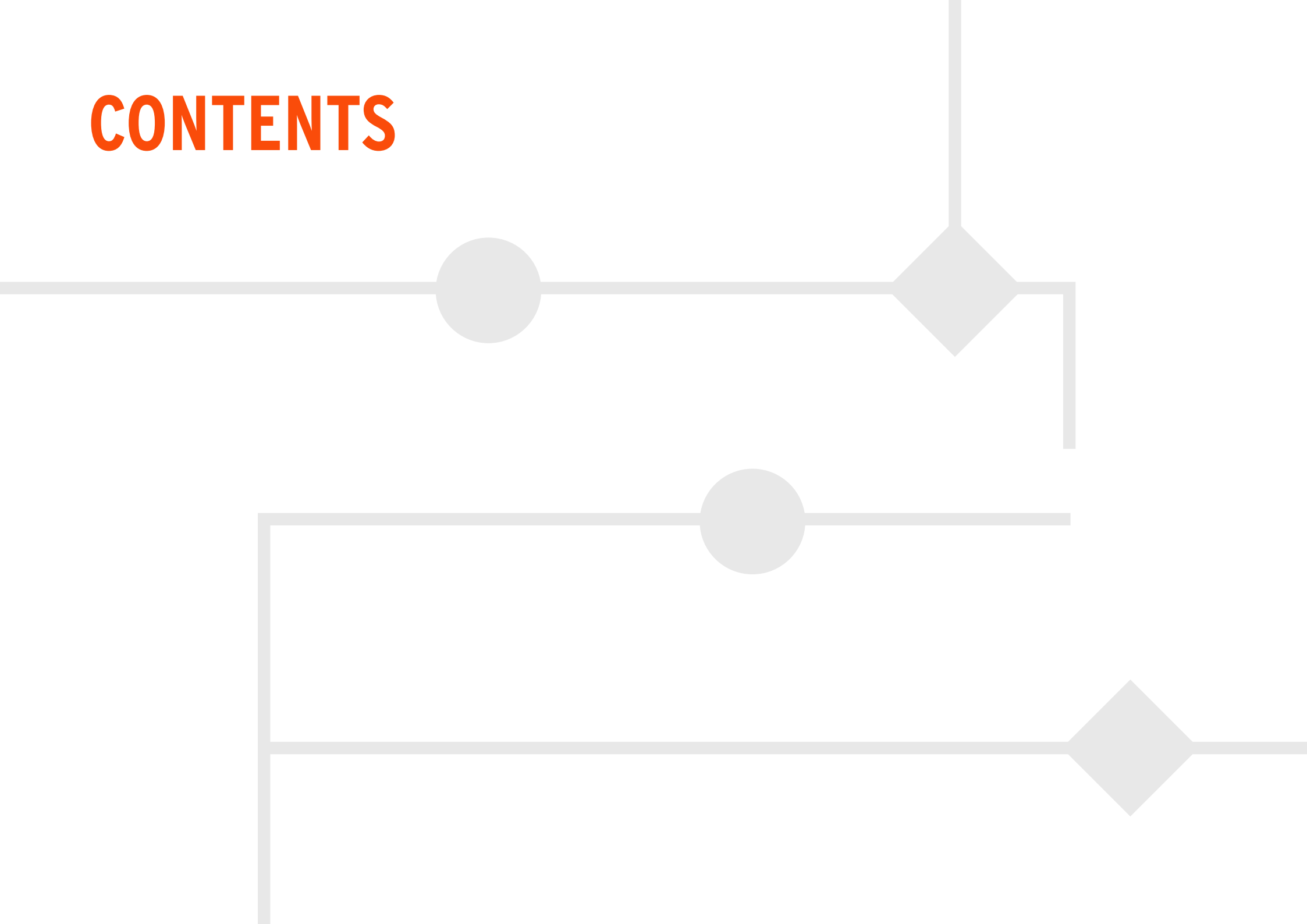




SystemaTM

**Safe Return to Port Compliance
for Operators**

CONTENTS



COMPANY PROFILE

Safety at Sea is a leading international software solutions and technical services provider serving the marine and energy sectors.

With innovation at our core, Safety at Sea leverages technology and expertise to offer modern, integrated, solutions to emerging maritime engineering problems and regulations.

