

**SUPSI**

# Analysis of Risk Management methodologies applied to Container Terminal Operating System projects

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“Fortes fortuna adiuvat!”

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## Appendix Key Terms

Term	Definition
<i>CMP</i>	<i>Communication Management Plan</i>
<i>CHE</i>	<i>Container Handling Equipment</i>
<i>CHEiD</i>	<i>Type and number of equipment (AGV1, STR3,...)</i>
<i>COPRAR D</i>	<i>Discharge list</i>
<i>COPRAR L</i>	<i>Load list</i>
<i>D&amp;R</i>	<i>Disaster and Recovery</i>
<i>EDI</i>	<i>Electronic Data Interchange</i>
<i>EDR</i>	<i>External Development Request</i>
<i>HLE</i>	<i>High Level Estimation</i>
<i>IMO</i>	<i>Hazard</i>
<i>JIRA</i>	<i>Software for case management</i>
<i>O&amp;A</i>	<i>Orientation and Analysis</i>
<i>Risk driver</i>	<i>factor that has a major influence on risk</i>
<i>RMG</i>	<i>Rail Mounted Gantry</i>
<i>RS</i>	<i>RS: Reach Stacker</i>
<i>RTG</i>	<i>RTG: Rubber Tired Gantry</i>
<i>SC</i>	<i>Steering Committee</i>
<i>TestLink</i>	<i>Software for test cases and test management</i>
<i>TOS</i>	<i>Terminal Operating System</i>
<i>TT</i>	<i>Terminal Trucktor</i>
<i>Stack</i>	<i>Vertical group of slots</i>
<i>Threat</i>	<i>Potential source of danger</i>

## Abstract

This project is an analysis of some of the best practice about the Risk management on the Terminal Operating System (TOS) implementation system.

The deliverable of this project is a Tool Of Risk Analysis (TORA) to evaluate and make an audit on TOS projects.

Container Terminal environment is presented to understand some of the possible issues on the development of a project.

The risks on project management are analysed with methodologies proposed in the ISO 31010 and ISO 31500.

After the ISO research was completed, the chosen methodologies used to identify the risks, are Checklist and Scenario Analysis.

The TOS industry is presented to highlight the challenges of project management TOS.

The analysis is targeted to reach the understanding of those challenges which are the highest in terms of impact and probability.

A survey has been submitted to professional service TOS consultant for risk rating.

The most dangerous risks are charted in an Impact Probability Matrix, in order to evaluate the danger level.

A list of question is produced to be submitted to the client.

The answers on this tool, will automatically populate the factor of the bounded risk, with the result to identify and evaluate the involved risk level.

# SUPSI

## Bachelor Thesis

### Commissioner

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<b>Project description:</b>	The project is based on the analysis of the Risk Management on the risk mitigation methodologies of TOS (Terminal Operating System) project of migration, upgrade or improvement. This project is operating in the container terminal branches.
Project title:	<b>Analysis of Risk Management on Risk mitigation methodologies applied to Container Terminal Operating System projects</b>
Confidential:	Private
Tasks:	The student will elaborate a solution based on the Best Practice of Logistic and Engineering Management methodologies about: <ul style="list-style-type: none"> <li>• Risk management</li> <li>• Logistic</li> <li>• Problem Solving</li> <li>• Forecasting scenario and Impact</li> </ul>
Target to achieve:	Analyse and structure the risk management of a container terminal IT management system migration and proposing a tool to identify risk on TOS environments. Targets of the project are: <ul style="list-style-type: none"> <li>• Risk identification of Project Management</li> <li>• Analysis from medium-high to high impacts and probability</li> <li>• Standardise the Risk Management structure</li> <li>• Deliver a tool of risk analysis and evaluation</li> </ul>
Technology and methodologies asset:	This project is the manifestation of the knowledge and expertise acquired during the course of Project Management, Logistic and Intermodal Transportation. In the project will be used the following methodologies/technique: <ul style="list-style-type: none"> <li>• Business Process Reengineering (BPR)</li> <li>• Project Management</li> <li>• Risk Management</li> </ul>
Out of scope	Risk Mitigation: <ul style="list-style-type: none"> <li>• Analysis</li> <li>• Methodologies</li> </ul>

<b>Supervisor</b>	Relator: Canetta Luca Contro relator: Bassi Antonio
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ISO Norms:

[n] autore/autori, titolo dell'articolo, titolo della rivista, volume, data, pagine specifiche

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- [26] Fig Go live:

<https://www.bing.com/images/search?view=detailV2&ccid=nfb5l1MH&id=BC374C80EDEB7221537B20A7FC633E57036D8081&thid=OIP.nfb5l1MHAY2elomg1ZaRSgHalp&mediaurl=https%3a%2f%2fwww.keeppcalm-o-matic.co.uk%2f%2fkeep-calm-and-lets-go-live-2.png&exph=700&expw=600&q=go+live&simid=607992441861898480&selectedIndex=10&ajaxhist=0>

