



## EFFECTIVE OPERATIONS IN PORTS (EFFORTS) A Model Based Approach for IT Projects

### CHALLENGE

To improve the competitiveness of European port operations, the EFFORTS project undertook a model-based approach to enhance traceability across all phases of IT systems development – from business analysis to system specification, design, implementation and testing.

### WHY ENTERPRISE ARCHITECT

*"Enterprise Architect provided excellent support of industry standards such as UML, and XML, while being easy to learn for both IT people and business experts. It also delivered the flexibility and adaptability needed to support specific profiles, such as UN/CEFACT's Modelling Methodology (UMM)."*

- Sven Mathes, Managing Director,  
NIELSEN+PARTNER

### BENEFIT

Visualising process, dependencies and interrelationships within Enterprise Architect made the existing processes at DPC highly transparent. This allowed the team to rapidly reach a common understanding of the problem domain, the scope of requirements and the specification of the target system.

Ports are complex facilities with many stakeholders whose business processes do not always match with others and whose individual information systems often differ. This inherent complexity can create a degree of fragmentation, causing lowered service levels and increased operational costs. In addition to the operational challenge, further pressure on IT systems development and maintenance is caused by legislation on security and customs, and ongoing change in customer requirements, port infrastructure and organization.

The aim of the "Effective Operations in Ports" ([EFFORTS](#)) project was to improve the competitiveness of European port operations and the quality of the ports labor conditions and market. A key aim of the project was to ensure a greater degree of consistency and continuity between IT systems specification, implementation, validation and rollout phases. Co-financed by the European Commission, EFFORTS was undertaken by a consortium of key players of the maritime industry from Europe, including technology developers, research institutions, consultancies and port authorities and operators.

### Feasibility Study: Automated Tracking of Vessel Manifest Data

An analysis of the manifest process at the Port of Dublin was carried out as a feasibility study within the framework of EFFORTS. The objective of this project was to specify a central service which links incoming manifest data against operational vessel movements, thus facilitating automatic status tracking of a vessel's manifest. A monitoring module would also allow automatic triggering of work flows in the case of missing or incomplete manifests. The project would also enable automatic data transmission to the Enterprise Resource Planning (ERP) system for invoice generation and provision of statistical data.

German IT consultant, NIELSEN+PARTNER, was a primary partner within EFFORTS and was responsible for developing a procedure model, which was specialised for IT integration projects within the port business.

## Defining a Roadmap for IT Integration Projects in Ports

The procedure model developed by NIELSEN+PARTNER provided a “roadmap”, or structured approach, for IT integration projects in the port business. The roadmap was defined using a model that allowed a seamless transition between different phases of the development cycle – in particular business analysis, detailed specification, system design, implementation and testing. The roadmap was based on a model of port processes, which can be used as “standard business cases” in order to solve concrete problems. Applying the roadmap thus enabled reuse, yielding faster development cycles and better quality of the results.

