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Maritime & Port Operations Efficiency 2012

Overview on Operations, Development and Finance

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Overview

- Planning & Development
  - Market
  - Planning
  - Costs
- Marine Operations
  - Pilotage
  - UKC
- Maintenance
  - Reliability Centered Maintenance
- Regulations/Approvals
  - Stakeholder

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Who are we?

Our role, our experience, our knowledge…

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David Wignall

Born and brought up in the North of England

Married to Carolyn with three children, Mark 20, Richenda 18, Lucy 16

Live in Singapore, has lived in Jakarta, Bangkok, Hong Kong , Sweden and UK

Run my own a Port Development and Consulting Company with about 20 other, previously I was:

- Responsible for developing a group of ten ports in Europe turning them from a loss making State Owned Enterprise into a profitable private company
- Head of Port & Logistics of the worlds largest independent maritime research company

I plan and finance port developments with ongoing projects including:

- Coal Terminal investment of US$ 400 million in Africa
- Container Terminal of US$ 1,500 billion in Canada
- Oil Products Terminal of US$ 500 million in Malaysia

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What is your business?

- Port Authority
  - Can you bid for the Government budget?
  - Do you have the right to talk as a Government body?
  - How well do you know your legal position?
- State owned company
  - Strong balance sheet?
  - Is this your sector?
- A developer with an idea
  - Have you experience in the sector?
  - How much cash do you have?
  - Do you own the commodity/seabed/anchorage?
- An international port operator/stevedore
  - Why are you here?

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Who are you?

- Managing Director/CEO
  - Miner
  - Commodity trader
  - Shipping line
- Engineer
  - Planner
  - Detailed design
- Commercial Manager
  - Marketing/Business Development
  - Contracts
- Finance Manager
  - Treasury
  - Management accounts

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Ports as a Business

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The Opportunity

- Improving the economy
  - Access
    - Coal mines
    - Markets, concentration/scale
  - Freight rates
    - Direct shipping of container
    - Ability to generate competition
    - Capacity surplus
- Commercial reasons
  - Investment return, Capital gain
  - Cash generation
  - Security of logistics, Cost reduction

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What matters most?

- The market…
  - Access
  - Sustainability
  - Volumes, Tariff rates and structure
- Regulatory position and approvals
- CAPEX
  - What is sensitive and what is not
- Business, Commercial and Financial Structure
  - Business Model
  - Partners
  - How you fund
- and the others…
  - OPEX
  - Tax etc…

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Markets

- What does an opportunity look like?
  - Market, by sectors
    - Containers
    - Petroleum/Vegetable Oils/Bio Diesel
    - Coal
    - Grain/Fertilizer
- Long term/Sustainable
  - Iron ore in India?
- Competition
  - Existing players
  - Change of use
  - Alternative logistics routes
  - Greenfield
  - Market changes

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Business Opportunities

	Existing Services	Extended services	New services
Existing Markets	Share of Customer New Customer Penetrate catchment area	Extended reefer services Empties depot Lashing	Local transport Container repair Port Services
Extended Markets	Extend catchment area Develop shipper relations New feeders	Inspection services Administration services	Built network Intermodal services
New Markets	Penetrate emerging areas	CFS Cold Storage	Warehousing Distribution centres

