Keselamatan Pelayaran dan Transformasi Digital

Presentasi Pra-Raker PRAMARIN

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Institut Teknologi Sepuluh Nopember (ITS), Surabaya

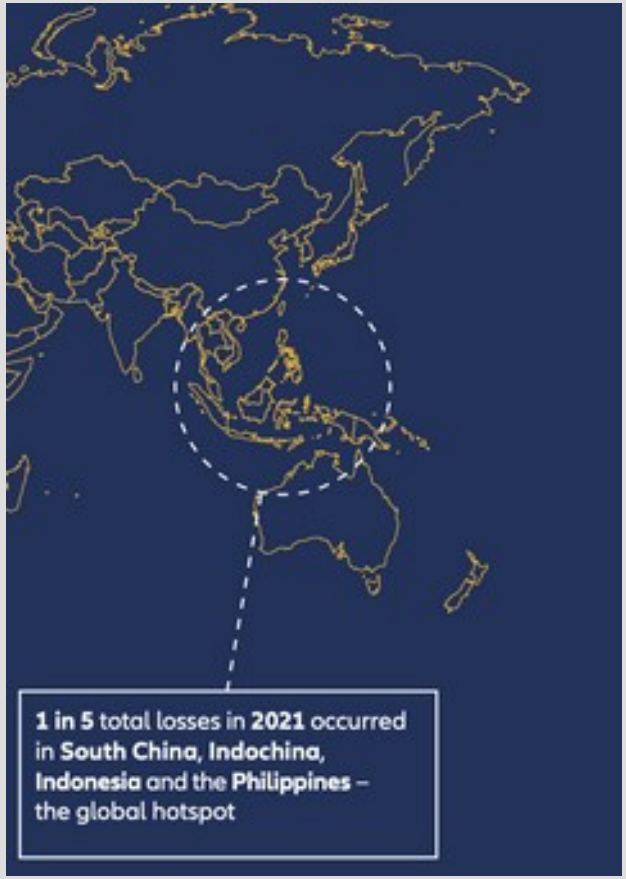
10/01/2023

Safety Review

Total losses for 2012 - 2021

Total losses by top 10 regions
From January 1, 2012 to December 31, 2021

Region	Loss
S. China, Indochina, Indonesia and Philippines	225
East Mediterranean and Black Sea	136
Japan, Korea and North China	87
British Isles, N.Sea, Eng. Channel and Bay of Biscay	55
Arabian Gulf and approaches	46
West African Coast	38
West Mediterranean	35
Bay of Bengal	29
S. Atlantic and East Coast South America	24
West Indies	23
Other	194
Total	**892**

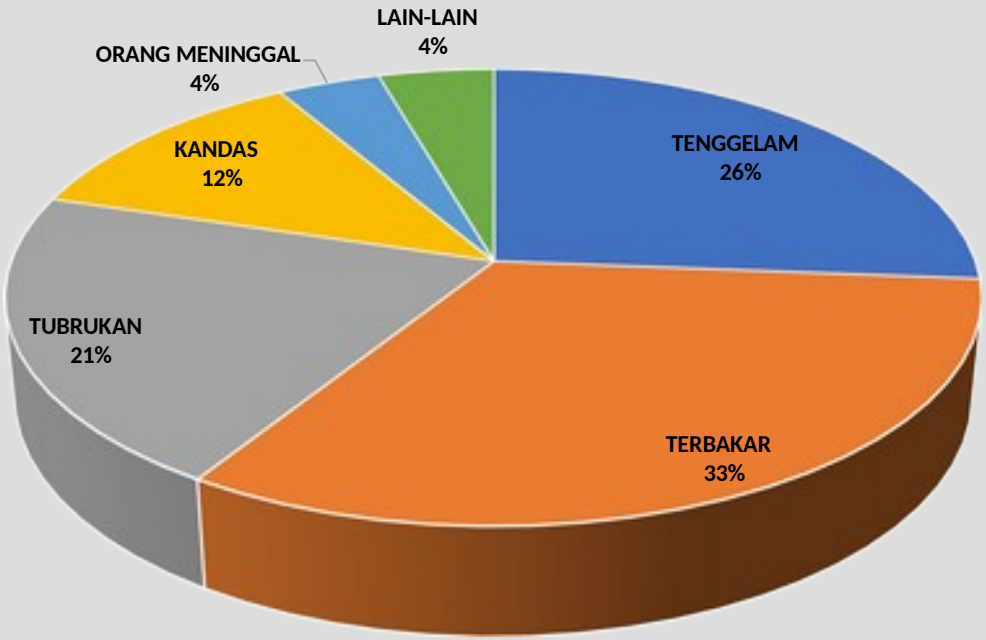


Safety as <u>foundation</u> for business sustainability

“Shipping & Safety Review”, Allianz, 2022

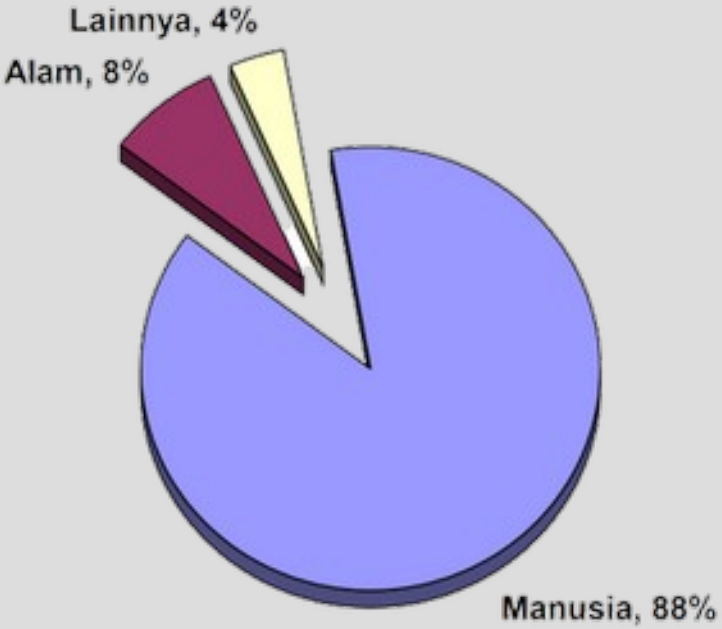
KECELAKAN KAPAL

Jenis kecelakaan



Sumber: Laporan Investigasi KNKT (2007-2021)

