ICT Transport & Logistics
For Smarter Container Terminals
1 Introduction

1.1 ICT Group

ICT Group (ICT) offers high level technical solutions in information and communication technology for several functional areas. ICT is active as system integrator in the Netherlands, Germany and Bulgaria.

The services provided by ICT are focussed on projects for the realization of system solutions, maintenance of IT systems and secondment of highly educated and skilled staff.

Market-oriented approach via specific market sectors ICT Group focuses on the technically oriented software development market. To serve this specialist market optimally, ICT concentrates on a selected number of markets. ICT approaches these markets via business units. The company focuses on specific market sectors through the following business units:
1.2 Container transport

The transportation of goods in (standardized) containers has shown a massive growth over the years worldwide and is still expanding. Modern container terminals build the bridge between the different modalities which are used in today’s container transportation. Loading and unloading equipment is combined with storage areas in order to link different types of transportation to each other. The modal-split, the relative expected volumes for each of the modalities, determine the design of modern container terminals. Advanced Terminal Management software is needed to make an efficient and cost-effective operation possible.

Mainports are playing an important role in the logistic operations in the Netherlands. Several leading players in container handling in Rotterdam have their operational processes running on high levels of innovative automation.

The high volumes of container to be handled in the largest port of Europe can only be realized with the sophisticated tooling and IT systems for Terminal Control and Equipment Control as they are used today.

From the beginning years of its founding, ICT Group has played an important role in making this mainport terminals work, smarter and profitable as they are known now all over the world.

The products and gained experience for mainport container terminals in Rotterdam can be used to give your main or inland terminal that same boost as well.

1.3 Container terminal automation

Every container terminal has a type of a Terminal Operation System (TOS) and/or Enterprise Resourcing Planning (ERP) that takes care of the basics of the operations and financials. But it takes more to make an terminal efficient and to perform a modern way of interacting with all stakeholders.

Modern equipment is fully automated with PLC’s and monitoring systems. Customs demands information and release containers for in- and export. An internet e-Portal is necessary for order entry and tracking and tracing of vessels and containers.

For automated terminals a process control system will be in place to control AGV’s and ASC’s.

ICT Group has knowledge and experience on above systems and can integrate, optimize all this applications to get an efficient operating terminal which provide the necessary information to all her stakeholders.
ICT Logistics integrates and add new services to the standard applications to optimize and visualise the terminal operations.

2 Container terminal solutions of ICT Group

The ICT Group is involved in developing the planning and control software, customs services and the E-services for all stakeholders since 1991 and is with well over 30 employees specialized in software development, maintenance and support of Container Terminals. Our enthusiastic employees have gained domain expertise since the start of Container Terminal operations and vast IT experience.

2.1 E-Services

The ICT Group has developed a lot of webportals for all kind of markets and particular for the container terminal market. ICT has not only the technical knowledge but also the domain knowledge to develop advanced E-Portals for container terminals.

RWGServices

ICT has developed the E-Services portal for the RWG Containerterminal on Maasvlakte II Rotterdam. This Portal is built with the latest Web technologies and is suitable for Cloud and On Premise hosting. It works seamless with the Navis N4 TOS system and the current RTO system from Infosys.

You can see the public part of it on: https://rwgservices.rwg.nl/
Behind the login there are a number of services available, such as:

- All kind of performance reports including TPDR reports. Those reports are generated/composed by our software from the N4 database and can be viewed and downloaded in various formats.
- Customs reports
- Mail groups for automatically periodically distribute reports such as hazardous goods
- Blocking/unblocking containers
- Extended user management, with delegate functionality. A shipping company can manage their own users and authorizations.
- Content Management (news, messages) for the portal as well for the app. This content can include pictures, films etc.
- Management damaged container photo’s
The portal is supported by a great App for iOS, Android and Windows Phone.

This app displays news (for instance: gate times, maintenance slots etc.) that can be managed in the portal and of course actual information about ships, trains and containers. Through push notifications users are instantly alerted when there is new content or changes in arrival times and subscribed containers.

**E-Services ECT**

ICT has developed the Internet- and Intranet web sites for ECT. The Internet and Intranet and closely integrated and linked to each other; even the styles for Internet and Intranet correspond.

