

# Applying COIN Services to the Cyprus Shipping Sector: Preliminary Results

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**Abstract:** The COIN service platform allows exposure, combination and integration of interoperability and collaborative services for their application to specific business domains. As part of the COIN sub-project 7, the objective is to exploit the COIN service platform in order to apply COIN services to the Cyprus marine shipping sector; together with our industrial partner Donnelly Tanker Management. In this paper, a case study is presented that demonstrates how COIN services are exploited to expedite and simplify business processes in the marine shipping domain. On the basis of the case study preliminary results are presented. These reveal the potential positive impact of the COIN service platform, in terms of reducing the time required to execute marine shipping processes.

## 1. Introduction: The COIN FP7 IP

Enterprise Collaboration (EC) and Enterprise Interoperability (EI) are two key aspects of networked enterprises, which are interdependent but simultaneously present [1]. EC comes from a business perspective and identifies the process of enterprises (mainly SMEs) that allows setting up and managing cross-enterprise business relations in response to business opportunities. EI originated by ICT and identifies a capability of enterprise software and applications to be integrated at the level of data, applications, processes and models of each enterprise. These aspects proceed along parallel tracks with rare opportunities to convene and mutually influence each other. Hence, research in EC lacks support of innovative and advanced ICT, while research in EI lacks concreteness and real-life business applications.

To address the above issue the enterprise **CO**llaboration and **IN**teroperability (COIN) research project set out to study, design, develop and prototype an open, self-adaptive service platform that offers business collaboration and interoperability services. The COIN service platform allows exposure, combination and integration of interoperability and collaboration services in a variety of business domains [2]. The availability and adoption of innovative COIN ICT services by business consumers is expected to foster and promote interoperability amongst collaborative enterprises to support various business forms such as supply chains and business networks. Furthermore, the open and modular architecture of the COIN platform will permit the addition of new developed services by service providers. The open, self-adaptive nature of the platform will also permit the customisation of existing resources (e.g. when applied to a specific business domain) to develop additional, highly-specialised services. Thus, the key goal is to promote via the COIN service platform the notion of “Software as a Service” (SaaS) [3] to support the vision: “Interoperability and collaboration services will become a pervasive knowledge and business utility at the disposal of European networked enterprises from any industrial sector and domain”.

## 2. Objectives

The objective of this work is to validate, test and establish the effectiveness of the COIN service platform in reducing the time and cost to execute business processes in the marine shipping domain. To achieve this target, two business use cases were identified, analysed and selected, in collaboration with our industrial SME partners. Following, the COIN service platform and a subset of appropriate COIN baseline and innovative services (offered by the platform) were utilised and applied for building the use cases. The paper is structured as follows: Section 3 gives a brief introduction to the Cyprus marine shipping sector and Section 4 describes the two selected business use-case scenarios. Following, Section 5 describes the technological capabilities of the COIN platform, providing details on the implementation of the first business use-case using the platform's capabilities. In Section 6 preliminary results are presented, via which the relevant business indicators and business benefits are revealed in Section 7. Finally, Section 8 concludes this paper.

## 3. The Cyprus Marine Shipping Sector

The contribution of the shipping industry to the Cyprus economy is as high as 5.5% of the Gross Domestic Product (GDP) –ship management and ship owning combined–, a value higher than in most other European countries. The Cyprus Registry is classified as the 10<sup>th</sup> largest merchant fleet globally and 3<sup>rd</sup> in the European Union, with approximately one thousand shipping vessels; gross tonnage in excess of 19 million. Limassol is considered the largest third party ship-management centre in the EU and one of the largest in the world (in excess of 130 ship-owning, management and other shipping related companies maintain offices there). The European merchant fleet capacity has significantly increased upon Cyprus accession to the EU, with the island contributing 15% – 25% of the EU fleet.

Among the ship-owning/management companies established and operating in Cyprus, it is estimated that 87% are controlled by EU (including Cypriot) interests. Approximately 4.500 persons are employed ashore and 40.000 seafarers of different nationalities are employed onboard vessels controlled and/or managed from Cyprus.