Penyebab kecelakaan kapal



Sumber: Mahkamah Pelayaran

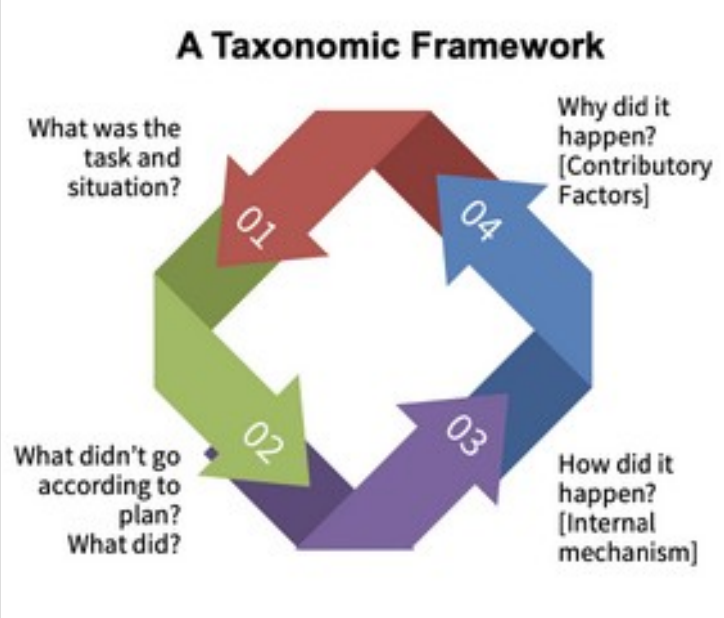
Consequences of Human Factors

Human Factors is the main reason for any risk covered by the Insurance, both for Marine Hull Insurance or Protection & Indemnity Club.

A. Hastono, ”Human Factors in Marine Safety: Perspectives of Insurance”, SAFEMODE SYMPOSIUM, 2022

SAFEMODE

- Penelitian tentang **peran manusia** dalam kecelakaan kapal dan pesawat terbang.
- Konsorsium lembaga riset, universitas, industri kapal & pesawat 34 mitra Eropa dan Asia.
- Dana Uni Eropa, 2018-2022



SAFEMODE

Understanding HF in safety occurrences

How did it happen?

I hit the wrong key
I was focusing on something else
I misheard an instruction
I forgot to do it
I made the wrong judgement call

What happened?

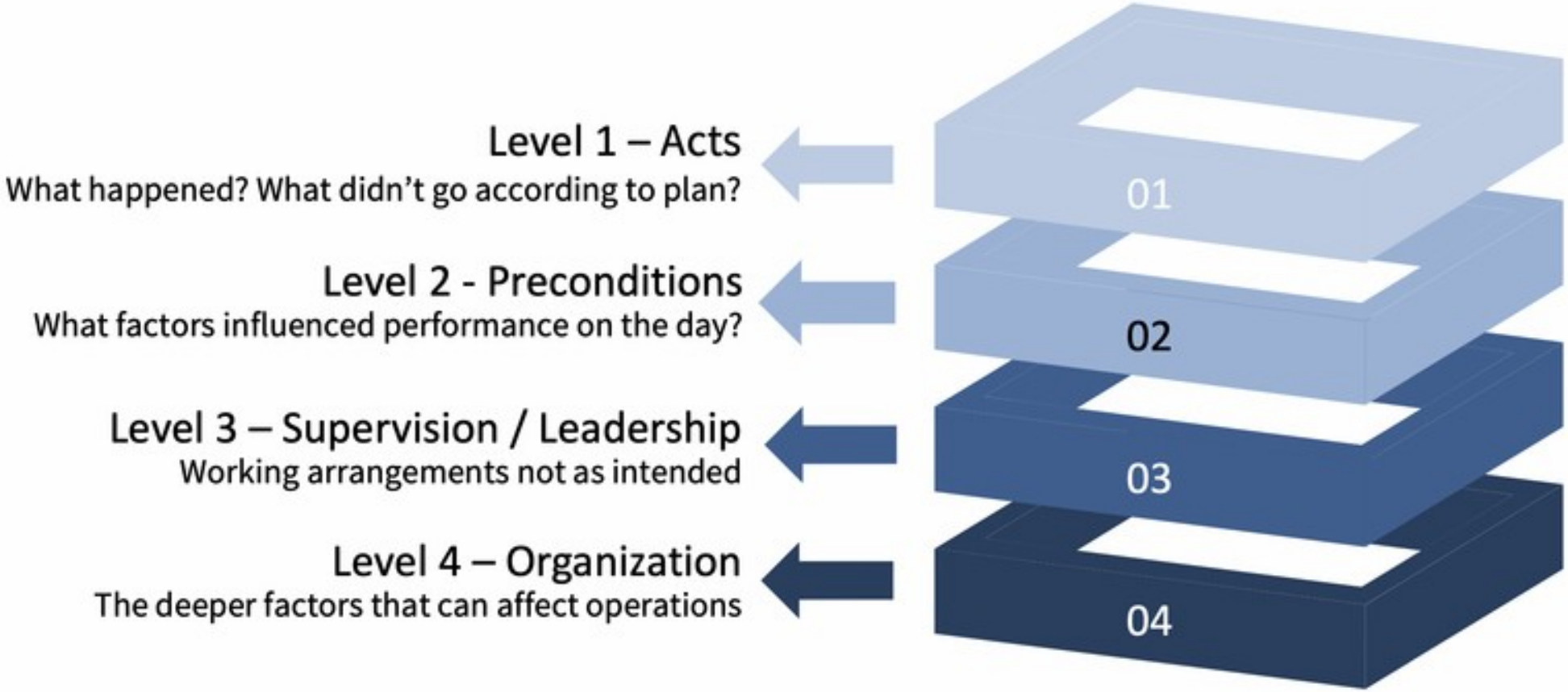
I did something wrong
I failed to do something
I did it too early / late
I did too much / too little
I made the wrong decision