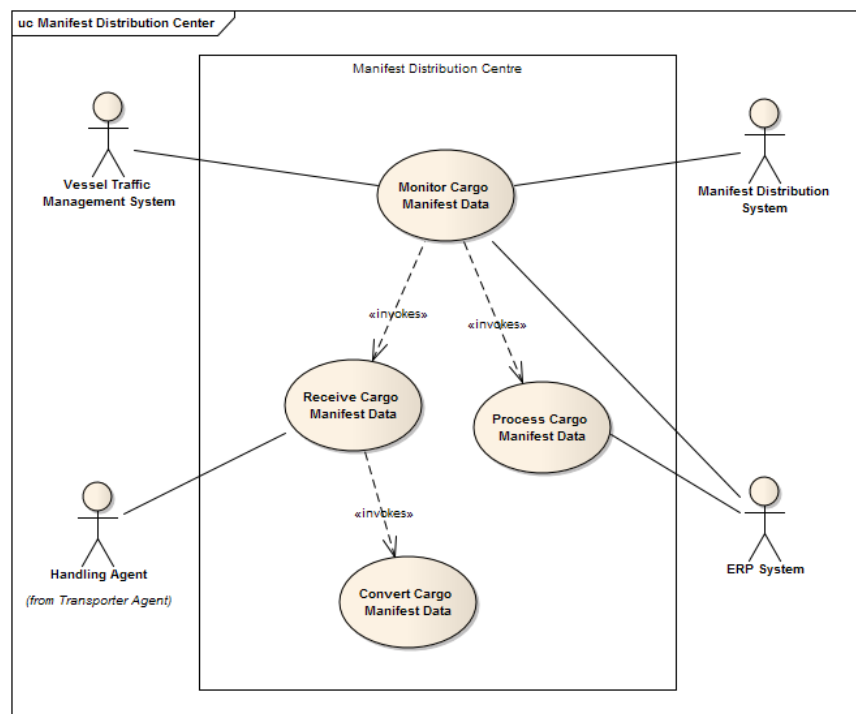
## Applying the Roadmap Model to Dublin Port Company

In order to demonstrate the feasibility and benefits of the roadmap model, the approach was applied to processing manifest data at Dublin Port Company (DPC). Several key objectives were defined for this pilot project:

- Address a real-world problem
- Involve realistic complexity, in terms of partners and interfaces
- The boundaries of the target system should be clearly defined

Manifests report the number and type of cargo or units loaded and discharged as well as the number of passengers and cars embarking and disembarking a vessel calling at a port. The manifest information used at DPC:

- Forms the basis for generating invoices for the port services provided
- Is used as the basis for statistical evaluations
- Supports processing of Dangerous Goods information



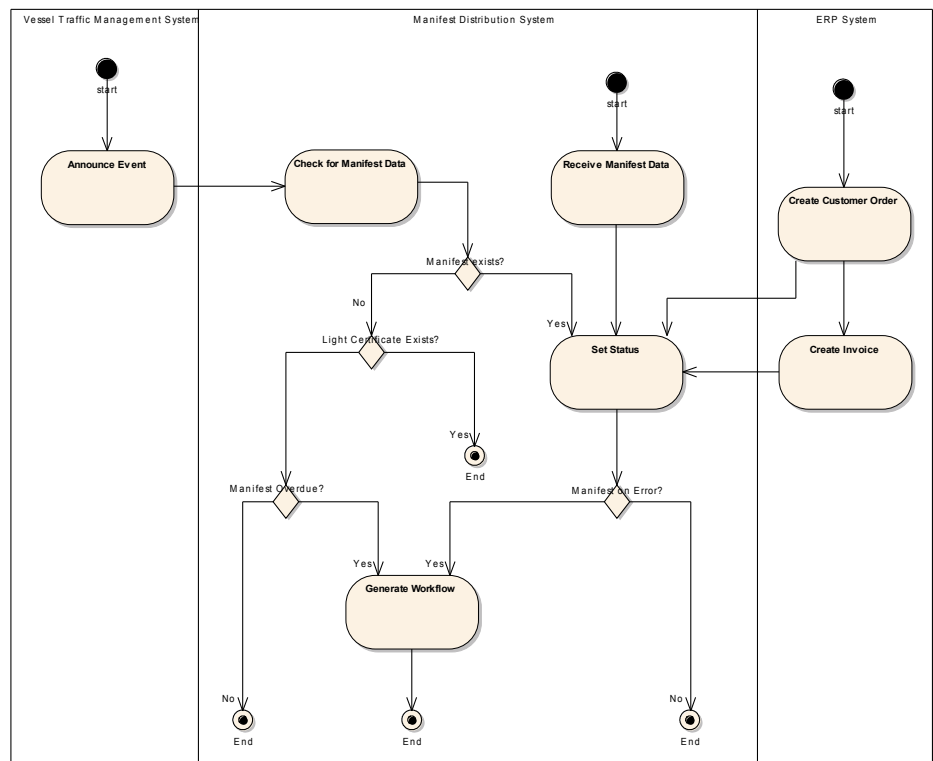
Major Use Cases of the proposed "Manifest Distribution Centre"