ICT has used a service oriented architecture (SOA) approach to improve security of the system and to make is scalable. This ECT e-Portal interfaces with a lot of internal legacy systems and existing webpages. The Microsoft BizTalk and Sharepoint products are used as backbone within the ECT e-Portal.
The Internet web site is equipped with many links and portal functionalities to expose information on containers and transport objects from the operational terminal control systems to the other stakeholders in the supply chain.

This platform is also used to realize services to support “hinterland” initiatives that offers shipping lines, forwarders, shippers and transport companies a comprehensive range of services for the fast, safe and efficient transportation of containers between the deep-sea terminals and the European hinterland and the last mile.

Barge

ICT have also developed an app for barge skippers to centralize all necessary information (cockpit) of the next call, fuel consumption, weather information and shipping messages from local authorities.

Customs

Goods that are intended to leave the customs territory remain under Customs supervision until they can leave. The Export Control System (ECS) is a system deployed by Customs to exercise supervision. ECS allows Customs to determine whether the goods declared for export or re-export
have actually departed from the European Union. This is done through electronic exchange of information between offices of export and offices of exit.

The office of exit is informed of the arrival of the goods: notification of arrival. Europe Container Terminal (ECT) has the role of Trader at Exit (TaE). The TaE sends to the office of exit an electronic message that the goods have arrived. The office of exit will inform the TaE whether the goods can be exported, by sending electronic accept or reject message. Goods can be subjected to inspection each time they are presented to Customs. The TaE is informed of this inspection by an electronic message.

To fulfill the role of TaE, ECT needed software to be able to send the notification of arrival and to block and release (unblock) containers with ECS goods in their Terminal Operating Systems (TOS) on several terminals. A TOS will automatically prevent a container from being exported as long as the container is blocked. ICT Group has developed this software, called ECT ECS. The software acts as a messagebroker between the TOS on several terminals of ECT and the customs and contains all functionality to decide automatically which containers must be blocked and released. ICT has developed this system for ECT.

The ECT ECS has a web based user interface which operators of ECT can use to monitor all data and status of all ecs export containers and to solve mismatches between electronic received MRN and container numbers and container visits in TOS.
2.2 Process Control

A Process Control System is designed for high throughput automated container terminals, equipped with ASC’s and AGV’s, combined with manned equipment. Operations are based on the logistical decoupling of waterside container flows and landside container flows. Containers are stored in an automated stack.

AGV’s are routed automatically by PCS for optimal performance of the Ship to shore operation. ASC’s operations and stack usage are automatically optimized to support STS and AGV operations at waterside and to serve SC’s operations at landside. Operators can use an extensive set of screens and functions to configure and influence the execution of the container handling process.

The main critical success factor for the PCS performance is the optimized support for the STS operation. PCS controls operations to remove containers from the STS area when the STS is unloading the ship, and to supply the requested containers in time for ship loading operations. “STS cranes must never have to wait”.

The main functions of PCS are:
- Split container movements in subsequent movements of equipment which is available for operation
- Planning in time of container movements
- Work load distribution within each type of equipment and usage of equipment given the planned work
- Control and adjustments in case of problems, errors, changing of plans or operator interaction
- Achieve maximum terminal performance
- Monitoring equipment and progress

The PCS product is a result of years of cooperation and innovation between ECT and ICT.
2.3 Equipment Control

(Automated) terminal operation can be achieved by using high effective, efficient container handling equipment, such as:

- STS - Ship to shore cranes
- AGV’s - Automated Guided Vehicles
- ASC’s - Automated Stacking Cranes
- SC’s - Straddle Carriers
- TT’s - Terminal Trucks
- MTS - Multi Trailer System
- RC - Rail Cranes

ICT brings in a lot of experience in automated equipment control.

Europe Combined Terminals (ECT) at Maasvlakte Rotterdam was one of the first container terminals using high tech automated equipment, such as Automated Guided Vehicles (AGV's) and Automated Stacking Cranes (ASC's).

Automated Stack Cranes

ICT Engineers were involved in the very first conceptual fase of development of the ASC’s concept. They were also responsible for the design, software development, testing and commissioning of the ASC's at DDE (Delta Dedicated East) terminal of ECT Delta Container Terminal at Maasvlakte, Rotterdam.