## 4. Description of the Business Use-Case Scenarios

The first business use-case describes the tasks undertaken by our industrial partner, namely Donnelly Tanker Management (DTM), and other involved parties for negotiating and coming to a decision on the voyage fixture. The pre-fixture queries, a prerequisite for the voyage fixture accomplishment, are formulated after negotiations based on standard charter party forms (i.e. standardized documents). The outcome of these negotiations is a recap document (standardized), containing details of the cargo, the voyage dates, loading and discharge ports, speed advisories, etc. Once formulated, the recap must be made available to the vessel's captain for any final queries or clarifications on the voyage.

Figure 1 illustrates the UML use-case diagram of the first business scenario. As can be seen, the Charterers and UPT (United Product Tankers) negotiate the standard charter party forms in order to produce the recap document. This is distributed to DTM who in turn sends this to the vessel's captain for any outstanding clarifications or queries. Using the recap, DTM may already instruct the captain of the ship to begin the voyage towards the general geographic area identified (e.g. Eastern Mediterranean). At this point DTM will request precise voyage orders that contain more specific details, such as the specific load/discharge ports, details regarding the cargo (e.g. exact tonnage) as well as issues like draft restrictions at the load port (e.g. depth of port).

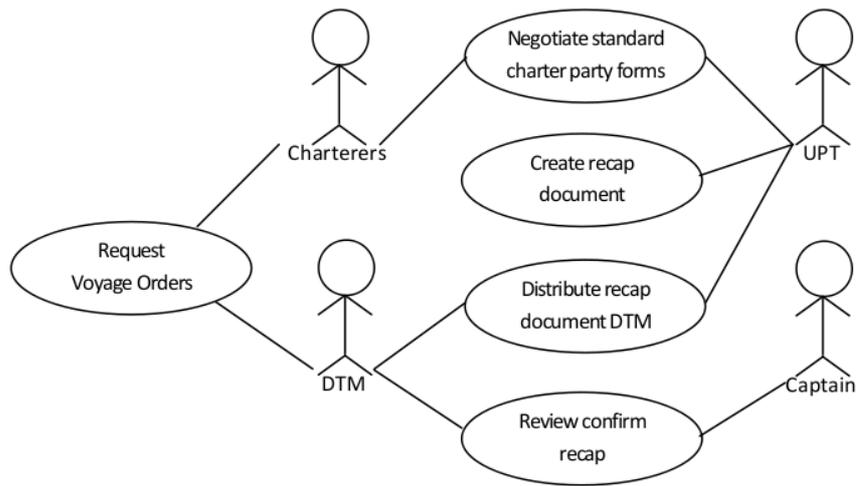


Figure 1: Formulation of the recap voyage document.

The second use-case scenario refers to the workflow process followed for the creation of the Proforma Disbursement Account (PDA). The PDA details the estimated port costs that the agent will have to pay for the vessel to have a smooth and quick turnaround at the port. For instance, the PDA will include harbour and pilot dues, towage expenses, mooring and un-mooring costs, garbage disposal etc.