Today, manifest information is received from different cargo agents at the Port of Dublin via different channels in various formats. Operational information about vessel departures and arrivals is recorded via a Management Information System (MIS). Invoices and statistical data are processed in an ERP system. Analysing the current situation at the Port of Dublin, helped to identify the following problems:

- A large number of different interfaces to cargo agents existed
- There was no automatic exchange of information between processing of incoming manifests and recording of vessel arrivals and departures
- Absence of IT support for monitoring the status of manifest data
- No automatic transmission of manifest data into the ERP system
- No automatic work flow. For example, the handling of missing or incomplete manifest information involved manual processes.

## The Value of Visual Modelling with Enterprise Architect

The use of Enterprise Architect within EFFORTS was decided upon early in the project. The tool was selected due to its support of industry standards including UML and XMI, ease of use, and extensibility for supporting specific methodologies such as UN/CEFACT Modelling Methodology (UMM), on which the EFFORTS roadmap was implemented.

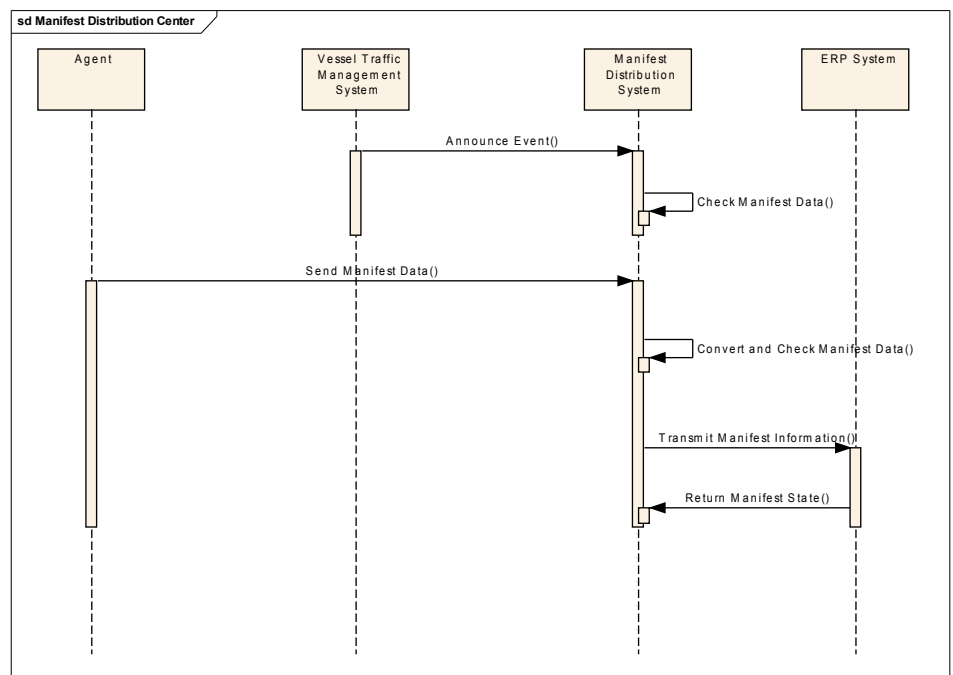


The "Monitor Cargo Manifest Data" Activity diagram in Enterprise Architect, shows how the major participants (Actors) interact to fulfill the process

A big challenge within EFFORTS was to make IT people and in particular, business experts, familiar with a model-based approach. Because Enterprise Architect was easy to learn and understand for both of these groups – who were not familiar with either the approach or the tool – little time was consumed by training and familiarization.

