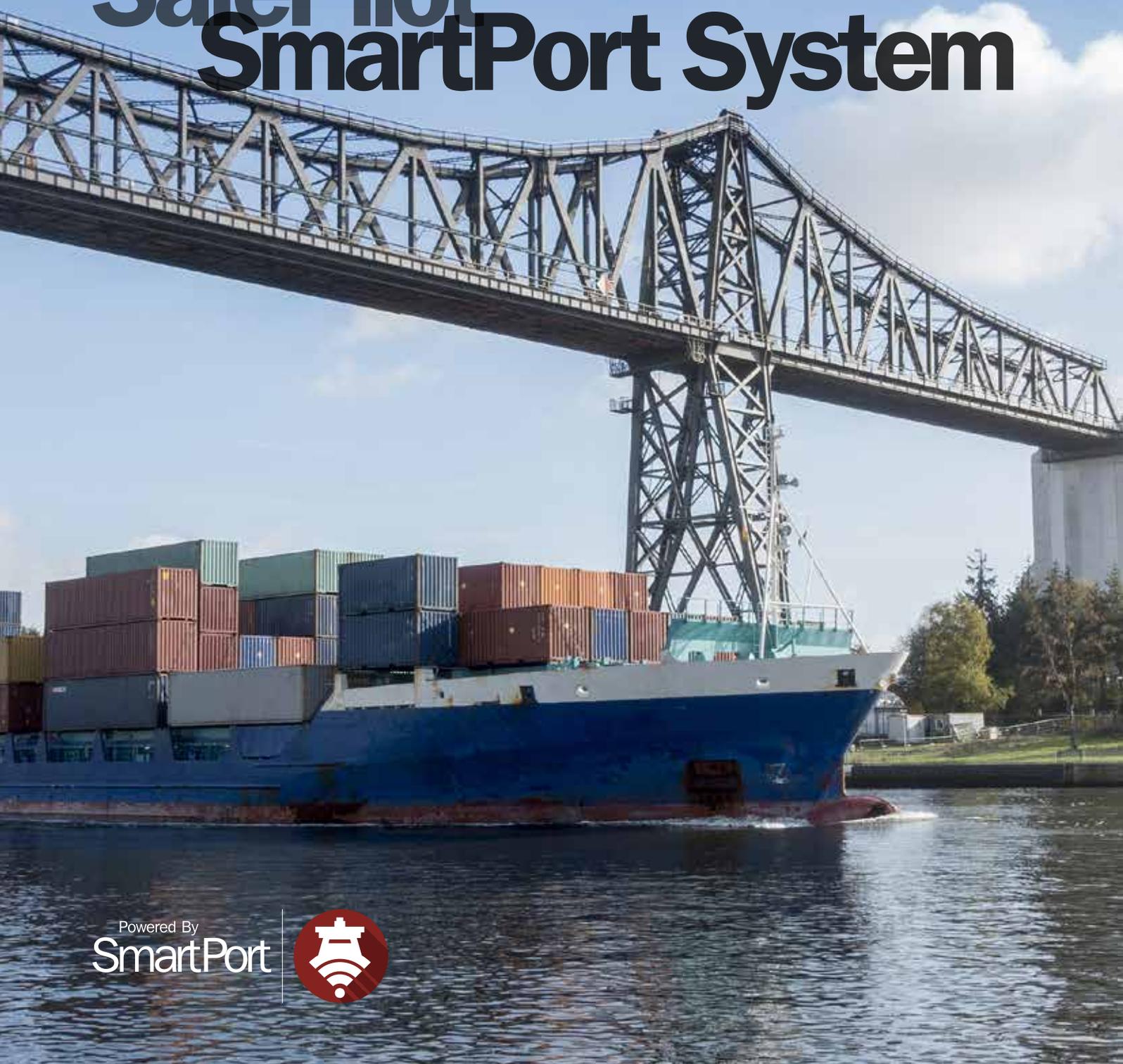




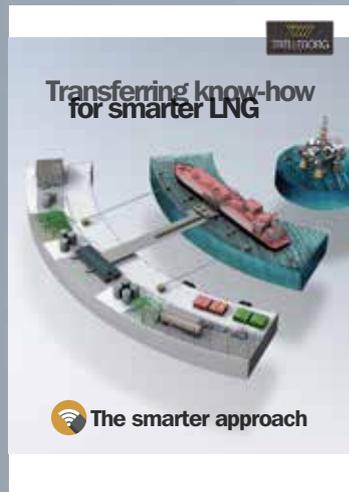
# SafePilot SmartPort System



Powered By  
**SmartPort**



# The Smarter Approach



## Connect with The Smarter Approach

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**Better connected systems mean faster turnaround and increased throughput, improved safety and lower operating costs.**

Connecting decades of experience with a new, smarter approach to port and terminal equipment optimization, Trelleborg's marine systems operation helps ports and terminals deploy smart, engineered solutions for port approach, berthing, docking and mooring. This enables better informed real-time and strategic decision making, both onshore and on board the vessel.