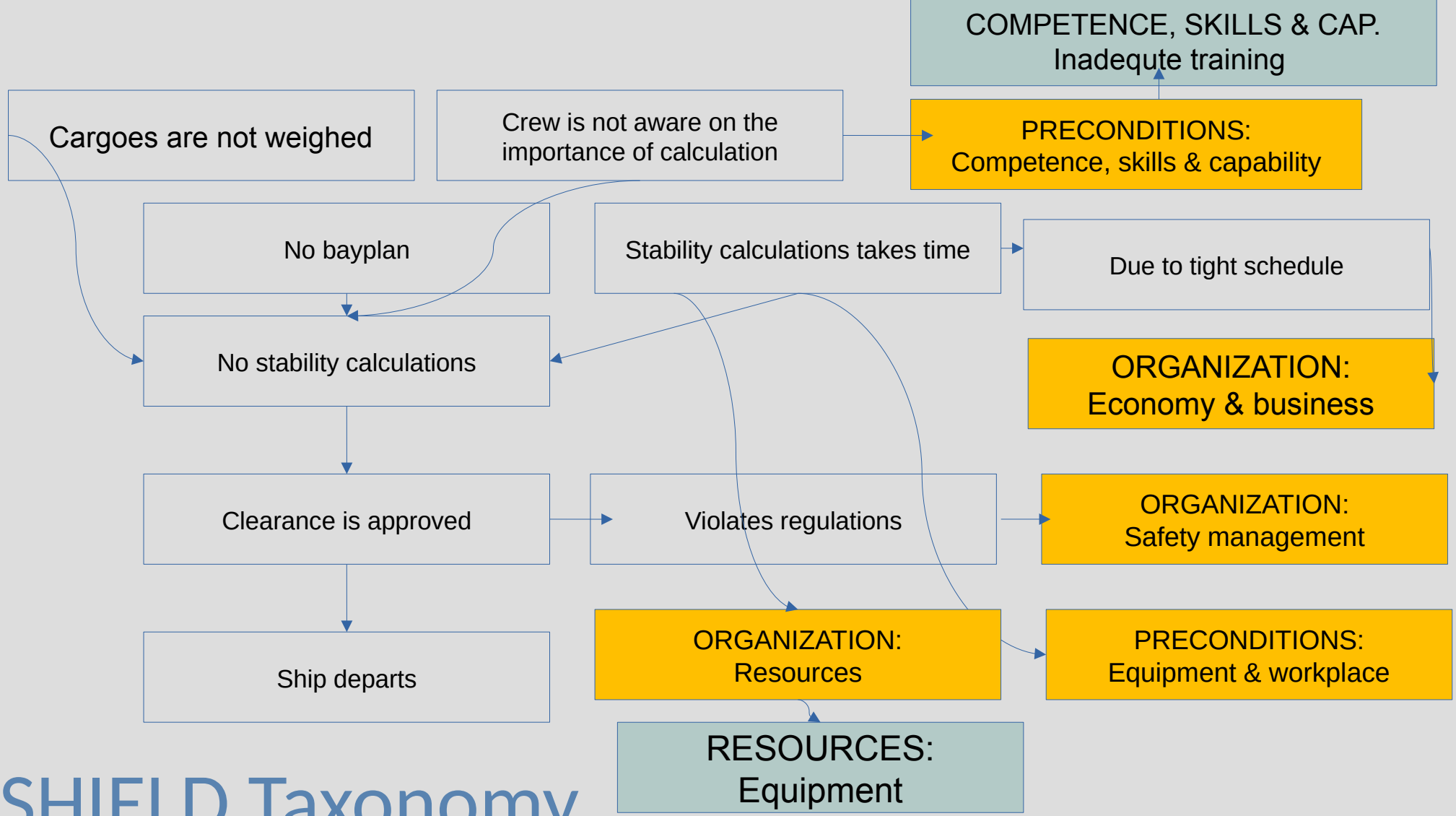
Why did it happen?

I was tired
I was overloaded
I was confused by the display
I'd never seen that configuration before
Communication was difficult

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement N°814961.