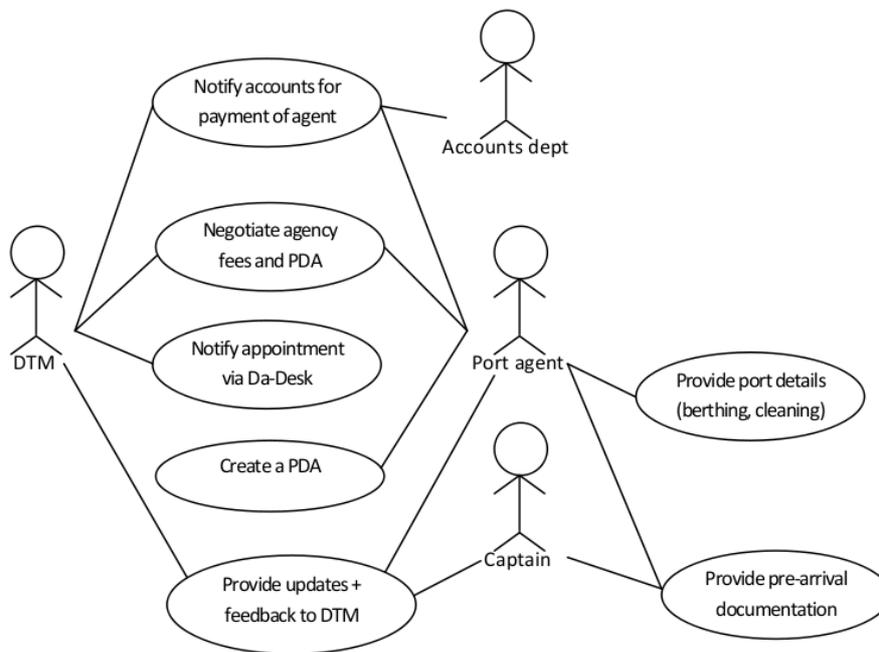


Figure 2: Creation and Settlement of the Proforma Disbursement Account

Figure 2 presents the UML-based use-case diagram, where DTM and the Port Agent negotiate the terms of the PDA. The port agent may be appointed by the ship owner (DTM) or by the charterer. If it was the charterer then the port agent will have been identified in the voyage orders. The main article up for negotiation between DTM and the port agent are the agency fees. As soon as agreement is reached, DTM uses the DA-Desk system to notify on the appointment of the specific agent and forwards the PDA to the vessel's captain. Once the PDA is finalised, DTM notifies its accounting department for settlement of the fees. The process continues with direct communication between the captain and the port agent for execution of the discharge and turn-around procedures at the destination port. It should be noted that this scenario can be applied to both loading and discharging procedures. Upon

completion of the process, the port agent sends the final disbursement account to DTM (PDA is an accurate estimate of costs). At this point DTM can close the voyage in Da-Desk.

## 5. Technology Description

The COIN service platform forms the backbone of the COIN project, integrating services for enterprise collaboration and interoperability. It fulfils the COIN objective of providing a pervasive service platform to host Baseline and Innovative COIN services for EI and EC, which can be used by European enterprises for running their business in a secure, reliable and efficient way. The platform is developed on top of the Liferay portal [4], [5], which is an enterprise-based web platform for building technology-oriented, business applications that deliver immediate results and long-term value. Using the COIN service platform we have implemented the business use-cases using the ProcessMaker application (i.e. business process management and workflow software) [6] offered within the platform. Through this application we are able to invoke the necessary Baseline and Innovative COIN services that allow executing the required business tasks for the specific use-cases.