From port owners and operators to consulting engineers, Trelleborg works with customers to determine best fit solutions for specific applications, and supply a fully integrated solution. End-to-end service and a comprehensive product portfolio meet and exceed customer needs, enhancing safety and improving efficiency in all marine environments, from conception to completion and beyond.

# SafePilot SmartPort System

**Trelleborg is a world leader in the design and manufacture of advanced, high accuracy piloting and navigation solutions for offshore and pilotage applications. SafePilot is our flagship product within the category.**

This new generation of navigation and piloting software is designed by a dedicated team of software programmers working closely together with worldwide working pilots.

The result is the most professional and user friendly PPU (Portable Pilot Unit) software. A touch screen interface allows quick interaction to make piloting smoother. The instant zoom function and new intelligent chart structure improves response and decision-making times, giving pilots greater control and accuracy in maneuver.

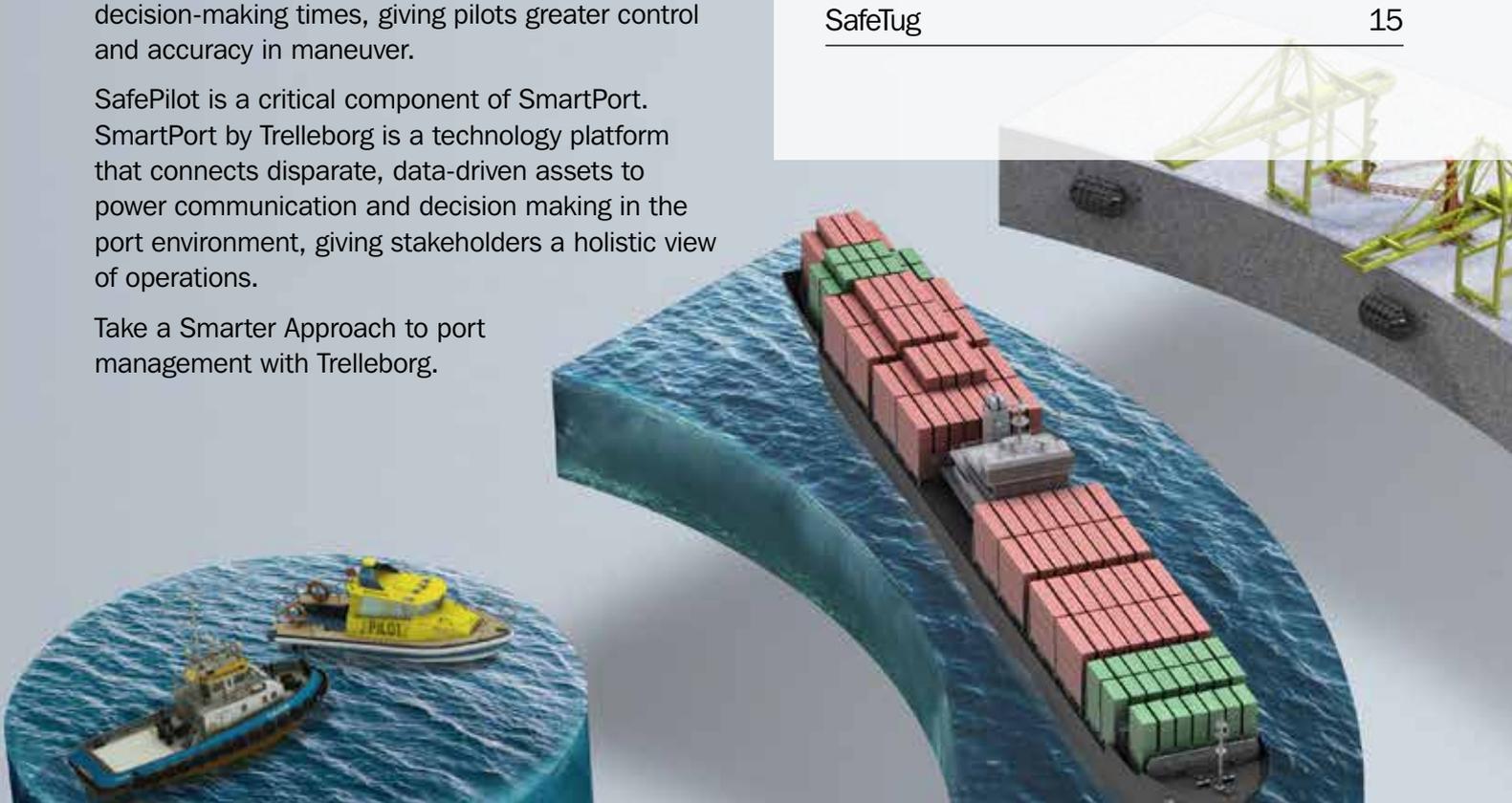
SafePilot is a critical component of SmartPort. SmartPort by Trelleborg is a technology platform that connects disparate, data-driven assets to power communication and decision making in the port environment, giving stakeholders a holistic view of operations.