SHIELD Taxonomy

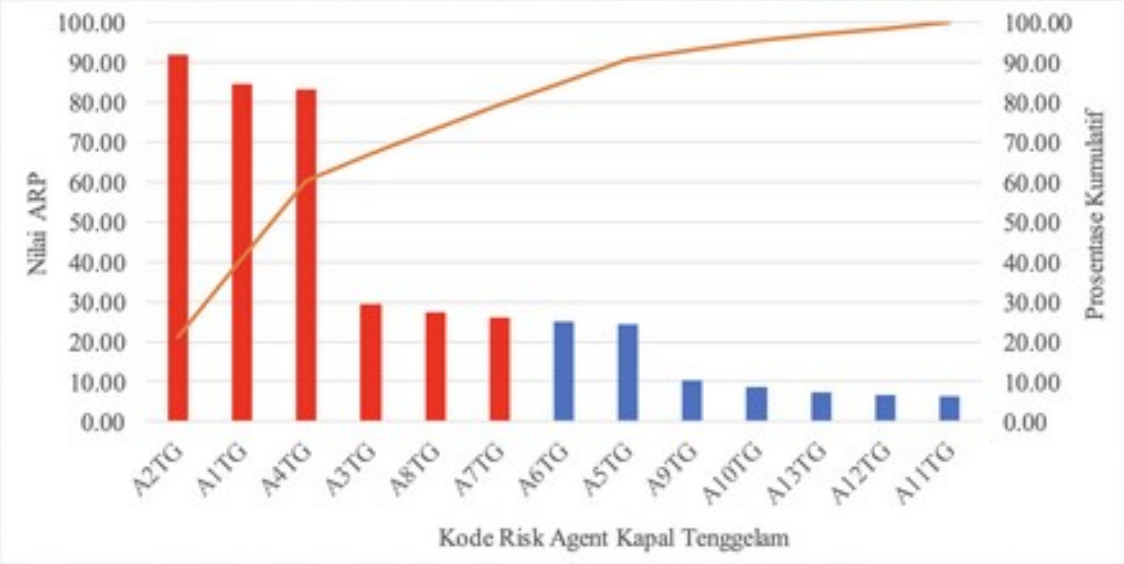




SHIELD Taxonomy

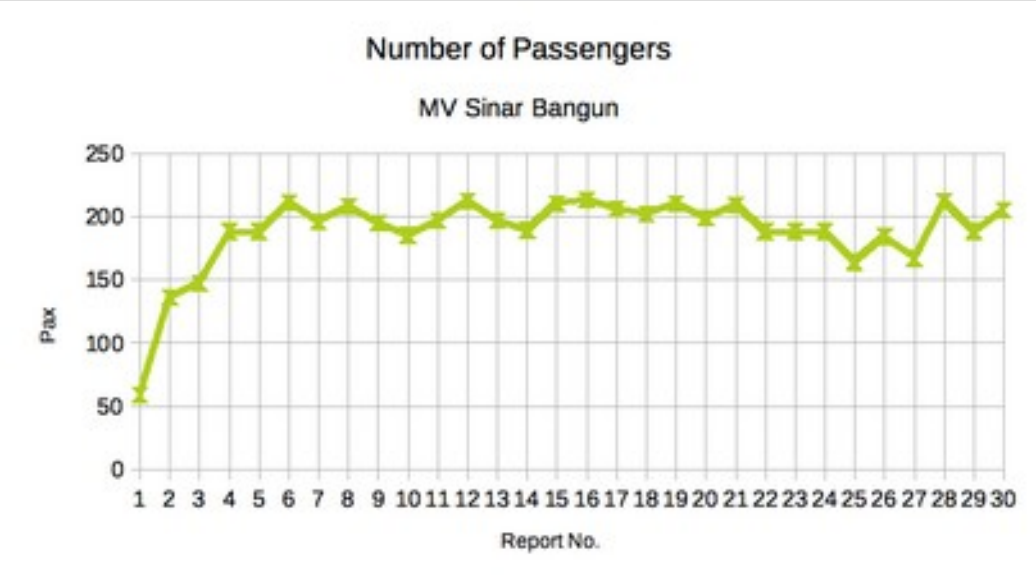
RISK AGENTS KRITIS: KAPAL TENGGELAM

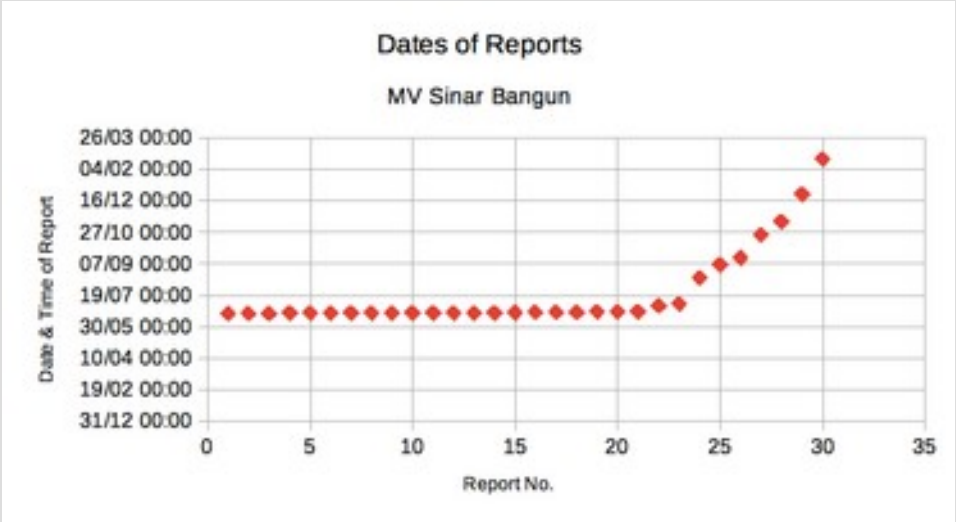
- Tidak membuat perhitungan stabilitas pasca pemuatan (A2TG)
- Tidak ada pemeriksaan jumlah/ berat muatan (A1TG)
- Tidak membuat stowage plan (A4TG)
- Tidak ada pemeriksaan stabilitas kapal (A3TG)
- Tidak ada pemeriksaan kondisi fisik nautis-teknis kapal (A3TG)
- Muatan tidak terikat dengan baik (A7TG)



