task 5.2 Ontology and conceptual modelling

A start has been made with the development of ontology and conceptual modelling.

The following input is used to develop the ontology and conceptual modelling:

- Earlier simulation studies conducted by Macomi in 2015-2016.

The conceptual modelling will contain:

- UML class diagrams
- Process flow

To finish the ontology and conceptual modelling, terminal visits to Melzo and La Spezia will be organized in the period of March-April 2017.

Tasks 5.3 and 5.4 have not started yet. However, Macomi has done some previous work to ensure their proper development, which is explained below.

Task 5.3 Development of the simulation component library

A start has been made with the development of the simulation component library. Several internal and external meetings have been held to study:

- Which existing simulation components can be reused from the Macomi Prescriptive Simulation Platform (PSP platform, see www.macomi.nl). Many components that were developed earlier should be reused.
- Which existing simulation components can be modified from the Macomi Prescriptive Simulation Platform.
- What components have to be developed from scratch.

Some external parties were involved in the meetings:

- A Terminal Operating System supplier (TOS) – December 2016.
- Port of Rotterdam – December 2016.
- Several terminals – December 2016 – January 2017.
- Delft University of Technology – January 2017.

A road map or implementation plan has been defined for the development of the library of simulation components (for internal use only). This way the progress of the development can be monitored closely.

The deliverable 5.3 (Operational simulation model of the first real-life case) is aimed for month 17. The deliverable 5.4 (Operational simulation model of the second real-life case) is aimed for month 17. Both D5.3 and D5.4 are on track.

Task 5.4 Coupling of simulation model with overarching architecture

A start has been made for the coupling of the simulation components to the overall architecture. Several calls / online meetings have been held between VTT, VIASYS and Macomi for the design of the overall architecture.

Next steps is a meeting between the parties involved in the overall architecture (VTT, VIASYS, IDP and Macomi). This meeting will most likely be held beginning of April (part of the overall meeting in Kiruna Sweden).

Deviation from work plan & remedial action

Macomi has suggested to change the timing and duration of the tasks 5.3, 5.4 and 5.5 in order to make them consistent with the appropriate activity starting date. There will be no changes to the timing concerning deliverables and milestones.

	original		new	
task	**Begin month**	**End month**	**Begin month**	**End month**
5.1	1	6	1	6
5.2	3	7	3	9
5.3	4	7	7	17
5.4	5	8	7	14
5.5	8	10	10	14
5.6	10	17	10	17

Work Package 8: Functional, economic and environmental analysis

WP#	**8**	**Start date:**	**M4**	**End date:**	**M36**

Objectives for the period M4-M6

The objectives of this WP is:

- Assessment of the functional, economic and environmental effects and the underlying driver models of inter- and multimodal terminals.

In addition, the WP tasks and activities will be focused on answering the following items:

- Which drivers (measured through standard macro and micro economic and logistics specific Key Performance Indicators) determine the overall impact?
- How can these aspects be integrated in decision processes and anticipated in planning, building and operating inter and multimodal terminals?
- Integration of WP 3-6 results and assessment of their influence on functional, economic and environmental impacts of intermodal terminals.

Description of work carried out and achievements

Task 8.1: Definition and description of functional, economic and environmental analysis.

The overview of subtasks included in T8.1 is as follows:

<u>Subtask 8.1.1 Functional analysis</u>

In this section the roles and influence of intermodal terminals on the overall logistics networks ("logistics grid") are described. Opportunities and risks are assessed based on current and expected trade flows (focus on European import and export) and the development of main transportation modes (land, air, ocean/water). Focus will be on location, size and functional scope (e.g. rail and road, container and bulk load).

Subtask 8.1.2 Economic analysis

In this section the economic aspects of an intermodal terminal will be assessed. This includes the microeconomic dimension of the terminal as a profit oriented business model as well as the macroeconomic dimension of a terminal as infrastructure and potential enabler for local development. It describes on one hand the prerequisites and criteria which determine profitable operations and on the other hand the influence on the hinterland (attractiveness of a city/area as business location).