Take a Smarter Approach to port management with Trelleborg.

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# A Smarter Approach at every stage

## A smarter approach to...

### CONSULTATION

Consultation from the earliest project phase to ensure the optimum fender, mooring, navigation and transfer solutions are specified, with full technical support from our global offices.



### CONCEPTS

Conceptual design in your local office – with full knowledge of local standards and regulations, delivered in your language – for optimized port and vessel solutions.



### DESIGN

Concepts are taken to our Engineering Centers of Excellence where our team generates 3D CAD designs, application-engineering drawings, a bill of materials, finite engineering analyses and calculations for both our fender systems and marine technology solutions.



### MANUFACTURE

Our entire product range is manufactured in-house, meaning we have full control over the design and quality of everything we produce. Our strategically located, state-of-the-art facilities ensure our global, industry leading manufacturing capability.



### TESTING

Across our entire product range, stringent testing comes as standard at every step in our in-house manufacturing process. We ensure that life-cycle and performance of our entire product range meets your specifications, and more.



### INSTALLATION

Dedicated project management, from solution design right the way through to on-site installation support. We design products and solutions that always consider ease of installation and future maintenance requirements.



### SUPPORT

Local support on a truly global scale, with customer support teams all over the world. And this service doesn't stop after a product is installed. You have our full support throughout the entire lifetime of your project, including customized training programs, maintenance and on-site service and support.



### THE FUTURE

Deploying the latest in smart technologies to enable fully automated, data-driven decision making that optimizes port and terminal efficiency. At Trelleborg, we're constantly evolving to provide the digital infrastructure our industry increasingly needs.



**When you choose Trelleborg you ensure your expectations will be met, because we deliver a truly end-to-end service – retaining vigilance and full control at every stage.**

# SafePilot SmartPort System



**The manufacturing industry has been running advanced production management systems for years. Now, the port and pilot business is ready to achieve the same huge benefits with the intelligent SmartPort System from Trelleborg Marine Systems. Our commitment to help pilots and ports to optimize safety, efficiency and transparency in the operations has ignited the concept behind SafePilot.**

# Unique Benefits

The new SmartPort System offers unique benefits to ports and pilots such as:

## INCREASED SAFETY

- Supporting communication visually for elimination of misunderstandings.
- Pilot has real time access to all information of value e.g. schedules, sensors or other players e.g. tug boats directly from the pilot display.
- Enhanced situational awareness between vessel, port, tugs and pilots reducing near misses, incidents and accidents.
- Interactive emergency assistance e.g. as assigned validated corridor.

## STREAMLINED ADMINISTRATION

- Documents such as Master-Pilot exchange form are automatically synchronized to administrative systems as soon as it is signed by the captain for immediate billing.
- Automatic sign on/off for optimized planning of resources.
- Optimal management of pilot resources on duty e.g. taking timely renewal of area certificate and general experience into account.

## CONSIDERABLY COST SAVING

- Safer and efficient operations due to added transparency between all players involved.
- Minimizing down time of port facilities due to reduced incidents and delays.
- Lesser and quicker administration due to automatic functions.

## A PILOT COLLABORATION TOOL

- Personal folder with automatic back up for easy restoring of lost device.
- Pilot community for knowledge sharing such as: Shared vessel database with ship details, notes and observations, shared routes, fender lines, no-go areas, etc.
- Automatic updates of charts and survey data.
- Real-time exchange of vessel movement and prediction.

## MODULAR BASED TO INDIVIDUAL NEEDS

- Multiple integration options for individual port requirements.
- Scalable from a basic PPU (Portable Pilot Unit) solution to a full port management system.
- Custom designed modules available for specific port requirements.

# SmartPort Configuration



**The SmartPort System combine pilot operation and port administration with all services needed for efficient piloting and port management. All port and pilot functions, data and schedules are linked together enabling full transparency, information sharing and live access to all relevant information with a touch of a finger at the right time to the right staff – and in real time.**

## **The SmartPort System consists of the following elements**

- SafePilot PPU
- SmartPort Engine
- SmartPort Engine Services
- SafePilot Shore Viewer
- SafeTug

SmartPort System is designed with a variety of modules that can be configured to suit any requirements from pilot to port operation. This ranges from a basic pilot PPU solution to a full blown SmartPort solution putting pilots, ports, and ship owners on the same page.