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Oil Tanking

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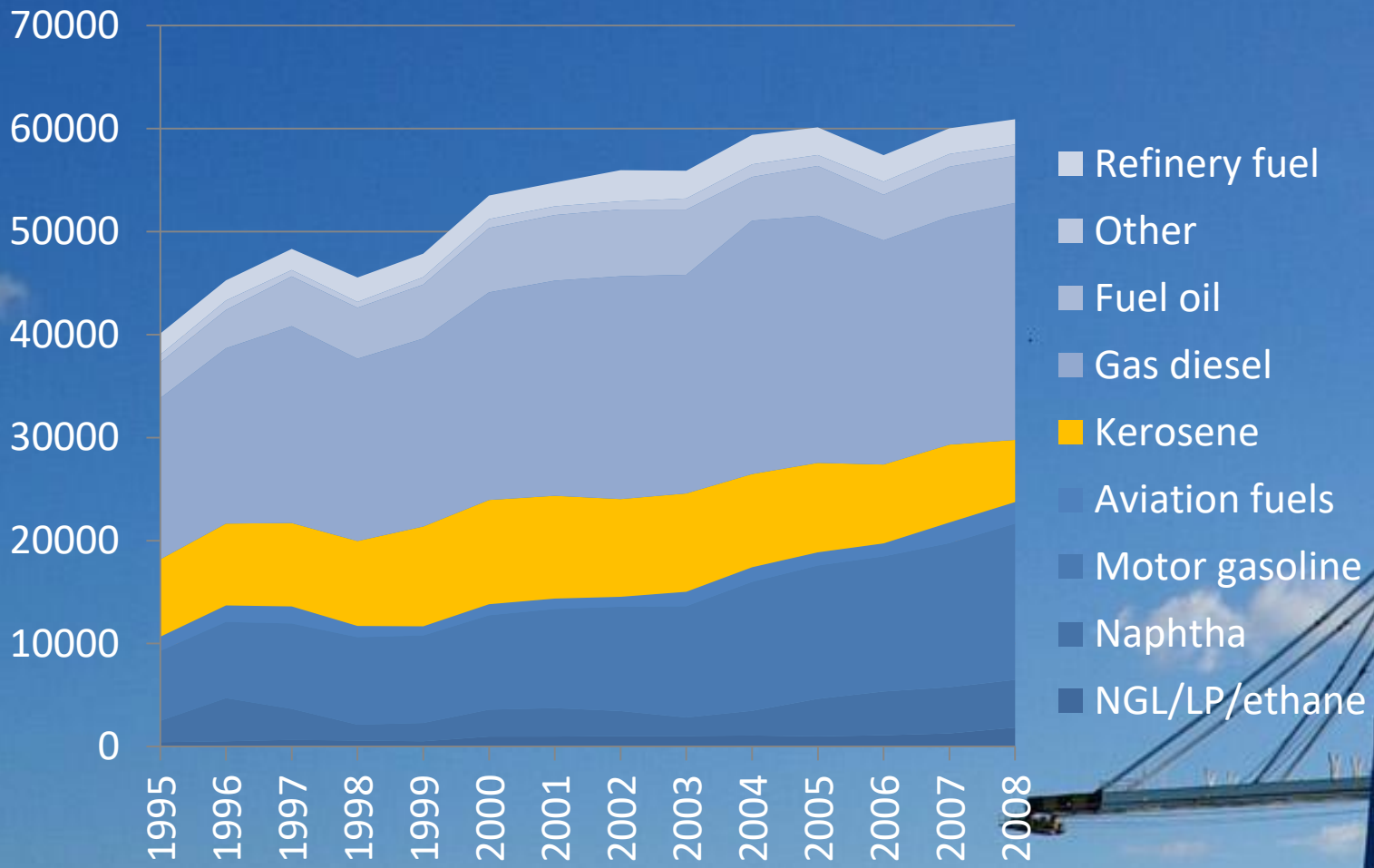
Product demand



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Strategic Storage

- Requirements of IEA:
  - 90 storage for energy requirements
- Current capability:
  - 28 days or less for members
  - 14 days of less for non members
- Korea, China & Japan ahead
- Other contracts out everywhere
  - Europe to Asia etc…

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Forecast of demand

	Two Crises One Recovery			One Crisis One Recovery		
	Growth Rate	2020	2030	Growth Rate	2020	2030
NGL/LP..	9.9%	5,713	14,660	12.2%	7,343	23,225
Naphtha	4.0%	7,445	11,041	11.6%	17,350	52,071
Motor gas	5.7%	29,334	50,834	6.0%	30,425	54,351
Av. Gas	2.1%	2,692	3,319	6.7%	4,559	8,722
Kerosene	-2.6%	4,380	3,353	-3.1%	4,153	3,041
Gas diesel	1.7%	28,144	33,301	2.7%	31,491	40,919
Fuel oil	-0.5%	4,326	4,124	-0.8%	4,179	3,871
Other	5.4%	2,072	3,500	6.8%	2,441	4,727
Ref. Fuel	1.6%	2,969	3,485	0.3%	2,545	2,627
	Forecast	87,074	127,616	Forecast	104,484	193,555
	Bunkers	440	440	Bunkers	440	440
		87,514	128,056		104,924	193,995