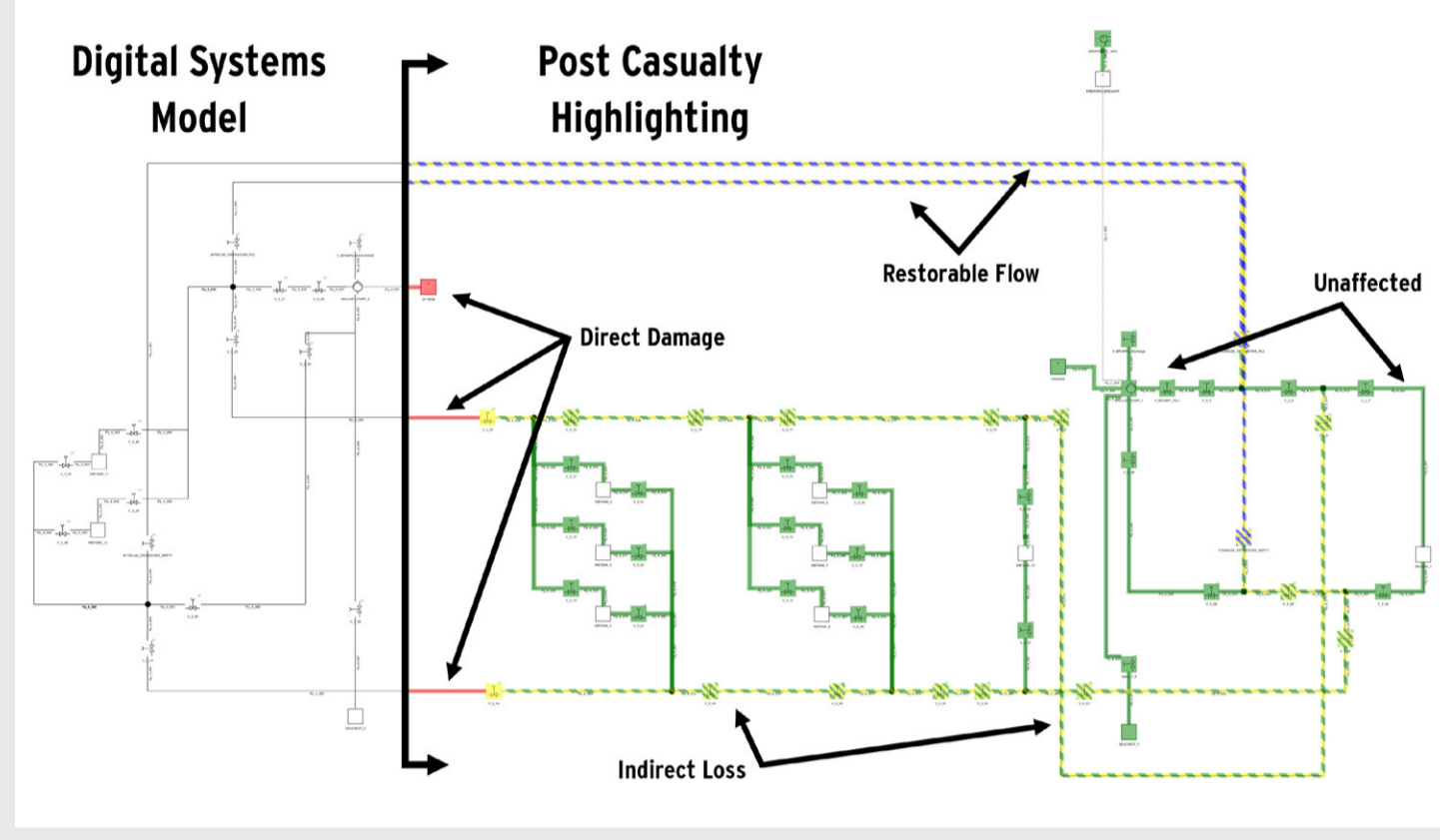
EXECUTIVE SUMMARY

Systema™ provides a proven and complete SOLAS Safe Return to Port solution to support the design, verification, and approval of ship systems' redundancy and to provide evidence to Class and Flag. The software enables both an overall and detailed assessment on a casualty by casualty basis delivering effective compliance at design and through the life of the vessel.

The Systema™ software models systems and interdependencies between systems enabling the impact of a failure in one system to be propagated across all ship systems. Critical systems can be identified, and potential design improvements quickly tested and easily verified, helping to speed up the design process with a focus on compliance. Automatic reporting provides a full set of documentation to support the Class and Flag approval process from detailed system reports to crew manual actions for onboard documentation. The Systema™ model can evolve throughout the vessel's lifetime, updated to reflect changes following design iterations, refit and revitalisation. Necessary documentation is updated efficiently by the software, reducing the manual and logistic effort. Issues can be identified early and resolved before the refit modifications are made.

Systema™ enables Operators to:

- ▶ Validate the shipyard's SRTP documentation.
- ▶ Gain confidence in the redundancy principles and compliance of their fleet.
- ▶ Have a strong basis for technical discussions with Class and Flag.
- ▶ Effectively manage SRTP compliance for the lifetime of the vessel.
- ▶ Reduce the documentation burden at build and during operation.
- ▶ Obtain a comprehensive set of crew recovery actions on a casualty by casualty basis.
- ▶ Obtain detailed understanding of ship system availability, including casualties outside of the scope of SRTP.