## **SAFEPILOT PPU**

The SafePilot PPU is an "all in one" toolbox for the pilot supporting all functions of the pilot from navigation, information exchange to administrative tasks. SafePilot provides the pilot with the necessary real-time information directly on the display for improved situational awareness and efficiency. Furthermore the SafePilot system provides added overview of the waterway as an important part of the SafePilot system is making information sharing easy and simple.

## **SMARTPORT ENGINE**

The SmartPort Engine is the brain of the system synchronizing data between pilot, port and subsystems. It is an advanced server set-up that gathers, structures, stores and communicates data in real-time. Recordings of all operations can be stored and pilot devices backed up in the SmartPort Engine.

## **SAFEPILOT SHORE (VIEWER)**

The SmartPort system offers the personnel within the port, an overview of all port and piloting operations by intelligently integrating relevant schedules and systems. Starting from simple real-time traffic overview based on AIS to remote monitoring and electronic interactions with the pilots on duty. This can be sharing of annotations, warnings or even validated corridors and passage plans etc. Furthermore, all administrative information from the pilot can be directly accessible electronically for the port staff, saving cost and time on the administrative processes.

## **SMARTPORT ENGINE SERVICES**

For a safe and efficient pilotage and port operation, information from various instruments, sources and systems are essential. By giving pilots as well as port personnel real-time access to relevant information and automatic interaction they can act instantly and make their decisions based on a complete understanding of the situation. The services available with SafePilot are extensive. This can be everything from simple AIS and meteorological data to comprehensive integration of administrative systems as e.g. automatic billing system.

- Weather (EMS), water level, height of tide, current speed and direction, wind direction and speed with average, present and peaks
- Weather forecast
- VTS, radar targets, AIS targets
- Chart management with automatic updating of ENC/bENC
- Differential corrections
- Vessel schedule
- Pilot rotation schedule
- Internet services
- Local sensors
- Administrative systems
- Electronic Master Pilot exchange form
- Shared vessel database with community

# SafePilot System



**The real-time information sharing capability of the SmartPort System provides both administrative and operational efficiency gains.**

**Its customizable nature provides a unique, flexible, sustainable and scalable solution to meet the challenge of the ports' future expansion.**

The SmartPort System can be configured to the requirements of each individual port either with a wide range of standard systems and modules and/or integrating customer specific modules. Furthermore, the SmartPort System can be expanded from a basic pilot PPU system to a full-blown pilot and port management system integrating almost all functions of a modern port operation.



## SafePilot PPU

SafePilot PPU is the pilot's tool box supporting all tasks from navigation to administrative duties. The PPU consists of a light weight CAT antenna and a pilot display with SafePilot PPU software and access to all relevant data via 3G/4G link to the SafePilot Engine.

The SafePilot PPU software is designed in contexts in order to be as simple, and intuitive to use as possible. A clear and simple display minimizes the risk of information overload and information of importance being overlooked.

The SafePilot PPU is designed to encourage sharing of information as passage planning, local conditions and intentions for the pilotage all with the purpose to ease communication, avoid misunderstandings, overcome language boundaries and provide full transparency of the operations and intentions between captain, pilot, tug and port personnel. With the overall purpose to enhance situational awareness!



## MANDATORY MODULE

- Pro Navigation - The mandatory module with general navigation data and features such as planning, route, arrival times, recordings, charts handling, predictions and history. The Pro Navigation module furthermore features support of external navigational data source (PPU), distance lines, safety contours, no go areas, CPA and TCPA and simulation tool of port maneuvers for e.g. passage planning or training purposes.

## OPTIONAL MODULES

- Docking – module with enhanced features such as shoulder distance to fender lines, docking display, transverse speed, berthing angle, etc.
- Lock – module with functions such as alignment guidance for lock approach and departure, distances towards lock gates fore and aft, status of lock gates (open/closed) through sensors integration via server, distances to lock walls from vessel shoulders fore and aft.
- River – module with quick jump between multiple locations of interest, meeting point with time (relative to route), drag meeting point with required speed info.
- Client / Server – module connection to the SafePilot Engine providing real time access to the integrated services, systems, servers and personnel.
- Offshore - module for Single Point Mooring, tandem and side-by-side offshore operation with optional product data, emergency shut down as well as manifold positioning and heave, pitch and roll monitoring.
- Custom specific modules available on request.

# SmartPort Engine



The SmartPort Engine is used as the bridge between the various sub-systems in the SmartPort System.