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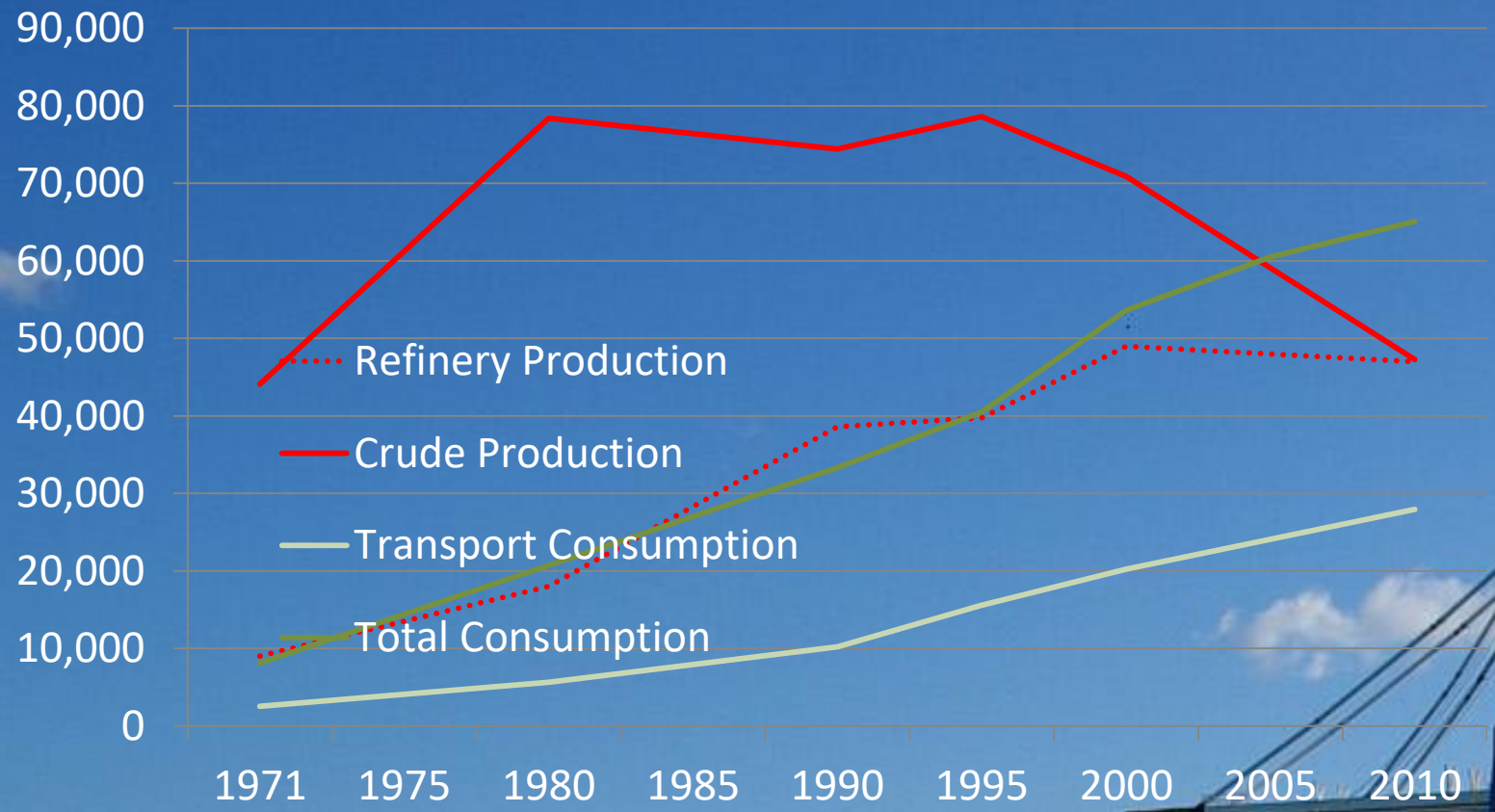
Crude and refining statistics



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Refineries…

- *"Although there will still be a gap between supply and demand in 2017, we won't have to import refined products"* April 2010

- *"A study suggests the project is not economically viable. But, we are not saying we will drop the project as we still need to discuss this with our partners"* September 2010

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Demand forecast

Description	Two Crisis		One Crisis	
	2020	2030	2020	2030
Total forecast consumption	87,514	128,056	104,924	193,995
Existing Refinery Capacity	47,000	47,000	47,000	47,000
Existing net imports	13,000	13,000	13,000	13,000
New domestic capacity	20,000	20,000	20,000	20,000
Forecast of net imports	33,514	74,056	50,924	139,995

- 5 million m^3 storage required over next 10 years maintain status quo in supply security and quality
- To meet “real” demand efficiently in the order of 15 million m^3 required