Subtask 8.1.3 Environmental analysis

In this section the environmental impacts of intermodal terminals will be assessed. This includes effects during building or enlargement phases of terminals and the effects of terminal operations (carbon footprint, handling of dangerous goods and related environmental risks). In this context, terminals are seen as integral parts of larger logistics networks, the related infrastructure and their environmental impacts.

Within T8.1 and deliverable D8.1, the following work has been done:

CENIT and DHL had an internal meeting with the aim of aligning of what has to be done, how we work on that together and the DHL's expectations regarding this issue.

In addition, some useful desk documents were collected: Logistics Trend Radar (2013) and Logistics 2050: A Scenario Studio (2015) both from DHL.

Previous documents are really useful to identify main (global) drivers and key trends in the logistics, assessing their potential impact of intermodal facilities. This kind of facilities have become increasingly popular as a method of increasing efficiency and decreasing costs across the entire spectrum of supply chain operations. Therefore, functional, economic and environmental impact analysis will be assessed in a general framework by analyzing previous transportation and logistics studies and, on the other hand, by reviewing statistical data and forecasts.

Deviation from work plan & remedial action

According to the activation of Risk 6 "Under resourced Partner/task/WP", which was activated due to an unexpected issue affecting the availability of resources that DHL

could provide for research and reporting tasks, tasks related to WP8 have been redistributed to CENIT.

This process was finished in January 2017, thus tasks related to WP8 started in February instead of December 2016, as it was planned. However, it should be mentioned that this delay will not affect the regular performance of tasks derived in WP8.

Inconsistencies found in the DoA regarding this WP are as follows:

- D8.1 Definition and description of functional, economic and environmental analysis: due date M28 instead of M20

Work package 9: Exploitation, dissemination and communication

WP#	9	Start date:	M1	End date:	M36

Objectives for the period M1-M6

The objectives of this WP is to develop a comprehensive and extensive strategy for exploitation and dissemination of the results and communication of the project. This set of activities will:

- Protect the intellectual property generated during the project;
- Promote and exploit the results of the project:
- Disseminate activities beyond the consortium to a wider audience;
- Promote the action and visibility of EU funding.

Description of work carried out and achievements

Task 9.1: IPR protection & Task 9.2: Exploitation

These two tasks are focused on the protection of the knowledge resulting from the project and the preparation of the ground for further exploitation results.

As all partners are involved in these tasks, it is expected to include a session about this topic during the second general meeting in order to:

- Set the basis of the Exploitation Agreement;
- Discuss on the protection of IPR and the use of patenting.

Task 9.3: Dissemination

- Design, creation and management of the INTERMODEL website:
    - Projects domain is: http://www.intermodeleu.eu/
    - Designing, creating and placing the INTERMODEL site on the server/project webside structure, public area, private area
    - Create accounts on Twitter https://twitter.com/IntermodelP ,Linkedin https://www.linkedin.com/in/intermodel-project-335722133, You Tube https://www.youtube.com/channel/UCZjDMG4L58ELZ9KB7JQ8u3Q

- Update the webside
- Website and intranet administration

- INTERMODEL EU promotional video:

  Published 7.11.2016
  This video introduces InterModel EU project, developing intermodal terminals 1.9.2016-31.8.2019.
  More information: http://www.intermodel-project.eu
  Coordinator: IDP, Ingenieria Y Arquitectura Iberia Sl, Spain
  Video: Janne Porkka, VTT, Technical Research Centre of Finland
  Terminals: La Spezia Port Authority & Melzo Milan, Italy
  Virtual models: Viasys VDC, Finland
  Music: Open Hands "Blue Chicken" (CC BY)

  https://www.youtube.com/watch?v=-w8Rsmg4KGc

- Project presentations by ZNIK

  Energy Cleantech Cluster Milano, Italy, in Brussels, November 30th, 2016
  Agro Transilvania Cluster Romania, in Brussels, November 30th, 2016
  Gdansk Port Authorities, in Gdansk, Poland, December 21st, 2016