Systema™ Digital Model with Post Casualty highlighting

BENEFITS AND FEATURES

IMO SOLAS Compliant: designed to analyse ship system compliance against Safe Return to Port regulations and to provide evidence for Flag and Class Approval.

Overall and Detailed Assessment: as required by SOLAS, the initial overall system redundancy and availability can be analysed as well as the following detailed assessment of critical systems.

Verifiable and Repeatable output: the system model provides an auditable and repeatable record of a vessel's basis for Safe Return to Port compliance.

Simplifying Complexity: as ships grow in size, the inherent complexity of ensuring compliance against a large array of interdependent systems grows to a point where a manual FMEA approach is prone to omissions.

Exhaustive Methodology: allows users to define the full systems as designed ensuring the consideration of all potential system interdependencies and failure modes.

Sustainable Compliance: the system model can evolve as the design and build phase progresses, providing a cost-effective methodology for continuously ensuring compliance throughout the lifetime of the vessel.

'What if' and Criticality analysis: to inform the design process, the system model can be used to understand the impact of layout changes, of cable rerouting options and of the criticality of systems and sub-systems.

Automatic creation of Crew Manual Actions: the software automates the process of creating the hundreds of manual actions against every regulatory casualty, directly supporting the delivery of the vessel to the owner.

Easy to understand, easy to learn: designed with the user in mind, it provides an intuitive interface for engineers to pick up and deploy quickly.

"A major benefit of the Systema™ software is that it is being consistently enhanced and its functionality improved to better meet the needs of industry based on feedback from the varied SRTP projects we have carried out."

Erik Werner
Lead Engineer Ship Design Services
Global Maritime

"The use of the Systema™ tool gives us the possibility to perform the enhanced analysis which is necessary to achieve a comprehensive SRTP assurance in design and operation. In the past we have done desktop studies but with the adoption of Systema™ we have been able to achieve a vastly improved and higher quality service to our clients"

Erik Werner
Lead Engineer Ship Design Services
Global Maritime

THROUGH LIFE VALUE

CONCEPT	DESIGN	OPERATION	REFURBISHMENT
<ul style="list-style-type: none"> ▶ Overall SRTP Philosophy designed ▶ High level system check 	<ul style="list-style-type: none"> ▶ Detailed digital systems model for each SRTP system ▶ Verifiable against regulations on a System by System and a Casualty by Casualty basis ▶ Ability to fix redundancy issues and recompute verification ▶ Generation of documentation for approval 	<ul style="list-style-type: none"> ▶ Provides Casualty by Casualty crew manual actions ▶ Able to support crew with system information ▶ Able to look at Casualties beyond SRTP limits ▶ Able to look at redundancy issues caused by system maintenance 	<ul style="list-style-type: none"> ▶ Modifications to the systems model quickly performed ▶ Reassessment of system redundancy model efficient ▶ Generates documentation for approval post refurbishment

SAFE RETURN TO PORT ONBOARD

It is the Operators responsibility to show ongoing compliance through the vessel lifetime by demonstrating the crew's ability to respond to an SRTP casualty within the limited timeframe allowed in the regulation.

SRTP Onboard™ supports the management of the response to a casualty by providing the crew with all information relevant to the casualty. The software simplifies the logistical complexity through the management of crew actions by assigning actions to crew members and monitoring progress in real time. Action cards, either in paper form or via Wi-Fi connected tablets, give the crew the necessary information to locate and carry out their assigned actions. The added benefit of progress monitoring is the identification of problem areas, allowing the crew to assign additional resources as required.

Through regular drills, the crew not only gain experience of SRTP, but the system can also be updated with observations or more detailed information, so knowledge is not lost due to crew changeovers. With automatic drill reports, it is possible for operators to manage crew training while also creating proof of compliance.

"Systema™ is not solely about the initial design and build process, it ensures SRTP compliance throughout a vessel's lifetime making it an ideal tool for designers, yards and operators."

Luis Guarin
Partner Naval Architect

BEYOND SAFE RETURN TO PORT

While Safe Return to Port requires an increase in the level of systems' redundancy, the casualty scenarios considered are limited to flooding and fire within the regulatory casualty thresholds such as single compartments for flooding casualties. The Systema™ model is a comprehensive representation of the ship systems which is not limited only to the SRTP casualties but can be applied to any casualty. This enables the operator to understand system availability in any casualty, and, importantly, any restorative action possible to support emergency response. By being able to consider any combination of flood and fire, or even single points of failure, detailed availability and action information can be extracted from the model. When more extensive damages are

considered, it is not expected that systems can be designed to achieve full redundancy but understanding which are expected to fail will aid the crew when making decisions related to evacuation and abandonment.

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