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Competition

Company/Development	2000	2006	2010	2013	Comment
Grand Total	15,078	15,078	15,717	18,517	Mostly crude storage
Pertamina	14,888	14,888	14,914	14,914	Mostly crude storage
Oiltanking	0	0	283	283	Facility being used for trading
TEP	0	0	100	100	Small scale operations
Vopak	0	0	198	198	
Dovechem	62	62	62	62	Small scale operations
Sinopec JV				2,600	Permissions not complete
Bangka (Mberutu)				100	SBM /50,000 DWT tanker
East Java (Mberutu)				100	50,000 DWT largest tanker
Others	128	128	160	160	Shell, BP and Petronas etc.
Effective 3rd Party Storage	190	190	803	3,603	

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Tariff forecast

	Penang	PTP	Singapore	North-port	West-port	Tanjung Priok
20' FCL	$ 66	$ 57	$ 107	$ 73	$ 73	$ 83
40' FCL	$ 94	$ 83	$ 154	$ 110	$ 110	$ 125
20' EMT	$ 66	$ 32	$ 57	$ 73	$ 73	$ 62
40' EMT	$ 94	$ 45	$ 84	$ 110	$ 110	$ 93

- Supply of capacity restricted
- Utilization rates high
- Discounts
  - Terminal operators resistant due to change in returns
  - Capacity constraints make them difficult to obtain
- Forecast for the future
  - Difficult to see rapid change to existing level of competition
- Long term Tariff Levels
  - Full TEU US$ 84, Full FEU US$ 125

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Building Market Understanding

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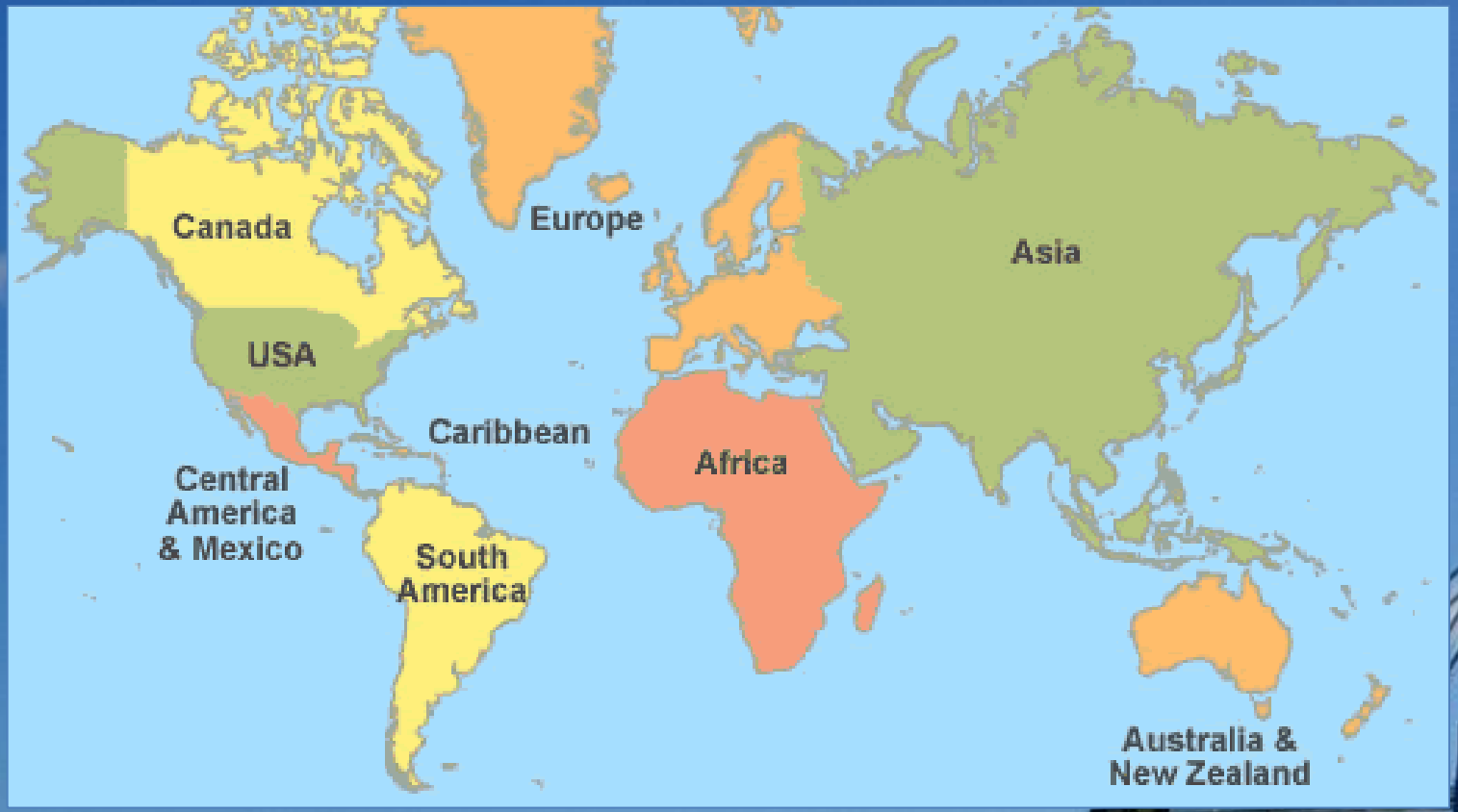
Location, Location, Location