- List of proposed conference papers discussed during an online meetings:

Deliv.	Main Author	CO-Author	TOPIC	Deadline for submission
3.1	CENIT		Indicators in intermodal terminals (comprehensive state of the art)	31/03/2017
5.2	MACOMI		Ontology for simulation at intermodal terminals	28/04/2017
8.3	CENIT	DHL	Development on the results from the terminals and recomendations for new and	15/02/2019
8.1-2	CENIT	DHL	Review on current studies and data forecast and implications on intermodal terminals	30/11/2018
2.4	VTT		Conference paper: Decision support for owners of terminal projects	30/08/2018

First conference paper related to work done in WP3 already submitted for the Call for papers 3rd ICPLT, held in September 2017 in Darmstadt, Germany. Title: Assessment of intermodal freight terminals with Key Performance Indicators integrated in the BIM process

Task 9.4: Communication

Overview of the activities within Task 9.4:

- Development of the Communication Plan 1
- Select trade shows and conferences in order to present the INTERMODEL EU project:

  Successful R&I in Europe. 8th European Networking Event Düsseldof, Germany (2nd – 3rd March, 2017)
  Transport Week Sopot Poland (7th – 9th March, 2017)

The communication plan, including the part concerning to scientific communication, will be formally presented during the next project Meeting in Kiruna.

No deviation is foreseen.

Work package 10: Ethics requirements

WP#	10	Start date:	M1	End date:	M36

Objectives for the period M1-M6

The objectives of this WP is to set out the 'ethics requirements' that the project must comply with.

Description of work carried out and achievements

Under this work package there is no task assigned. However, IDP has written the two deliverables with regard to:

- H-Requirement No. 1: concerning humans in research activities as identified and established according to EU and national directives.
- POPD-Requirement No. 2: information on consent procedures that must be implemented before the start of relevant research.

On the one hand, in accordance to the nature of the research carried out under the INTERMODEL EU project, human participants are not required.

On the other hand, data collected for the project excludes personal sensitive data and is basically related to intermodal terminals.

In the case where the consortium could consider to gather the opinion of human experts, the information will be collected in a completely anonymous way, as established in the Data Management Plan and those experts will be part of the consortium members / stakeholders which already have their own procedures for data protection.

If the opinion of external experts or potential users is needed in the future, the information will be also collected in an anonymous way and the Data Management

Plan will be updated with all the necessary to comply with EC directives and national regulations regarding POPD. Both deliverables have been distributed among all the partners in order to get the approval. In case of changes throughout the project, both documents will be updated if required.
Deviation from work plan & remedial action
No deviation is foreseen.

3.3 Summary of Deliverables

D#	Name	Delivered	Summary and Comments
D1.1	Website and intranet	YES	The INTERMODEL website has been designed, developed and launched. The site serves as both dissemination and project management tools and, includes public and private areas. The public area promotes the project and allows for dissemination of public results and permits the public to contact the consortium via contact form and visit partners' websites. The private area, accessible via a login, includes confidential and project management documents, helps partners share information and communicate more effectively. The website will include all the relevant public information regarding the project to make it known and will be used as a dissemination tool of the results and developments of the project to industry experts, interested parties and the public. It will include vídeos and reports regarding the simulations of the pilots. The content of the website will be periodically updated as the project advances.
D1.2	Internal Progress report prepared and ready for revision in the INTERMODEL General Assembly 1	YES	Report including a summary of the progress made, critical points, risks and contingency plans.
D1.9	Risk and Contingency Plan M6	YES	Report including the monitoring and control activities related to the risks, starting with those described in the initial Risks Plan. This document will be updated every 6 months.
D1.14	Data Management Plan 1	YES	Outlines how data collected or generated will be handled during and after the INTERMODEL EU action, describes which standards and methodology for data collection and generation will be followed, and whether and how data will be Shared.
D2.1	Information and requirements for terminal use cases	NO	To collect existing knowledge, based on key performance and risk indicators (WP3), on freight terminals, model based planning and terminal simulation, and convert results into model-based information requirements. Work is progressing with preliminary versions, deadline for final deliverable is M9.
D2.2	Integrated planning environment architecture and interface specifications	NO	The approach to combine planning individual segments and discipline models (buildings, logistics etc.). Proposes implementing open formats. Work has started and first preliminary version has been made, deadline for final deliverable is M12.
D3.1	Study of the State of the art and description of KPI and KRI of terminals, hinterland mobility and rail network	YES	This deliverable provides a set of KPIs (high-level indicators) and PIs (secondary level indicators) that will be included in a scoreboard integrated in the BIM decision-making tool. This comparative scoreboard that includes the selected KPIs related to financial, operational, quality service, sustainable and safety issues and from three points of view (investor/management, operator and public body) will