Sumber:
Shanty Yahya, "Analisis Risiko Kecelakaan Kapal Di Perairan Laut Indonesia Menuju Zero Accident: Menggunakan Metode House Of Risk (HoR)", Disertasi, ITS, 2021

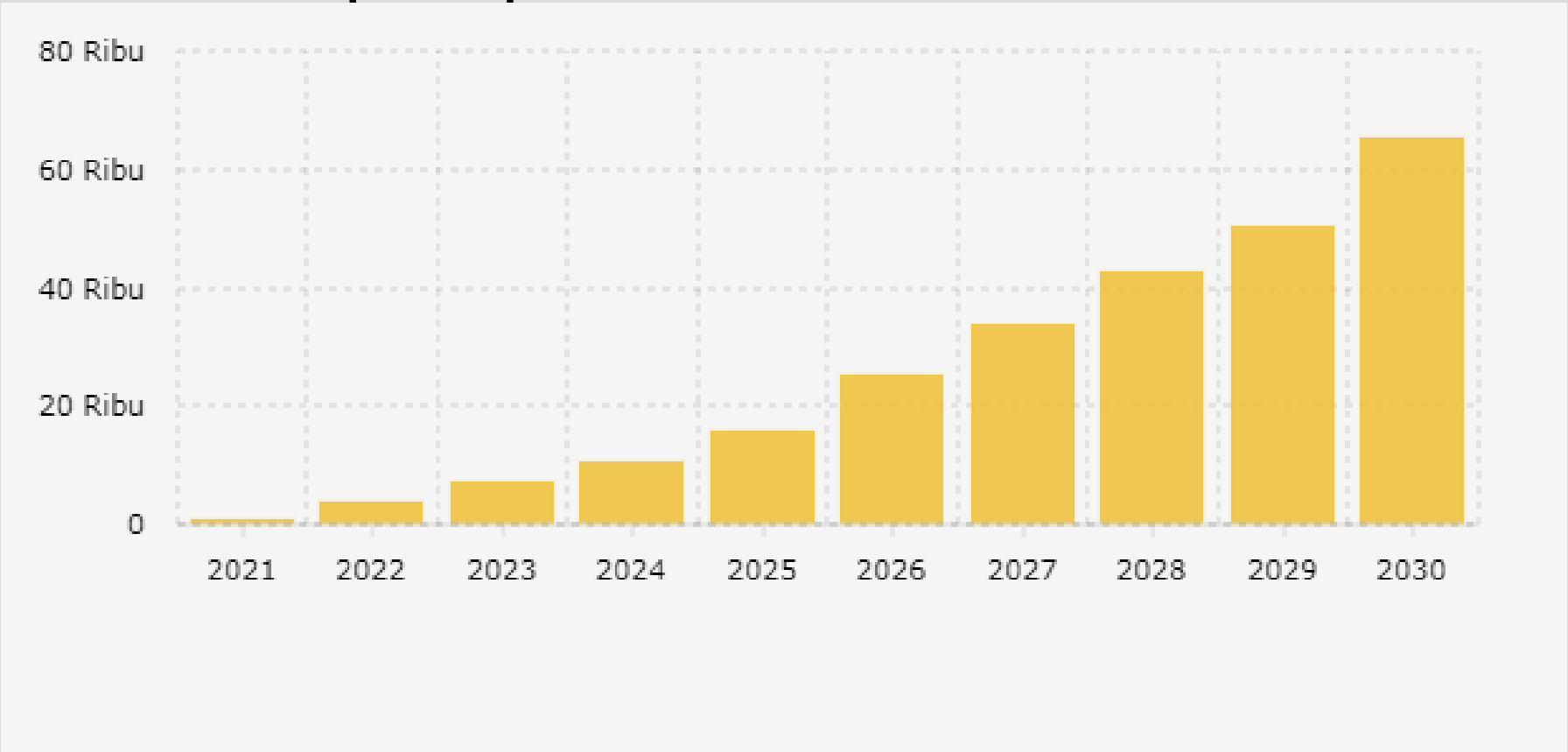
INTEGRITAS DATA
SINAR BANGUN





Informasi tentang jumlah penumpang berubah terus.
Integritas data rendah

Pertumbuhan mobil listrik: Antisipasi potensi risiko keselamatan



https://databoks.katadata.co.id/datapublish/2021/07/08/mobil-listrik-di-indonesia-diproyeksikan-tumbuh-pesat

Car Carrier Falicity Ace
Terbakar, terbalik & tenggelam
Maret 2022

Kebijakan >>> Aturan >>>

Pemanfaatan teknologi

this report underlines digitalization as not solely a technological issue, but also as human capital and institutional issues.

https://www.worldbank.org/en/topic/transport/publication/accelerating-digitalization-across-the-maritime-supply-chain

Blog | Education | Worldwide

Can digital technology solve safety challenges for the maritime industry?

In this article, we zoom into what safety challenges the maritime industry faces and how digital technology can help solve them. Explore the article further.

MARPRO · August 31, 2022 · 1,019 · 4 minutes read

***"Complicated processes .. or paper-based procedures** play a decisive role in human error and a high level of stress":.*

https://maritime-professionals.com/can-digital-technology-solve-safety-challenges-for-the-maritime-industry/

How can digital innovation address human safety challenges in marine?