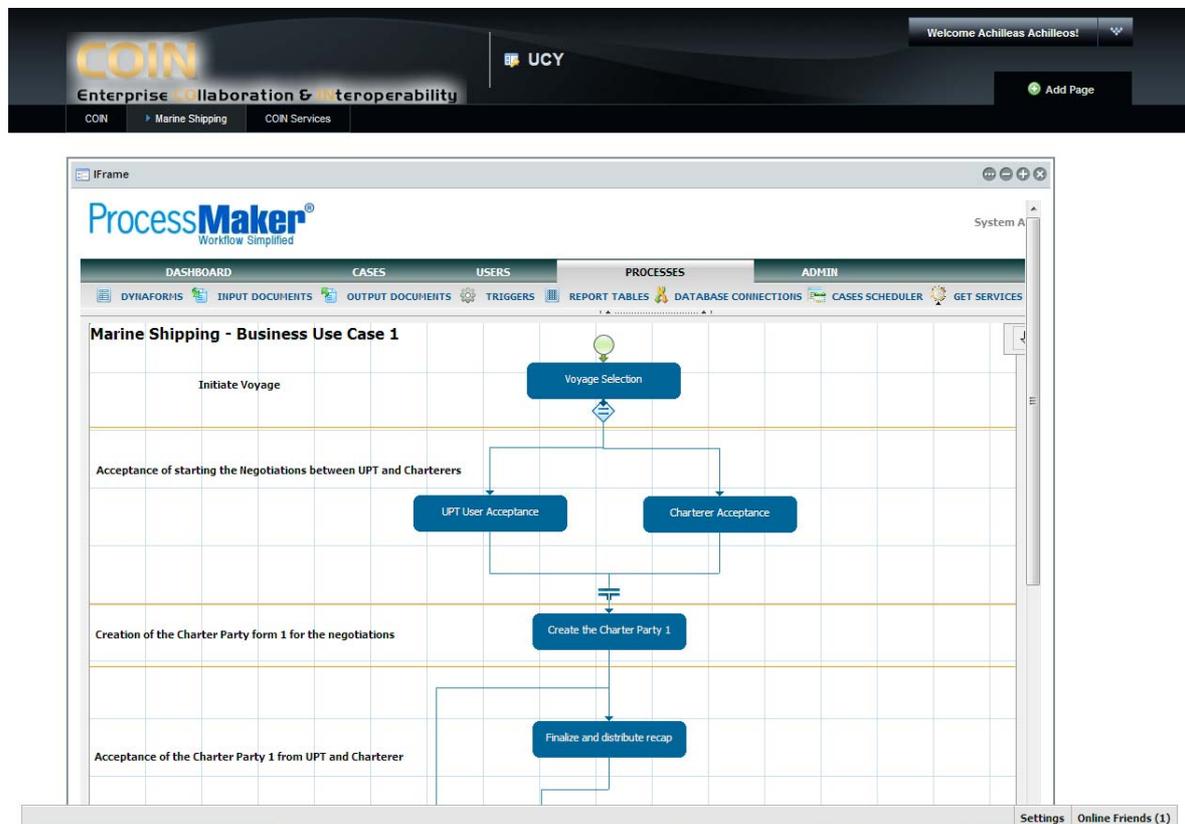


Figure 3: Workflow Process Definition of the Recap Document Business Use-Case

Figure 3 illustrates part of the formulated workflow process for the first business use-case that refers to the “Formulation of the recap voyage document”. As aforesaid, the business process is defined using the ProcessMaker application of the COIN platform, which allows creating, assigning and executing business tasks. These tasks (e.g. Voyage Selection) can be associated with forms, users and web service triggers (i.e. invoking COIN services), so as to carry out successfully business processes. For instance, the primary task shown in Figure 3 (i.e. Voyage Selection) is assigned to a DTM employee and is associated to the form shown in Figure 4. This enables a DTM employee to start a new business use-case (see Figure 4), as soon as a new voyage fixture arises and needs to be negotiated and decided. Figure 4 showcases actually that the assigned DTM employee acts a business use-case partner, rather than a developer, using though the same COIN service platform portal.