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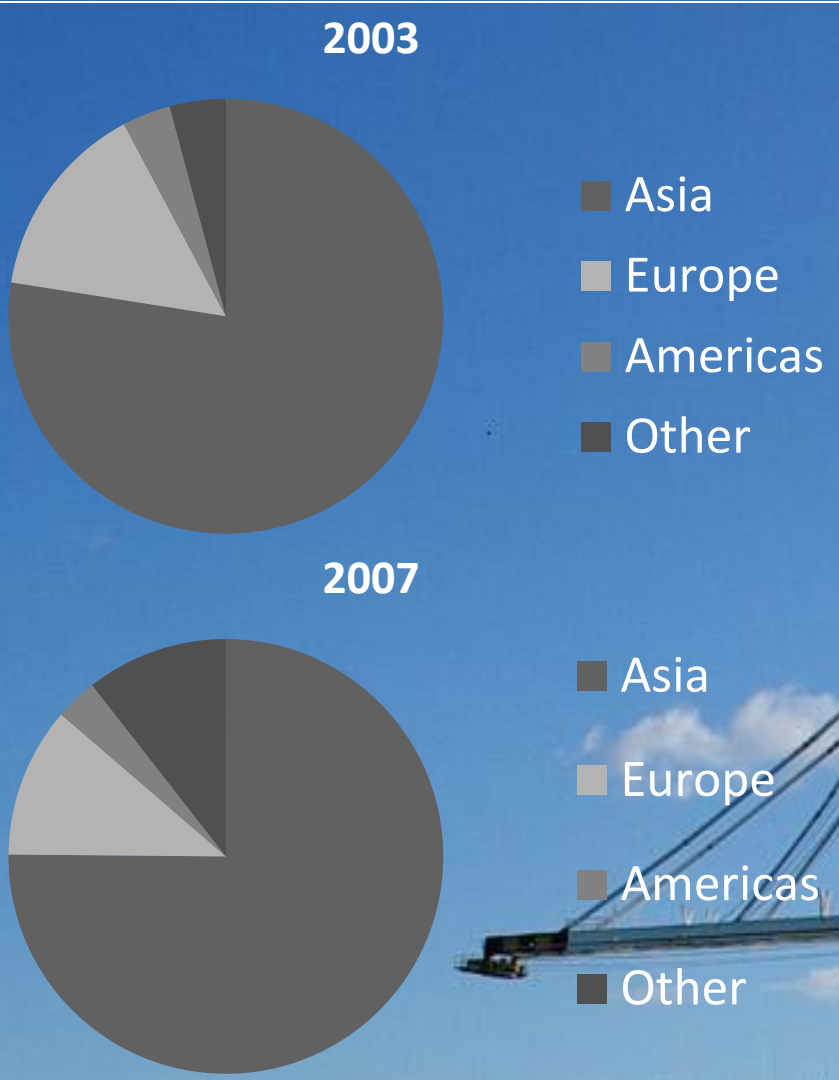
Export markets

- 2003
  - Domestic, 29mt
  - Export, 86mt
- 2007
  - Domestic, 17 mt
  - Export, 140 mt
- 2020
  - Export 500 mt+



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Indonesian coal production

- Prospects are generally good:
  - Indonesia has large coal reserves and resources relatively close to ports
  - Indonesia is close to major Asian markets
  - High world energy prices likely
    - In stable periods coal prices driven by production cost
    - In periods of high or rising energy prices thermal coal prices driven by the energy equivalent prices of alternative fuels minus a “coal discount”
    - Coal can substitute for natural gas and heavy fuel oil in many industries such as power production and cement manufacturing
- But coal is a high-carbon fuel….