Regulators could be key to faster adoption of digital technologies for safety in the marine and other industries

https://www.lr.org/en/insights/industry4/digital-innovation-to-address-human-safety-challenges/

Sea Transportation System consists of:

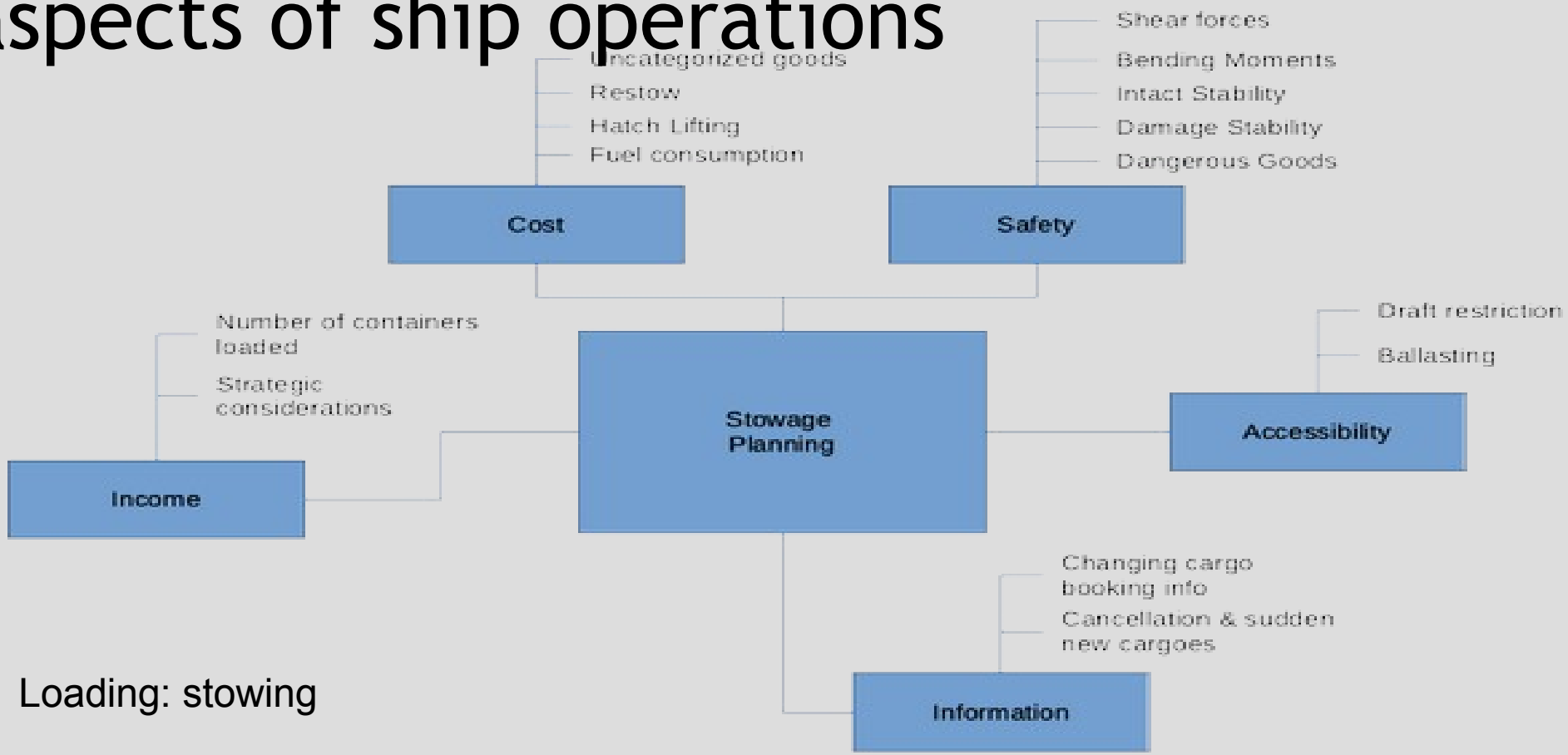
Shore System

Sea System

SYSTEMS PERSPECTIVES

https://www.freepik.com/free-vector/cargo-ship-loading-port-cartoon-illustration_5901391.htm

Load planning involves 5 most critical aspects of ship operations



Loading: stowing

How digital technology can improve safety at sea.

22 Jan 2019 ARTICLE INDUSTRY 4.0 DIGITAL & ANALYTICS MARINE & SHIPPING

As part of the LR Safety Accelerator, LR interviewed nearly 600 marine operators to find out the main human safety challenges they are currently facing.

LR: The figure of **75% of accidents being caused by human error** came up quite frequently. Fatigue came up explicitly - it's a problem in every safety-critical workplace but in a marine environment when you're on the bridge of a ship, it can lead to major safety issues.

https://www.lr.org/en/insights/industry4/how-digital-technology-can-improve-safety-at-sea/

MEMILIH TEKNOLOGI

Sistem:
Organisasi, orang, peralatan, aturan dipastikan bekerja dengan benar

Manusia:
Meminimalisir kelaiaian

Teknik:
Memastikan fisik kapal dalam kondisi laik laut

Alam:
Memastikan dapat mendeteksi, memprdiksi perilaku alam.
Agar bisa menentukan tindakan.