Furthermore, the very visual, and therefore tangible, approach of Enterprise Architect resulted in a transparent and well-understood implementation of the EFFORTS roadmap, which found wide acceptance by the stakeholders at the Port of Dublin. This in turn, enabled smooth communication between project co-ordination, IT and business experts. Necessary communication cycles could thus be reduced to a minimum.

The model based approach developed within EFFORTS – consisting of a standard process model and an individual project specification model – could be integrated into Enterprise Architect seamlessly. In this sense, the pilot verified that the EFFORTS roadmap and its implementation in Enterprise Architect ensure seamless flow between the different phases of a complex IT integration project.



UML Sequence Diagram showing the interfaces involved in the "Manifest Distribution Centre"

## Maximizing Traceability and Model Interoperability

By using an Enterprise Architect 'Base Project', it was straightforward to transfer the EFFORTS roadmap to the DPC pilot project. The different phases of the roadmap were implemented as UML Packages, which are well suited to the structural nature of the roadmap. Beyond implementation of the roadmap, a key challenge was to import the standard business cases developed within EFFORTS, which were created in a process modelling tool other than Enterprise Architect.

By using the XML Meta-data Interchange (XMI) format – a standard specifically designed to enable exchange of model information and interoperability between modeling tools – the business cases were successfully imported into Enterprise Architect. This provided maximum traceability from the abstract business cases to the roadmap implementation.

## Conclusion

The objective of EFFORTS was to develop a model based approach for IT projects in the port business. The results of the pilot project at the Port of Dublin were especially useful in validating the benefits of the EFFORTS roadmap approach. This approach will be incorporated into the service products offered by NIELSEN+PARTNER, especially for maritime transport. DPC in turn, will continue improvement of their IT systems based on the results of EFFORTS.

The methodology, which is especially advantageous for small and medium sized ports, and the process model can be used as a basis for documentation and analysis when standards such as ISO 9001, ISO 14000, ISO 28005-2 or ISPS code will be implemented in each port. It also plays important roles when developing Key Performance Indicators (KPIs), benchmarking or implementing the best practices.



## About NIELSEN + PARTNER

NIELSEN+PARTNER Unternehmensberater GmbH ([www.nundp.com](http://www.nundp.com)) is an IT consultant located in Hamburg/Germany focussing on the industrial sectors Transport/Logistics and Finance. Major fields are conception/design, implementation, and deployment of IT solutions including necessary migrations from current systems. The main focus thereby is on application integration/electronic data interchange (EDI) as well as development of individual software components. The company has 42 employees in total. Last year, N+P generated a total turnover of 5.4 million Euro, 1.2 million of that realised by the subsidiary NIELSEN+PARTNER Unternehmensberater AG located in Zurich/Switzerland.

## About Dublin Port Company

Dublin Port Company is a self-financing, private limited company wholly-owned by the State, whose business is to manage Dublin Port, Ireland's premier port. Established as a corporate entity in 1997, Dublin Port Company is responsible for the management, control, operation and development of the port. Dublin Port Company provides facilities, services, accommodation and lands in the harbour for ships, goods and passengers. The company currently employs more than 150 people.



## About Sparx Systems

Sparx Systems ([www.sparxsystems.com](http://www.sparxsystems.com)) specializes in high performance and scalable visual modeling tools for planning, designing and constructing software intensive systems.

With customers in industries ranging from aerospace and automotive engineering to finance, defense, government, entertainment and telecommunications, Sparx Systems is a leading vendor of innovative solutions based on the Unified Modeling Language (UML) and its related specifications. A Contributing Member of the Object Management Group (OMG), Sparx Systems is committed to realizing the potential of model-driven development based on open standards.

The company's flagship product, Enterprise Architect, has received numerous accolades since its commercial release in August, 2000. Now at version 7.5, Enterprise Architect is the design tool of choice for close to 200,000 registered users world-wide.