- [27] Fig Training

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- [28] Fig Quay crane

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- [29] Fig Open top

<https://www.bing.com/images/search?view=detailV2&ccid=IS8xedwV&id=12563177FFBAEEF2C947FD06EA64EE8A20211402&thid=OIP.IS8xedwVD2lQPpXIWGlprQHaf1&mediaurl=https%3a%2f%2fwww.royalwolf.com.au%2fwp-content%2fuploads%2f2016%2f02%2fOpen-Top-2.jpg&exph=540&expw=685&q=open+top+container&simid=608001160646167445&selectedIndex=5&ajaxhist=0>

- [30] Fig Hazardous container

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- [31] Fig O&A meetings

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## 6.2 Appendix

### A1 Risk Methodologies Chart

	Technique	Description	Application	Scope	Time horiz.	Decis. level	Starting info / data needs	Specialist expertise	Qual-quant	Effort to apply
	<b>ALARP/SFAIRP</b>	Criteria for tolerability of risk to human life.	evaluate. risk	1	any	1/2	high	high	quant	high
	<b>Bayes analysis</b>	Application of Bayes theorem to incorporate new evidence into prior beliefs about probabilities.	analyse likelihood	any	any	any	medium	high	quant	medium
	<b>Bayesian networks decision nets</b>	A graphical model of variables and their cause-effect relationships. Uses a set of probabilities representing the belief a node will be in a given state, given the states of the connecting nodes.	deciding between options	any	any	any	medium	high	quant	medium/high
	<b>Bow tie analysis</b>	A diagrammatic way of describing the pathways from source of risk to outcomes and reviewing controls.	analyse controls describe a risk	2/3	short/medium	any	low	low	qual.	low
	<b>Brainstorming</b>	Technique used in workshops to encourage imaginative thinking.	elicit views	any	any	any	none	low	qual.	medium
	<b>Business impact analysis</b>	Identifies critical functions of an organization and the resources needed to maintain them. Estimates the times within which particular resources need to be restored.	analyse conseq. analyse controls	1	Short/medium	2	medium	low	quant	medium
	<b>Causal mapping</b>	A network diagram representing events, causes and effects. and their relationships.	analyse causes	2	any	any	medium	moderate	qual.	medium
	<b>Cause consequence analysis</b>	A combination of fault and event tree analysis that allows inclusion of time delays. Both causes and consequences of an initiating event are considered.	analyse causes and conseq.	2/3	medium	3	high	high	quant	high
	<b>Check lists classifications, taxonomies</b>	Lists based on experience or on concepts and models that can be used to help identify risks or controls.	identify risk or controls	2/3	any	any	good data needed to develop. None to use	low	qual	Low
	<b>Cindynic approach</b>	Considers goals, values, rules, data and models of stakeholders and	identify risk drivers	1/2	short or medium	1	low	moderate	qual.	high

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		identifies inconsistencies, ambiguities omissions and ignorance. These form systemic sources and drivers of risk .								
	<b>Conditional value at risk CVaR</b>	Also called expected shortfall (ES), is a measure of the expected loss from a financial portfolio in the worst a% of cases.	analyse likelihood and conseq.	1	short	3	high	high	quant	medium
	<b>Consequence likelihood matrix</b>	Compares individual risks by selecting a consequence likelihood pair and displaying them on a matrix with consequence on one axis and likelihood on the other.	report risks evaluate	any	any	any	medium	low to use, medium to develop	qual.	low
	<b>Cost-benefit analysis</b>	Uses money as a scale for estimating positive and negative, tangible and intangible, consequences of different options.	compare options	any	short/medium	any	Medium /high?	moderate	quant	medium
	<b>Cross impact analysis</b>	Evaluates changes in the probability of the occurrence of a given set of events consequent on the actual occurrence of one of them.	analyse likelihood	1/2	Short medium	any	Low to high	Moderate/ high	quant	high
	<b>Decision tree analysis</b>	Uses a tree-like representation or model of decisions and their possible consequences. Outcomes are usually expressed in monetary terms or in terms of utility.	compare options	3	Short medium	2	Low/	moderate	quant	medium
	<b>Delphi technique</b>	A method to collect judgements on a topic through a set of sequential questionnaire. People participate individually but receive feedback on the responses of others after each set of questions.	elicit views	any	any	any	none	none	qual.	Medium/high
	<b>Event tree analysis (ETA)</b>	Models the possible outcomes from a given initiating event and the status of controls and to analyse the frequency or probability of the various possible outcomes.	analyse conseq. and controls	2/3	any	any	Low/medium	moderate	either	medium
	<b>Fault tree analysis (FTA)</b>	Analyses causes of a focus event using Boolean logic to describe	analyse likelihood analyse causes	2/3	medium	3	High for quant analysis	Depends on complexity	either	Medium/high