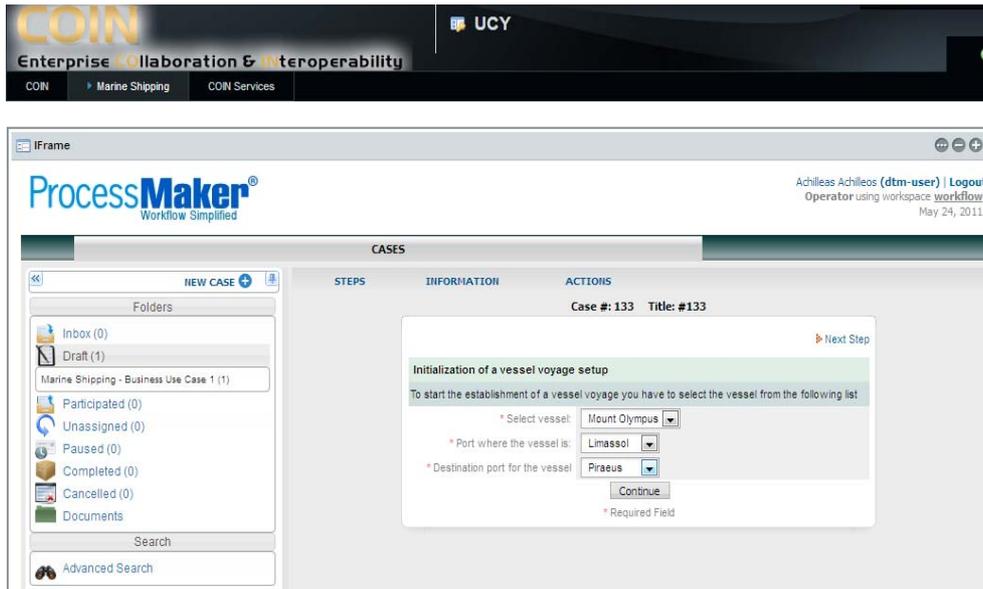


Figure 4: Running the Recap Document Business Use-Case

An important aspect is the definition of Web Service triggers and assignment of those triggers to tasks, so as to provide the capability to invoke and consume COIN services during the execution of the use-case. Each COIN service assists each user and simplifies the completion of his associated task. For instance, the Trusted Information Sharing (TIS) service (Figure 5) allows negotiating partners in the process to exchange information and business data (e.g. recap document) in a private and secure way [7]. Another example is the collection of COIN Baseline Communication Services, such as the Instant Messaging Service (IMS). This service allows the UPT user to notify the DTM operator about the finalisation of the recap document and inform that their input is required (i.e. next task – review recap and forward it to the vessel captain). The IMS service uses the Extensible Messaging and Presence Protocol (XMPP), which allows notification of user clients; using skype, sms and other instant messaging clients. In terms of implementation of the business use cases, the common issue faced is the necessity to gain knowledge of the COIN services functionality in order to be able to communicate and utilise the services.

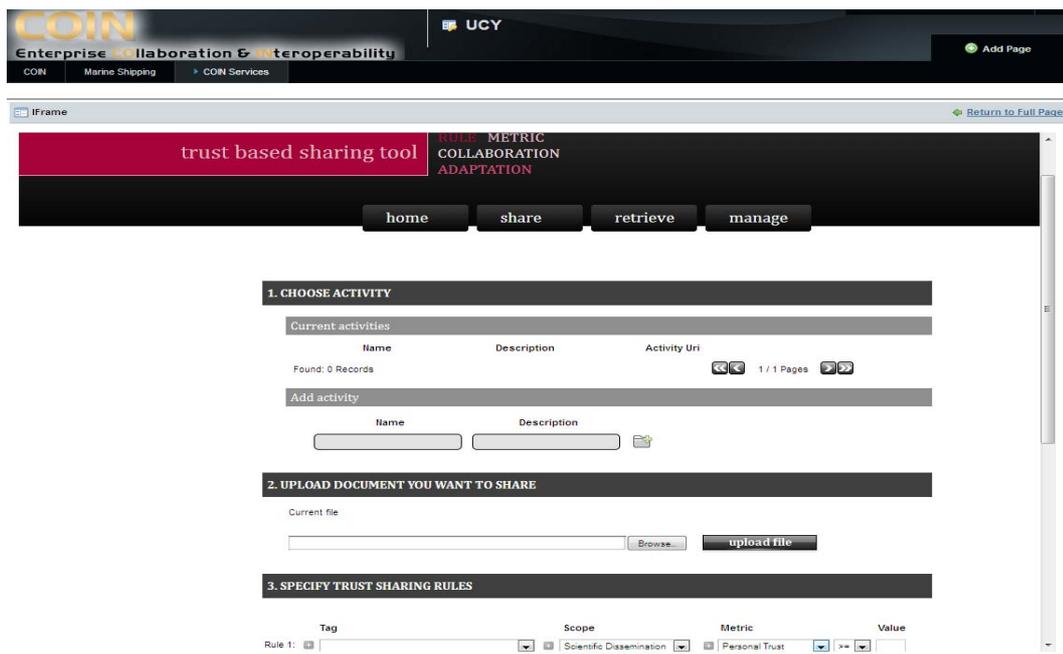


Figure 5: COIN Platform - Trusted Information Sharing (TIS) Service

Apart from the aforementioned example services, additional COIN services are used for the implementation of the two business use cases. The complete list of used services, selected from the pool of COIN services [8], is provided below with a brief description of their functionality. It is important to note that COIN services were selected after analysis of the use-cases with our domain experts; i.e. Donnelly Tanker Management.