It handles the synchronization between SafePilot PPU, SafePilot Services and SafePilot Port personnel as well as external operations. Data recorded on the SafePilot systems are being synchronized to the SmartPort Engine for later retrieval. Each user will have a personal account on the SmartPort Engine with data such as back up of routes and notes etc. The SmartPort Engine requires an “over the air” connection using cellular network.

## **MANDATORY MODULE**

- SmartPort Engine – the standard module of the engine with AIS input, OTA (Over the Air) differential corrections, PPU input, data storage, chart management, ship/shore synchronization and shared annotations.

## SmartPort Engine Services

SmartPort Engine Services may be considered as add-on services or modules to the SmartPort Engine according to the requirements of the individual Port. The SmartPort Engine links together multiple auxiliary services from a variety of different sources such as web services, sensors and instruments, servers, communities, tug boats, administration systems, and port personnel etc. The following SmartPort Engine Services are available.

### OPTIONAL MODULES

- Meteorological data – with data such as: tide, current, wind (speed, direction & peak), humidity etc.
- Meteorological forecast – module with integration to weather forecast services.
- VTS integrations – with integration of data such as radar targets or overlays.
- bENC (survey data) – automatic survey overlay updates to PPU.
- Tug integration – RPM, vector, visual order indication and confirmation.
- Laser docking system integration.
- AUX data on demand.
- Administration – with synchronization to pilot PPU for instant retrieval of signed Master/Pilot exchange form, electronic sign on/off, over the air updates and integration of schedules etc.
- Shared vessel database – with pilot community.

## SafePilot Shore Viewer

SafePilot Shore Viewer provides full overview and transparency of the ongoing operations for shore based personnel based on the individual customer's demands and needs. The system synchronizes real time all relevant data between the pilot, port control, tug boat, port administration and other port personnel being involved. The SafePilot Shore Viewer is modular based and scalable.

- SafePilot Shore Viewer includes as standard: shore monitoring with PPU and AIS input, client / server connect to engine services and PPUs.

### OPTIONAL MODULES

- Map editor – with synchronization to pilot PPU offering shared annotations, lock editor, bEnc boundary editor, approach alarm zone editor etc.
- Editing - routes, fenders lines, etc.
- Traffic management – offering synchronization modules between shore control and pilot PPU as: passage plan exchange, validated routes, safe corridors, navigational guidance, PPU data feedback etc.
- Custom specific modules available on request.

# SafePilot in Practice

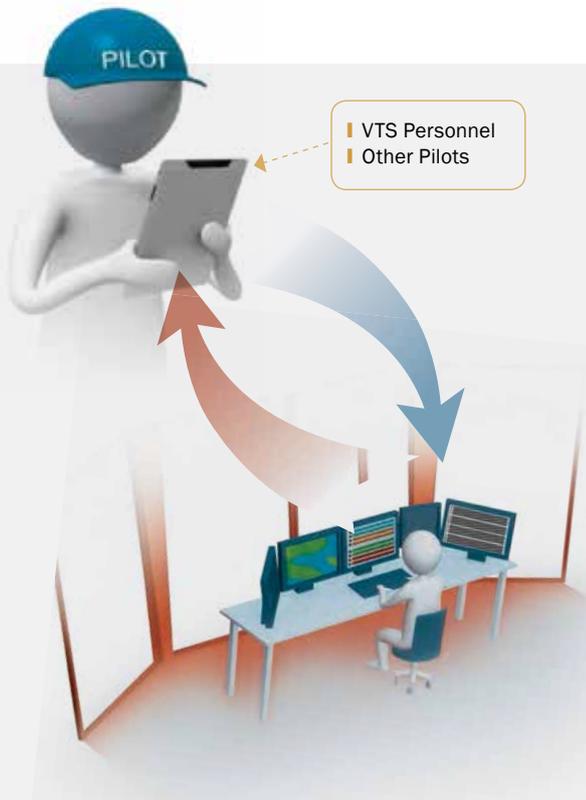


- M/S Danville gives 24 hour notice of arrival.
- Danville is assigned a berth in the berth planning tool by the port administration. The assigned berth is synchronized to SafePilot for display on the boarding pilots PPU display.
- The SafePilot administration module flags pilot Tom Bain as the most experienced pilot on duty at the time of ETA. Tom Bain has several moves of Danville and the sister ship behind him. The move is therefore assigned to Tom Bain.

- Tom Bain starts his shift by checking his iPad at home. On his iPad he accesses the schedule and confirms the Danville move. He can see that 2 tugs have been ordered. Tom checks the tide, weather conditions and forecasts. Finally he enters the shared vessel database to refresh his memory of the vessel particulars, as well as check if any of his colleagues have made any notes of interest on Danville since his last move of the vessel. An entry has been made that the new crew on Danville speak very limited English and it is necessary to support communication visually.