			help to compare alternatives, assess potential measures and solutions and provide support to decision-makers taking into account both project definition and exploitation phases. *Comments: at first sight and before testing the collection of KPIs from terminal simulation tool/traffic simulation model/BIM, it seems feasible to obtain all the KPIs included in the deliverable. However, further tests within the project could show difficulties and/or the impossibility of gathering all the information required to calculate them. In that case, a revision of the KPI list will be carried out, and if necessary, it will be modified and updated.*
D3.2	Pilot innovations and improvements	YES	Selection of the technological and operative innovations to be implemented in the four pilot terminals and the rail interconnection between them.
D3.3	Input data analysis and scenarios	NO	The input data will be set so that the pilot cases can be correctly defined to design them using the BIM methodology and incorporate all the relevant BIM dimensions.
D4.1	BIM Execution Plan Guideline	NO	The BIM Execution Plan is being developed. It will definí the scope of BIM implementation, will describe the team characteristics needed to achieve the modelin, the process impacts of using BIM, contract recommendation for BIM implementation, and the appropriate level of modelin of the different elements and categories of the terminals to better optimize the dedicated resources.
D5.1	Data model	YES	The deliverable consists of 2 parts: • Data model in the format of a ERD and report. The data model defines the scope of what is being simulated within the project. Furthermore, it states how the simulation models will work internally. • Data requirements document. This document can be send to terminal that will be simulated in the project. The terminal can fill in the data that is required for building simulation models.
D5.2	Ontology and conceptual modelling	NO	A first draft version has been made and will be distributed for review within the project group. Due date month 9.
D5.3	Operational simulation model of the first real-life case	NO	Due date month 17.
D5.4	Operational simulation model of the second real-life case	NO	Due date month 17.
D8.1	Definition and description of functional, economic and environmental analysis	NO	• Internal meeting with DHL • Desk research as regards to the impact of intermodal facilities • Identification of main drivers According to the activation of Risk 6 “Under resourced Partner/task/WP”, Task 8.1started two months later than expected. However, the deadline for D8.1 is not under risk and will be delivered on time.
D9.1	Communication Plan 1	YES	The Communication Plan 1 has been implemented during February 2017.

			A comprehensive Intermodel EU Communication Plan prepared at the beginning of the project, on the basis of the draft contained in the application. The Communication Plan describes the various actions that fit the objectives and tools, It is the basis for internal and external communication, defines the communication strategy of the project, including objectives, target groups, information systems and internal and external communications. The plan sets out what the details of the dissemination of project results.

3.4 Milestones table

MS#	Name	Related Deliverables	Achieved	Summary and Comments
MS4	Definition of KPI and KRI	D3.1	YES	List of KPIs that will be used to compare alternatives, assess potential measures and solutions and provide support to decision-makers taking into account both project definition and exploitation phases through a scoreboard integrated in the BIM decision-making tool.
MS5	Characterization of pilot cases	D3.2	NO	First part corresponding with the definition of innovations and imprevements that will be implemented into the four pilot terminals is already done. However, test scenarios must be defined by the end of M12 according to the project planning.

Annex I

This appendix includes:

- DoA inconsistencies (document sent to the EC);
- Risk activation plan (document sent to the EC);
- Updated Gantt chart.