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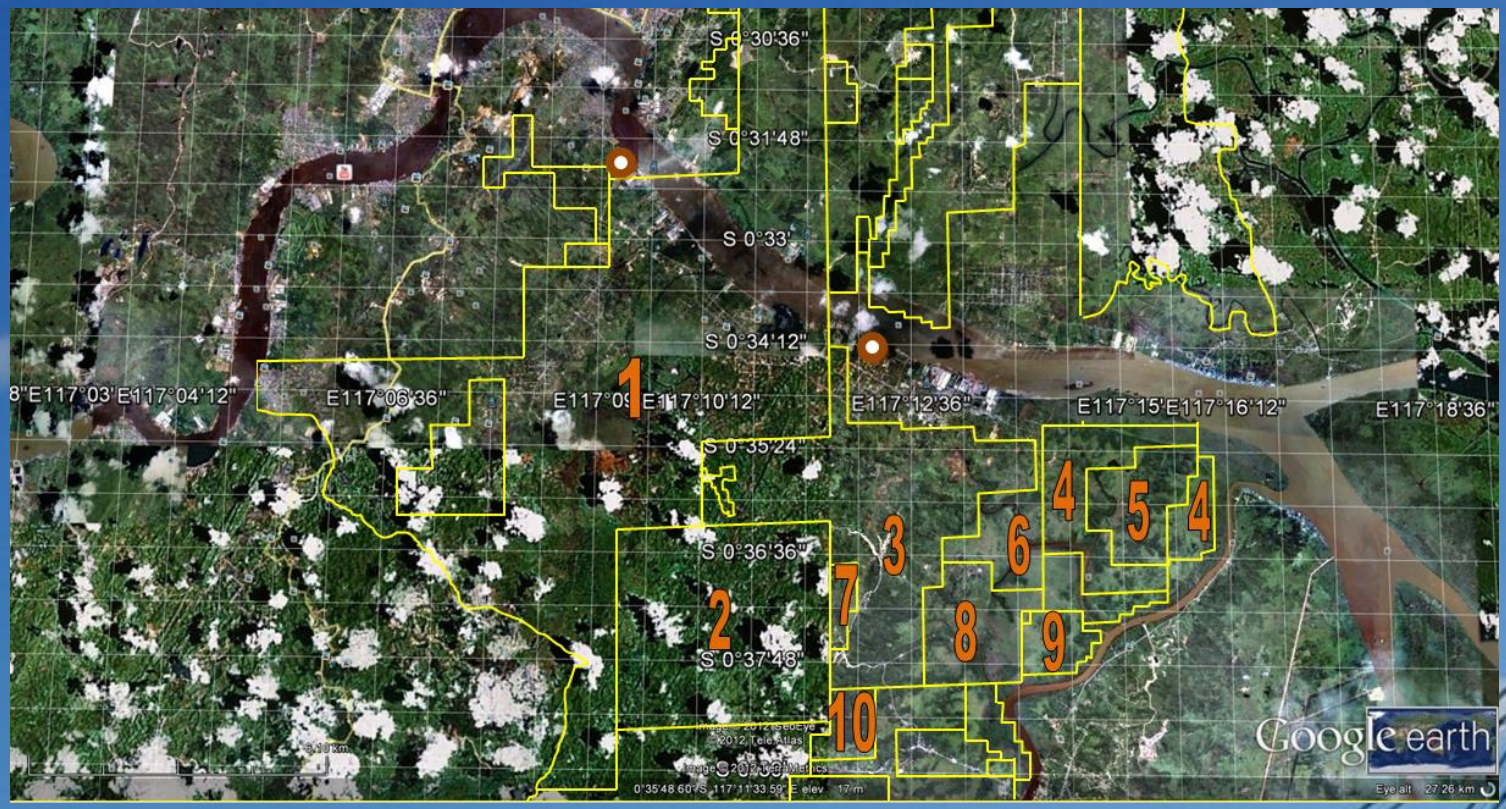
2012 and the fall in the coal price