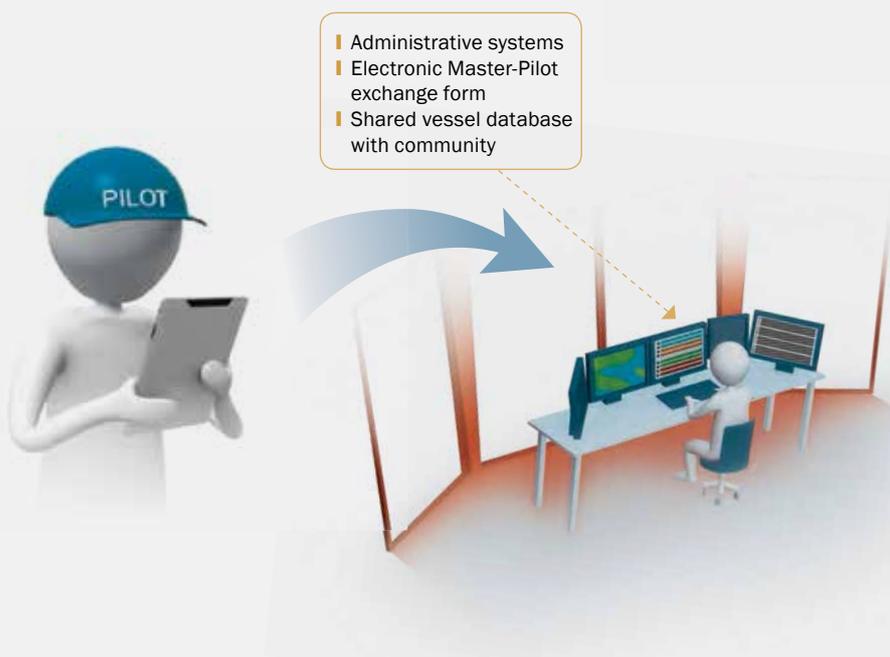
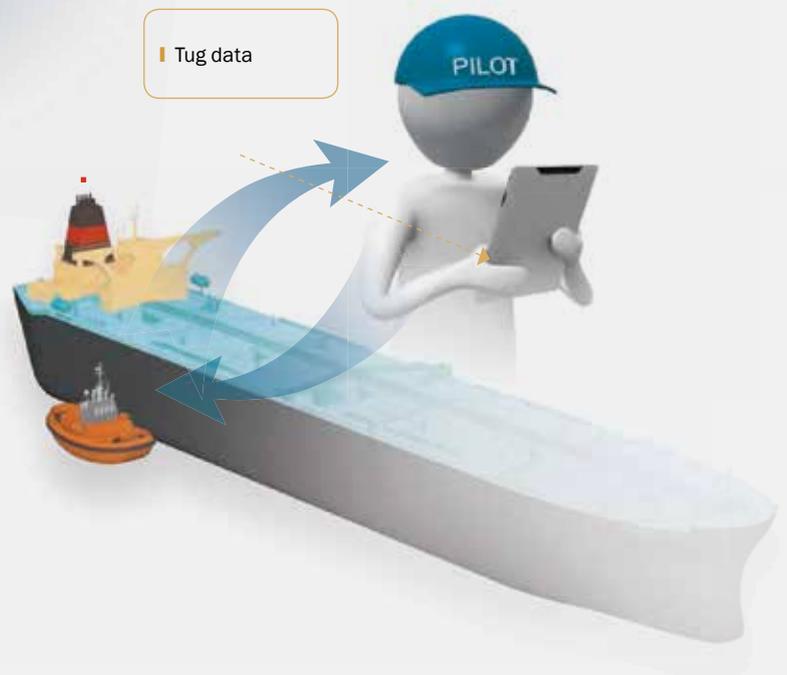


- Weather (EMS), water level, height of tide, current speed and direction, wind direction and speed with average, present and peaks
- Weather forecast
- Shared vessel database with community



- Tom is now heading for the Pilot boat.
- When boarding the Danville, Tom Bain demonstrates the intended manoeuvre and assigned berth on the iPad for the Captain. They exchange information and sign the Master-Pilot exchange form directly on the iPad.
- The approach progresses well. Tom receives a message on his display that an outbound vessel has been assigned a safe corridor from the VTS as they are restricted in their ability to manoeuvre due to rudder problems.

■ The docking manoeuvre of Danville is very challenging due to wind direction and force. The performance (RPM and power vector) of the two tug boats are synchronized to Tom's display providing a continuous overview of his power reserves during the manoeuver.



- Safe alongside, the Master-Pilot exchange form, the recording of the transit and the request for deviations are zipped and synchronized automatically to the SmartPort Engine for storage and to the billing system.
- Tom leaves the Danville for the next job.