- Collaboration Visualization Tool (CVT) – Formulation and visualization of human collaboration networks, including COIN business users and their discovered relations (e.g. based on prior joint activities).
- Trusted Information Sharing (TIS) – Flexible sharing of business related information and contextual data (e.g. documents) on the basis of the recorder CVT relations.
- Interoperability Space Service (ISS) – A negotiation software tool for exchanging and negotiating business documents in standardised UBL format.
- COIN EC Baseline Services – A suite of baseline communication services that include Skype call, instant messaging and notification services; see Figure 6.

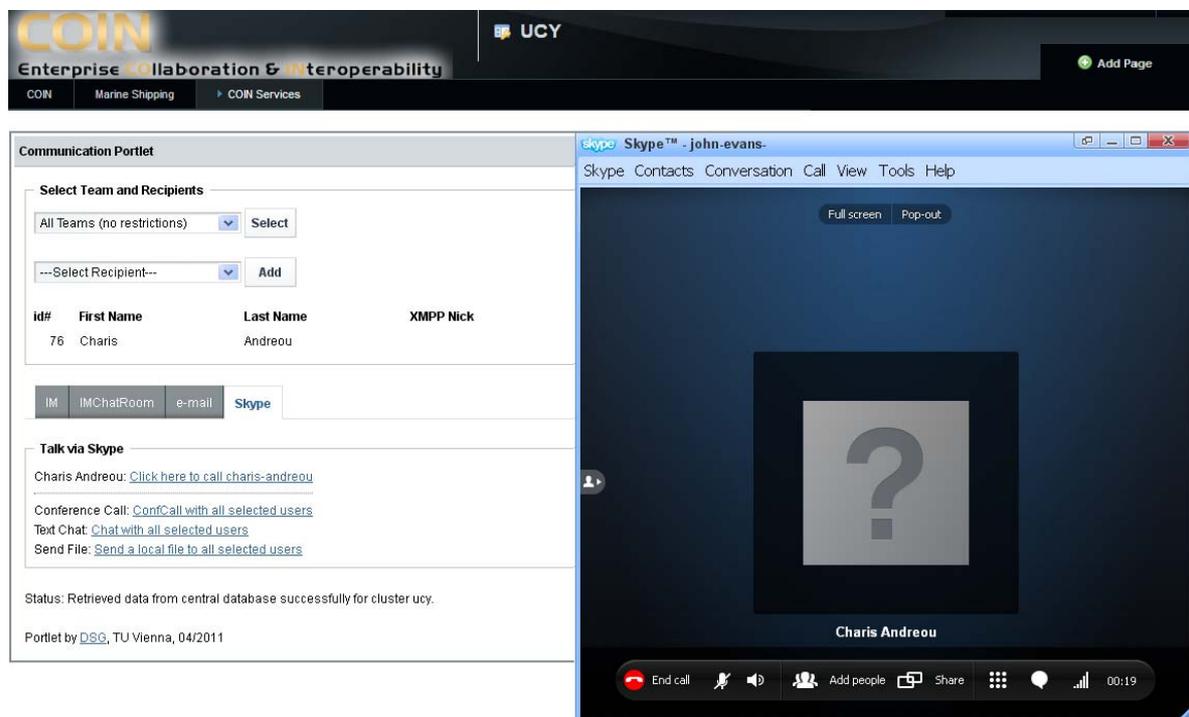


Figure 6: COIN Platform – Communicating with Partners Using the Skype Call Feature of Baseline Services