Based on Siemens Programmable Logic Controller S5 system, logic control and continuous control was developed and tested to enable fast and reliable operations at DDE Terminal.

Equipment control of the Automated Stacking Cranes consists of:

- Low level safety control
- ASC positioning control, using RF transponders
- Crane X,Y,Z movements control
- Spreader control
- Automated Drive Control switchover, enabling three axis movements using two AC drives only
- Twin movements control, enabling the step-by-step movement with seamless switchover from one axis to two axis movement at the same time to gain speed
- AC drive S-curve setpoint control, enabling fast speed up and slow down keeping acceleration and mechanical strain at a constant level
- Automated and manual operation
- Interfacing to PCS Terminal Process Control System (TOS)

**Quay cranes and other equipment**

At the ECT Euromax terminal ICT has worked on the specification of the equipment interfaces with the TOS system of quay cranes, and ASC’s. The quay cranes and ASC’s at Euromax are automated by ABB software and are highly automated. By specifying the interface a thorough knowledge of both equipment software and TOS system was gained.

ICT has played an important role at Euromax with:
- acceptance test of ASC and quay crane
- integration test of equipment with TOS
- integration test of TOS with automatic fuel station (fueling of AGV’s is an unmanned process at Euromax)

For APMT ICT is involved in the testing of the equipment for the new terminal on Maasvlakte 2 in the Netherlands.

**2.4 Consultancy**

In the past decades ICT Group has been involved in a number of consultancy and commission projects. Examples are:
- Description of business processes
- Consultancy and configuration of TOS systems
- Training of terminal operating system (TOS) users
- Requirement specification of TOS
- Acceptance testing TOS systems
- Project leader of implementation of external truck process
- Interface of process control system with equipment (AGV, quay cranes, ASC)
- Requirement specification of process control system
- Testing equipment
- Acceptance testing of process control system
- Testmanager implementation TOS upgrade
- Acceptance testing equipment software
• Project leader of implementation of second trolley of quay crane
• Integration test of TOS with automatic fuel station (fueling of AGV’s is an unmanned process at Euromax)

3 Managed Service

Container terminals are operational for 24/7 hours and most of the IT systems are vital for the terminal operations. A reliable service partner is then necessary for assure continue availability of the IT systems. Also software is always prone to modifications, because of either failures or enhancements.

ICT has proven the for many years to be a reliable partner, not only for development, but also for service.

ICT has a Service Department with extended experience in:
• ITIL, ASL processes (incident management, problem management, etc.)
• Life Cycle Management;
• Supporting 'Third Party' Software;
• Keeping up with technologic trends;

ICT service offers its services under the name 'Managed Services services. As framework we use the Application Services Library (ASL). This is a framework of processes focused on the management, maintenance and renewal of applications and information systems. ASL has three levels:
• Operational: the (normal) management software and adaptive and corrective maintenance and renewal applications.
• Tactical: the coordination of the work.
• Strategic: to provide direction for the (service) organization and the future of information systems that support the business processes of the user organization based on developments in the area.

ICT has its Managed Service services prepared in accordance to a scalable model. You can choose from four levels of services: Bronze, Silver, Gold and Platinum. Depending of the nature and importance of the application you can choose a basic Bronze service or a 24/7 with guaranteed response time “Gold” service.

ICT has for instance managed serviced contracts from ECT, RWG and APMT.
4 References

All the above-mentioned items we have put to practice at our customers in the logistic area, amounting up to a yearly turnover of 15 million Euro’s:

- Europe Container Terminals
- APMT Rotterdam
- APMT 2e Maasvlakte
- Container Terminal Twente (CTT)
- RWG
- Portbase
- Secure Logistics (CargoCard)
- EMO Bulk Terminal Maasvlakte Rotterdam
- Dutch Railways ProRail
- Amsterdam Airport (Schiphol).
- Vanderlande Industries
- PostNL
- DHL Express Benelux
- TNT Group
- Corus (Tata) Steel
- Philips
- ASML
- and many more ...

For more information about Container Terminal solutions provided by ICT Group, please feel free to contact:

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