Safety reporting and digitalization requires more than just technology. It requires **technology that works and a human-centered approach**"

https://safety4sea.com/cm-how-digitalization-applies-in-shipping-to-boost-operational-efficiency/

Visual Alarm:

compliance to IMO Criteria (red/green)

Criteria of IMO A-167 Resolution

No.	IMO Criteria	Actual	Unit	Critical	Status
1	Area under GZ curve up to 30 deg	0.0688	m.rad	0.0550	OK
2	Area under GZ curve from 30-40 deg	0.0470	m.rad	0.0300	OK
3	Area under GZ curve up to 40 deg	0.1158	m.rad	0.0900	OK
4	Initial GM to be at least 0.15 m	0.2123	m	0.1500	OK
5	GZ to be at least 0.2 m at an angle > 30 deg	0.3162	m	0.2000	OK
6	Maximum GZ to be at angle > 25 deg	30.8000	deg	25.0000	OK
7	IMO weather criterion (Max. Initial Angle of Heel)	17.6511	deg	16.0000	REJECT
8	IMO weather criterion	-	m.rad	1.0000	REJECT

Regulasi & Teknologi

S1

(1971)
(Rev.1 1981)
(Rev.2 1983)
(Rev.3 1995)
(Rev.4 1997)
(Rev.5 June 2001)
(Rev.6 July 2004)
(Rev.7 May 2010)

Requirements for Loading Conditions, Loading Manuals and Loading Instruments

IACS considers that this Requirement satisfies Regulation 10(1) of the International Convention on Load Lines, 1966.

S1.1 General

S1.1.1 Application

These requirements* apply to all classed sea-going ships of 65m in length and above which are contracted for construction on or after 1st July 1998, and contain minimum requirements for loading guidance information.

For CSR Bulk Carriers and Oil Tankers, these requirements apply in addition to those of the Common Structural Rules.

<u>Audio</u> Alarm

compliance to IMO Criteria

List Audio Alarm

No	Criteria	Audio
1	Draft Mid	On
2	Trim	On
3	Heel	On
4	AREA_U30	On
5	AREA3040	On
6	AREA_40	On
7	INITGM0.15	On
8	GZ0.2	On
9	MAXGZ25	On
10	MAXHEEL	On
11	IMOWEATHER	On
12	Intact Limit KG	Off
13	Damage Limit KG	Off

Jika IMO Safety Criteria terlanggar, maka komputer akan berbunyi ”beep.. beep .. .beep”.

Quality assurance berupa serfifikasi dari biro klasifikasi/ IACS members

Loading Software

sertifikasi Lloyd’s Register (2022)

Loading Computer Software General Approval Post URL5				
No.	Software Name	Software version	Company Name	Nationality
1	Autoload	6.0 (build 699 and later)	Autoship Systems Corporation	Canada
2	Autoload	6.0 (build 699 and later)	Autoship Systems Corporation	Canada
3	LCCAD	8.0	BARTEX, Zbigniew Szozda	Poland
4	Load Com	1.5	Com Associates Ltd.	England
5	GHS Load Monitor	10.0	Creative Systems Inc.	USA
6	DELTALOAD[+]	1.0	Delta Marine Engineering & Computer Trading Co.	Turkey
7	LOADPLUS	1.0.5	HANLA IMS CO., LTD	South Korea
8	ANKO Marine Load Planner	3.0	Helintec Marine Limited	Cyprus
9	CargoMax	2.1	HERBERTABS SOFTWARE SOLUTIONS, LLC	USA
10	CargoMax	2.1	HERBERTABS SOFTWARE SOLUTIONS, LLC	USA
11	LOADICATOR	5.0	Inokuma Co., Ltd.	JAPAN
12	MACS3.NET	1.1	Kalmar Germany GmbH	Germany
13	MACS3.NET	1.1	Kalmar Germany GmbH	Germany
14	amcLoad	4.1.2	Kapniaris Spyridon Marine Consultancy	Greece
15	Loadmaster	X5	Kockum Sonics AB	Sweden
16	LOADSTAR (Windows)	1.0 (release 1.2)	Kockum Sonics AB	Sweden
17	EASEACON	5.7	Kockumation A/S	Sweden
18	KLOAD	5.0	Kongsberg Maritime AS	Norwegia
19	LODIC	5.2	Kongsberg Maritime AS.	Norwegia
20	Load Station	1.5.0.0	KUZEY GEMİ TASARIM GÖZETİM VE DANIŞMANLIK LTD. ŞTİ.	Turkey
21	SAFELOAD	2.0	MARIC	South Africa
22	VSTAB	2.0	Maritime Associates Pte Ltd.	Singapore
23	NAPA Stability	STBA	Napa Ltd.	Finland
24	NAPA Loading Computer	D/Including Grain Loading (TE & UTE)	Napa Ltd.	Finland
25	NAPA Loading Computer	D/Including Grain Loading (TE & UTE)	Napa Ltd.	Finland
26	NavantiaSystems Loading Instrument (NSLI) (formerly known as SIMBAZ)	NSLI T2 191107	Navantia S.A.	Spain
27	NavantiaSystems Loading Instrument (NSLI)	NSLI T3 210219	Navantia S.A.	Spain
28	**iStow**	**2.0**	**PT Pranala Digital Transmaritim**	**Indonesia**
29	SeaWeigh	4.2	QinetiQ Ltd	United Kingdom
30	MULTILOAD for Windows	4.0	S.A. Malliaroudakis Maritime (UK) Ltd	United Kingdom
31	LOCOPIAS	44409.0	SARC BV	Netherlands
32	CLOAD	6.1.1	Sea Control System Corporation Limited	China
33	LR SEASAFE Onboard (GStab)	3.2	Seasafe Marine Software & Computation (UK) Ltd.	United Kingdom
34	Smart Load	1.0	Shanghai SDARI Marine & Offshore Engineering CO., Ltd	China
35	TANKSTAR	1.0.7801	TANK STAR B.V	Netherlands
36	SHIPMANAGER88	8.0	Techmarine S/W Co. Ltd.	Republic of Korea
37	TSB Supercargo (Container Ships)	6.2	Total Soft Bank Ltd.	South Korea
38	TSB Supercargo (Container Ships)	7.0	Total Soft Bank Ltd.	South Korea

source: https://maritime.lr.org/l/941163/2022-01-25/2vjst/941163/1643125463tlqlby2i/lcs_posturl5_valid_2021_03_03.pdf (5 September 2022)

Products approved by Lloyd’s Register worldwide:
Indonesia: salah satu dari 20 negara produsen loading software dunia yang tersertifikasi LR.