# SafeTug



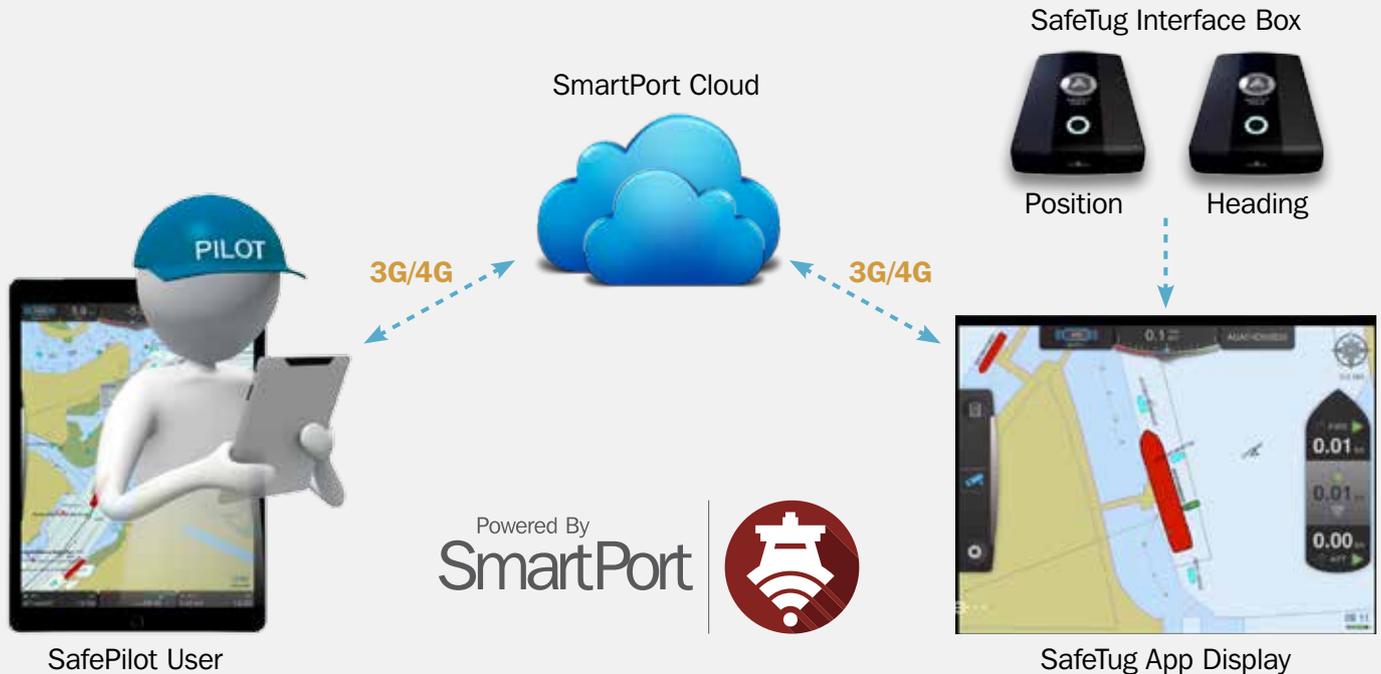
**SafeTug is a software solution that brings all the benefits of SafePilot to tugboat operators through real time data sharing. The complete SafeTug system enhances collaboration between the tug skipper, bridge team, pilot and port, enabling safer and more efficient operations.**

Utilizing the latest technology, SafeTug improves the range and accuracy of navigational measurements, offering true 360° visibility and enhancing situational awareness in real time, to create a safer and more effective pilotage experience.

SafeTug integrates with SmartPort Cloud, exchanging data to provide an overview of port and piloting operations. It features over-the-air (OTA) differential corrections, real time traffic overview, live positioning data with predicted paths, data recording, storage and more. Making everyone aware of the operation at hand. This aid the pilot to know exactly where the tugs are located with real-time data exchange, and for the tug master to know exactly what the movement of the assisted vessel is. Furthermore, the on-shore crew can monitor the whole operation as it happens and by playback for investigation.

## Dynamic Data

SafeTug uses dynamic data to give tugboat skippers accurate, real-time information on the movement of the ship they are maneuvering. This includes the ship's speed and direction, rate of turn, trajectory, heading, and course over the ground. The software also shows the position of other tugboats using the system.



## FEATURES

### Intelligent chart handling

Dedicated 3D chart kernel with fast-action touchscreen zooming and panning functionality.

### Prediction and past tracks

Prediction footprints include rate of turn to give a clear picture of the vessel's movements ahead of time. Past track with adjustable time interval is also included.

### Touchscreen interface

Everything you need to maximize visibility and communication between tug skippers and pilot, right at your fingertips.