## 6. Preliminary Results

In this phase of the COIN sub-project 7 the development of the business use cases is being finalised, including analysis and evaluation of the used COIN services, by selecting relevant business indicators/metrics (see Section 7). Initial results obtained, from running and testing the use-cases with our industrial partners, revealed the added-value offered by the fact that all business tasks can be carried out effectively through the common COIN service platform. Also, reduced time for communication between parties was observed and acceleration in decision making. In fact, up to today, the business processes were carried out by our shipping partners using different ad-hoc facilities such as telephone, email, etc. Consequently, the ad-hoc nature of the business processes was creating in many occasions unexpected obstacles such as communication delays, non-efficient document exchange (e.g. documents send as email attachments), limited capabilities to coordinate different partners,

etc. Our immediate objective is to finalise the implementation of the business use-cases (i.e. pilots) and quantify the results according to the business indicators described next.

## **7. Business Benefits**

The business benefits provided by the COIN service platform, in terms of collaboration and interoperability, can be measured by identifying relevant business indicators. This allows measuring the changes and improvements in business process parameters, on the basis of the business indicators. Using the Value Reference Model (VRM) [9] and in accordance to the business scenarios, the appropriate business indicators were identified and selected that will assist the quantification of the results.

VRM supports key issues and gears together processes within and between individual units of business networks for the benefit of the following: (i) Planning, (ii) Governing and (iii) Execution (information - financial - physical flows); with the objective to increase the performance of the total chain and support evolution [9]. In particular, VRM employs a common, process-based language of syntax and semantics, which enables the successful application of SOA-enabled practices. On the basis of the VRM model we have identified the following business benefits, which will drive the selection and evaluation of precise metrics (e.g. velocity, cost) provided by the VRM model.

### *7.1 Reduction of Lead Time of New Cases/Projects*

One of the most important objectives in the maritime sector (or any other logistics sector for that matter) is fast decision making and quick reaction in overcoming any arising problems. Reducing the time for communication between the several parties involved in voyage establishment will ultimately lead to the more successful simultaneous management of multiple voyages through timely completion of individual tasks.

### *7.2 Improved Efficiency of Collaboration Processes*

The use of the workflow service in combination with all other EI and EC services can improve the collaboration process. Negotiations amongst various parties, communications, notifications and document collaboration services as part of the EI and EC services can contribute to that.

### *7.3 Reduce/Remove the Barriers to Geographically Distributed Team Work*

The management of ship voyages overlaps geographic barriers. Thus, vessels managed by DTM can be in different geographic locations. Also, charterers and brokers are located in any country of the world. Nevertheless, DTM has to be in continuous communication with the vessel, as well as the charterers and the brokers. In fact, DTM should be able to monitor negotiations between other parties that are not located at the same place.

### *7.4 Costs Reduction Due to Adoption of Interoperability*

Critical errors because of a lack of communication or delayed information can cause monetary loss (e.g. due to missed opportunities) and contribute as a result to an increase in expenses. The transfer of the overall expenses of a voyage must be an automatic procedure and not a manual process driven by human operators; as is currently the case.

## 8. Conclusions

The objective set out in this work (as partners in COIN SP7) is to apply the technological capabilities provided by the COIN service platform to the Cyprus marine shipping sector. Therefore, after initial study and analysis of the business processes undertaken by our industrial partners we have identified, defined and developed two business use-cases. These cases were built via the technology-based collaboration and interoperability features and services offered by the COIN platform. Preliminary pragmatic results were obtained, from the feedback received during the execution and testing of the pilots. These results establish (in a non-quantitative manner) the effectiveness of the COIN service platform in reducing the time and cost to execute processes in the marine shipping domain. Our immediate target is to finalise the case studies and build the final pilots, which will be used directly by our industrial partners, so as to quantify the results using the identified business indicators and their associated metrics. This will be done in an interactive way with the SMEs, in order to build on the feedback and the results acquired from the metrics-based evaluation. This will enable configuration of the COIN-based online portal (e.g. with additional COIN services) so as to serve marine processes within the enterprises network.

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