		combinations of failures. Variations include a success tree where the top event is desired and a cause tree used to investigate past events.								
	<b>Failure modes and effect and (criticality) analysis FME(C)A</b>	Considers the ways in which each component of a system might fail and the failure causes and effects. FMEA can be followed by a criticality analysis which defines the significance of each failure mode, (FMECA).	identify risks	2/3	short	operational	Depends on application	moderate	either	low to high
	<b>F/N diagrams</b>	Special case of quantitative consequence likelihood graph applied to consideration of tolerability of risk to human life.	evaluate risk	1	any	1/2	high	high	quant	high
	<b>Game theory</b>	The study of strategic decision making to model the impact of different players' decisions involved in the game. Example application area can be risk based pricing.	decide between options	1	Medium	1/2	High	high	Quant	Medium to high
	<b>Hazard analysis and critical control points HACCP</b>	Analyses the risk reduction that can be achieved by various layers of protection.	analyse controls monitor	3	short	3	Low/medium	moderate	qual.	medium
	<b>Hazard and operability studies HAZOP</b>	A structured and systematic examination of a planned or existing process or operation in order to identify and evaluate problems that might represent risk to personnel or equipment, or prevent efficient operation. The method applies to processes for which design information is available.	identify and analyse risks	3	medium	3	High	high for facilitator moderate for participants	qual.	high
	<b>Human reliability analysis</b>	A set of techniques for identifying the potential for human error and estimating the likelihood of failure.	analyse risk identify sources of risk	2/3	any	3	medium	high	qual/quant	high
	<b>Interviews</b>	Structured or semi-structured one to one conversations to elicit views.	elicit views	any	any	any	none	low/medium	qual.	high
	<b>Ishikawa analysis</b>	Identifies contributory factors to a defined outcome (wanted or	analyse sources of risk	any	any	any	low	low	qual.	Low

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	<b>(fishbone diagram)</b>	unwanted). Contributory factors are usually divided into predefined categories and displayed in a tree structure or a fishbone diagram.								
	<b>Layers of protection analysis (LOPA)</b>	Analyses the risk reduction that can be achieved by various layers of protection.	analyse controls	3	any	3	medium	moderate	quant	medium
	<b>Markov analysis</b>	Calculates the probability that a system that has the capacity to be in one of a number of states will be in a particular state at a time t in the future.	analyse likelihood	3	short	3	medium	high	quant	Medium
	<b>Monte Carlo analysis</b>	A technique used to calculate the probability of outcomes by running multiple simulations using random variables.	analyse risk	any	any	any	medium	high	quant	medium
	<b>Multi criteria analysis</b>	A method for comparing options that makes trade-offs explicit. Provides an alternative to cost benefit analysis that does not need a monetary value to be allocated to all inputs.	decide between options	any	any	1/2	low	moderate	qual.	varies
	<b>Nominal group technique</b>	Technique for eliciting views from a group of people where initial participation is as individuals with no interaction, then group discussion of ideas follows.	elicit views	any	any	any	none	low	qual.	medium
	<b>Pareto analysis</b>	The Pareto principle (the 80–20 rule) states that, for many events, roughly 80% of the effects come from 20% of the causes.	set priorities	any	any	any	medium	moderate	qual.	low
	<b>Probability distribution function (PDF) and S curves</b>	A means of displaying the relationship between consequences and their likelihood. Can also be plotted as a cumulative distribution function (CDF).	display risk evaluate risk	any	any	3	medium	moderate	quant	low
	<b>Reliability centred maintenance (RCM)</b>	A risk based assessment used to identify the appropriate maintenance tasks for a system and its components.	evaluate risk decide controls	2/3	medium	3	medium	High for facilitator moderate to use	either	medium /high
	<b>Risk indices</b>	A method for rating the significance of risks based on ratings applied to	compare risks	any	any	any	medium	low to use medium to develop	qual.	low

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		factors which are believed to influence the magnitude of the risk.								
	<b>Risk register</b>	A means of recording information about risks and tracking actions.	recording risks	any	any	any		low /moderate	qual.	ongoing
	<b>Scenario analysis</b>	Possible future scenarios are identified through imagination or extrapolation from the present or modelling. Risk is then considered for each of these scenarios.	Identify risk, conseq. analysis	1/2	medium or long	1/2	low/ medium	moderate	qual.	low/ medium
	<b>Surveys</b>	Paper or computer based questionnaires to elicit views.	elicit views	any	Medium / long	2/3	none	low/ moderate	qual.	high
	<b>Structured what if technique SWIFT</b>	A simpler form of HAZOP with prompts of "what if" to identify deviations from the expected.	identify risk	1/2	medium	1/2	medium	low	qual.	medium
	<b>Toxicological risk assessment</b>	A series of steps taken to obtain a measure for the risk to humans or ecological systems due to exposure to chemicals.	assess risk	3	Medium / long	2/3	high	high	Mostly quant	high
	<b>Value at risk (VAR)</b>	Financial technique that uses an assumed probability distribution of losses in a stable market condition to calculate the value of a loss that might occur with a specified probability within a defined time span.	analyse risk	1	short	3	high	high	quant	medium

Nome Cognome (1. Firma)

Nome Cognome (2. Firma)

Funzione  
Settore/prodotto

Funzione  
Settore/prodotto