### iPad compatibility

Experience intuitive, next generation operational software direct from your tablet.

### Realtime data exchange

Realtime data exchange between both pilot and tug skipper. No AIS lag and updates of the situation every second.

## BENEFITS

### Improved accuracy

Data is filtered down so only information relevant to the current operational phase is provided, allowing for faster, more accurate and more confident decision-making.

### Enhanced safety

SafeTug's situational overview gives operators speed and direction of current and other vessels instantly, enabling a safer port approach.

### Situational awareness

SafeTug provides accurate, real-time data to improve communication between the bridge team, pilot and port – increasing situational awareness and reducing margin of error.

### Greater efficiency

Connecting communications between bridge team, pilot and port, SafeTug minimizes downtime of port facilities, leading to fewer incidents and supporting efficiency gains.

## **DISCLAIMER**

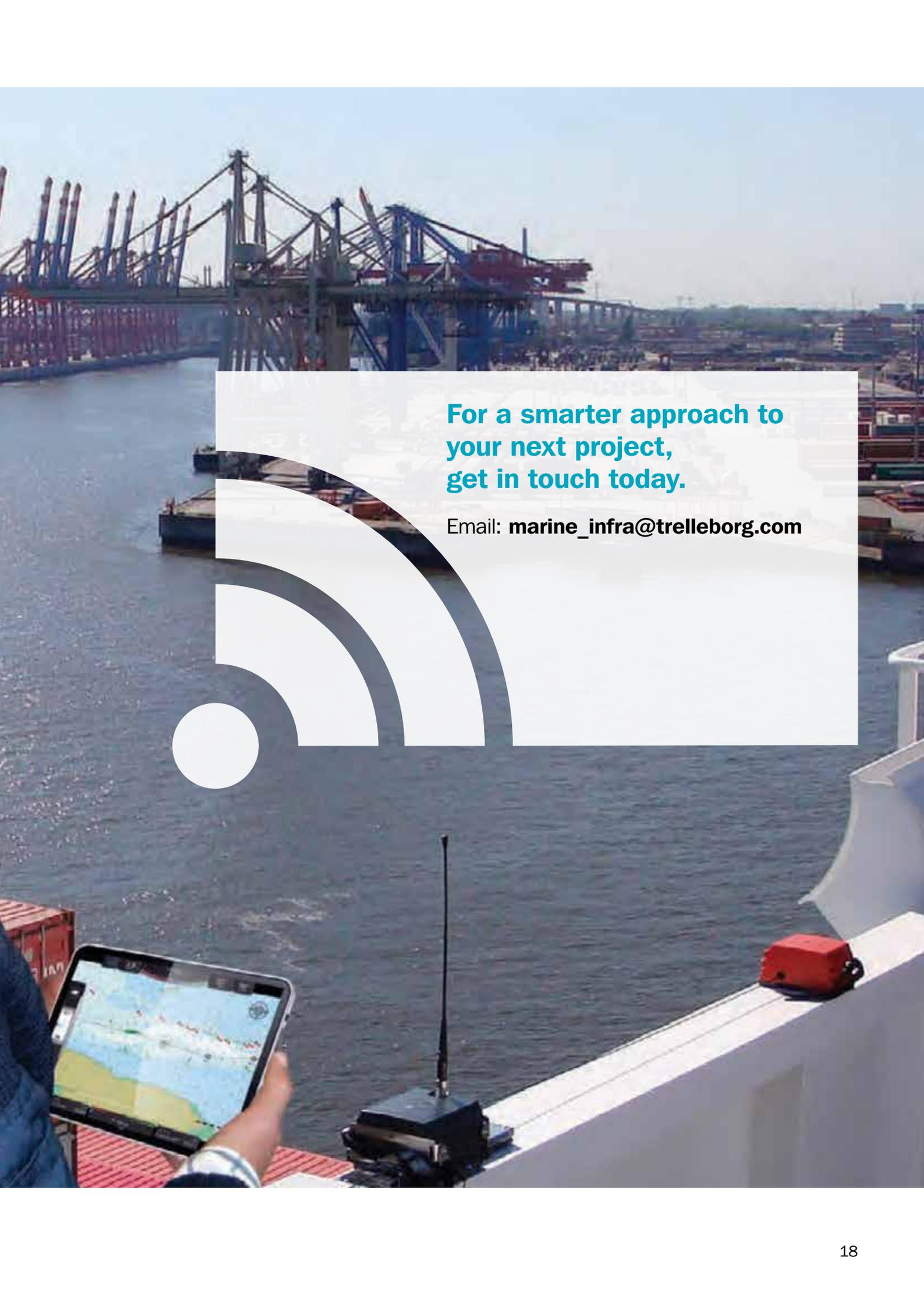
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