Pendaftaran Paten & Hak Cipta ...

(19) Bundesrepublik Deutschland
Deutsches Patent- und Markenamt

(10) **DE 10 2004 031 977 A1** 2006.01.19

(12) **Offenlegungsschrift**

(21) Aktenzeichen: **10 2004 031 977.4**
(22) Anmeldetag: **25.06.2004**
(43) Offenlegungstag: **19.01.2006**

(51) Int Cl.⁸: ***B65G 67/60*** (2006.01)
B63B 25/22 (2006.01)
G06F 17/30 (2006.01)

(71) Anmelder:
Nugroho, Setyo, 12157 Berlin, DE

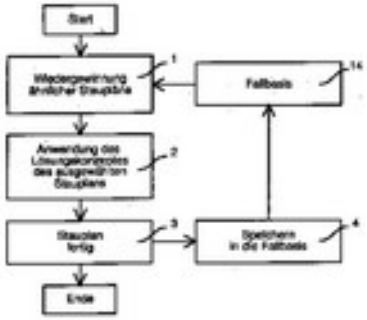
(72) Erfinder:
gleich Anmelder

(74) Vertreter:
Anwaltskanzlei Gulde Hengelhaupt Ziebig & Schneider, 10179 Berlin

Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

(54) Bezeichnung: **Verfahren zur Erstellung eines Stauplanes für Containerschiffe**

(57) Zusammenfassung: Ein Verfahren zur Beschleunigung des Prozesses der Stauplanung für Containerschiffe wird hiermit vorgeschlagen. Das Verfahren beruht auf dem Prozess des Erinnerns daran, wie alte ähnliche Probleme gelöst worden waren. Alte Staupläne werden systematisch in der Fallbasis gespeichert. Bei jeder neuen Stauplanungsaufgabe wird auf solche Fälle zurückgegriffen. Der Planer hat die Gelegenheit, einen ähnlichen Fall auszuwählen, dessen Lösungskonzept auf das jetzige Stauplanungsproblem anzuwenden und ihn oft zu modifizieren. Das Verfahren ist ein lernendes System, wobei jeder neu in der Fallbasis gespeicherte Stauplan die Lösungsfähigkeit des Systems erhöht.



(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG

(19) Weltorganisation für geistiges Eigentum
Internationales Büro

PCT

(43) Internationales Veröffentlichungsdatum
5. Januar 2006 (05.01.2006)

(10) Internationale Veröffentlichungsnummer
WO 2006/000462 A1

(51) Internationale Patentklassifikation⁷: **G06F 17/60**, B65G 63/00

(21) Internationales Aktenzeichen: PCT/EP2005/007003

(22) Internationales Anmeldedatum: 27. Juni 2005 (27.06.2005)

(25) Einreichungssprache: Deutsch

(26) Veröffentlichungssprache: Deutsch

(30) Angaben zur Priorität:
10 2004 031 977.4 25. Juni 2004 (25.06.2004) DE

(71) Anmelder und
(72) Erfinder: **NUGROHO, Setyo** [ID/DE]; Peter-Vischer-Str. 42, 12157 Berlin (DE).

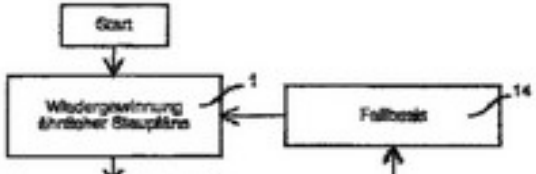
(74) Anwälte: **HENGELHAUPT, Jürgen,** D. usw.; Gulde Hengelhaupt Ziebig & Schneider, Wallstrasse 58/59, 10179 Berlin (DE).

(81) Bestimmungsstaaten *(soweit nicht anders angegeben, für jede verfügbare nationale Schutzrechtsart)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ,

[Fortsetzung auf der nächsten Seite]

(54) Title: METHOD AND SYSTEM AIDING WITH THE ESTABLISHMENT OF STOWAGE PLANS FOR CONTAINER VESSELS, CORRESPONDING COMPUTER PROGRAM, AND CORRESPONDING COMPUTER-READABLE STORAGE MEDIUM

(54) Bezeichnung: VERFAHREN UND ANORDNUNG ZUR UNTERSTÜTZUNG DER STAUPLANERSTELLUNG FÜR CONTAINERSCHIFFE SOWIE EIN ENTSPRECHENDES COMPUTERPROGRAMM UND EIN ENTSPRECHENDES COMPUTERLESBARES SPEICHERMEDIUM



(57) Abstract: Disclosed is a method for accelerating the stowage planning process for container vessels. Said method is based on a process which remembers how previous similar problems were solved. Former stowage plans are systematically stored in a case base. Such cases are used for each new stowage planning task. Planners can choose a similar case, apply the solution concept thereof to the current stowage planning problem, and frequently

Transformasi digital …

CATATAN PENUTUP

- **Kebijakan & regulasi modern**: intensif teknologi
  - Non compliance >>> klaim & premi asuransi
- **Transformasi digital**: imperatif
  - Untuk produktivitas DAN keselamatan pelayaran

Terimakasih

www.iStow.id