- Coal price down 20 to 25%
  - Testing US$ 80/t
  - Still well above US$ 45 to 50/t long term price
- Short term effect
  - Pull back in key markets, China...
  - New coal capacity coming on line
  - Projects being deferred or cancelled
  - Production being scaled back
- Long term competitive position
  - Production costs, variable but in general low
  - Government take, low in international terms
  - Logistics costs
    - Haul distance to river, Length of river, Transhipment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Coal production

Concession	Production (kilo tonnes)				
	2007	*2008*	*2009*	*2010*	*2011*
1	178	772	1008	2228	4,222
2	-	-	5	111	555
3	25	140	585	535	3,200
4	-	5	65	86	444
5	-	60	430	300	540
6	-	-	-	-	60
7	-	105	30	260	*350*
8	-	-	110	16	55
9	-	-	-	10	55
10	-	-	115	460	780
	203	1,082	2,348	4,006	10,261

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Sustainability of production

Concession	Resource	Reserves	Est. Life	Quality		
				kCal	S	M/C
1	1,200	500	50	5,000 to 6,400	0.2 to 2.4%	15%
2	20	15	10	4,700 to 5,300	1%	18%
3	10	25	10	4,500 to 4,700	1%	17%
4	5	15	10	4,700 to 4,900	2%	16%
5	5	15	10	4,700 to 4,900	2%	16%
6	5	15	10	4,500 to 4,700	1%	17%
7	40	100	20	4,700 to 5,300	1%	18%
8	10	50	15	4,700 to 5,300	1%	18%
9	10	80	20	4,700 to 4,900	2%	16%
10	20	100	20	4,700 to 5,300	1%	18%

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Competitiveness and logistics

Concession	Production Capacity	After Invest?	Method	Production costs	Logistics
1	4,920	6,000	Open cast	12 to 15	Own jetty
2	1,200	No plan	Open cast	18 to 20	10
3	4,000	No plan	Open cast	12 to 14	8
4	500	No plan	Open cast	15	14
5	Variable	No plan	Open cast	17	14
6	Variable	No plan	Open cast	17	14
7	500	No plan	Open cast	18	8
8	200	No plan	Open cast	14	10
9	250	No plan	Open cast	14	15
10	1,000	No plan	Open cast	19	16

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Barge jetties on the Mahakam River

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Barging on the Mahakam River

- Most barging on the river is by specialist contractors
  - Mix of 4,000 to 8,000 DWT barges used
  - Large pool of tugs and barges 300+
  - Take or pay contracts used for time charters (COA form)
- Charter rates:
  - US$ 70,000 per month
  - US$ 9.0 /t from Bunyot
  - US$ 6.5 /t from Selerong
  - US$ 2.0 /t minimum
- Stevedore and transhipment charges
  - Complex cost structure
  - Estimates US$ 0.5 to 1.5 /t for loading (sometime “in house”)
  - Estimated US$ 2.0 to 2.5 /t for unloading
  - Estimated US$ 1.5 to 2.5 /t for transhipment

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Target markets and design ship

Ship Type	*Capacity*	*Beam*	*Draft*	*Length*
Capesize	175,000 DWT		18.0 m	289 m
Small Capesize	125,000 DWT		16.5 m	289 m
New Panamax	105,000 DWT		15.0 m	up to 366 m
Panamax	80,000 DWT	32.8m	12.1 m	224 m
Handy-max	50,000 DWT	31 m	11.3 m	180 m

- Markets
  - "Chinamax" 400,000 DWT long distance ore trades
  - China, Panamax and Capes
  - India, Vietnam Handy-max to Supra-max
- New Panamax to Cape cost increase > 5%
- Target small Capes?

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The competition – at berth

Port Name	Tanjung Bara	Bontang	Balikpapan	Deep Water	Miang Besar
Stockpile Capacity	1,000,000 t	350,000 T	1,040,000 T	Not available	1,000,000 t
Ave. Loading Rate	80,000 t/day	50,000 t/day	50,000 t/day	50,000 t/day	100,000 t/day
Loading Facility	2 Quadrant Loaders	Quadrant Luffing Loader	Conveyor or Ship Loader	Ship Loader	Ship Loader
LOA	310m	250m max	235m	Not available	389m max
Beam	50m	No restriction	45m	No restriction	65m max
Draft	17.25m	13.5m max	13m LWS	20m	31m max
DWT	210,000	90,000	90,000	200,000	400,000
Bunker Available	No	No	No	No	No
Working Hours	24 Hours	24 Hours	24 hours	24 Hours	24 Hours

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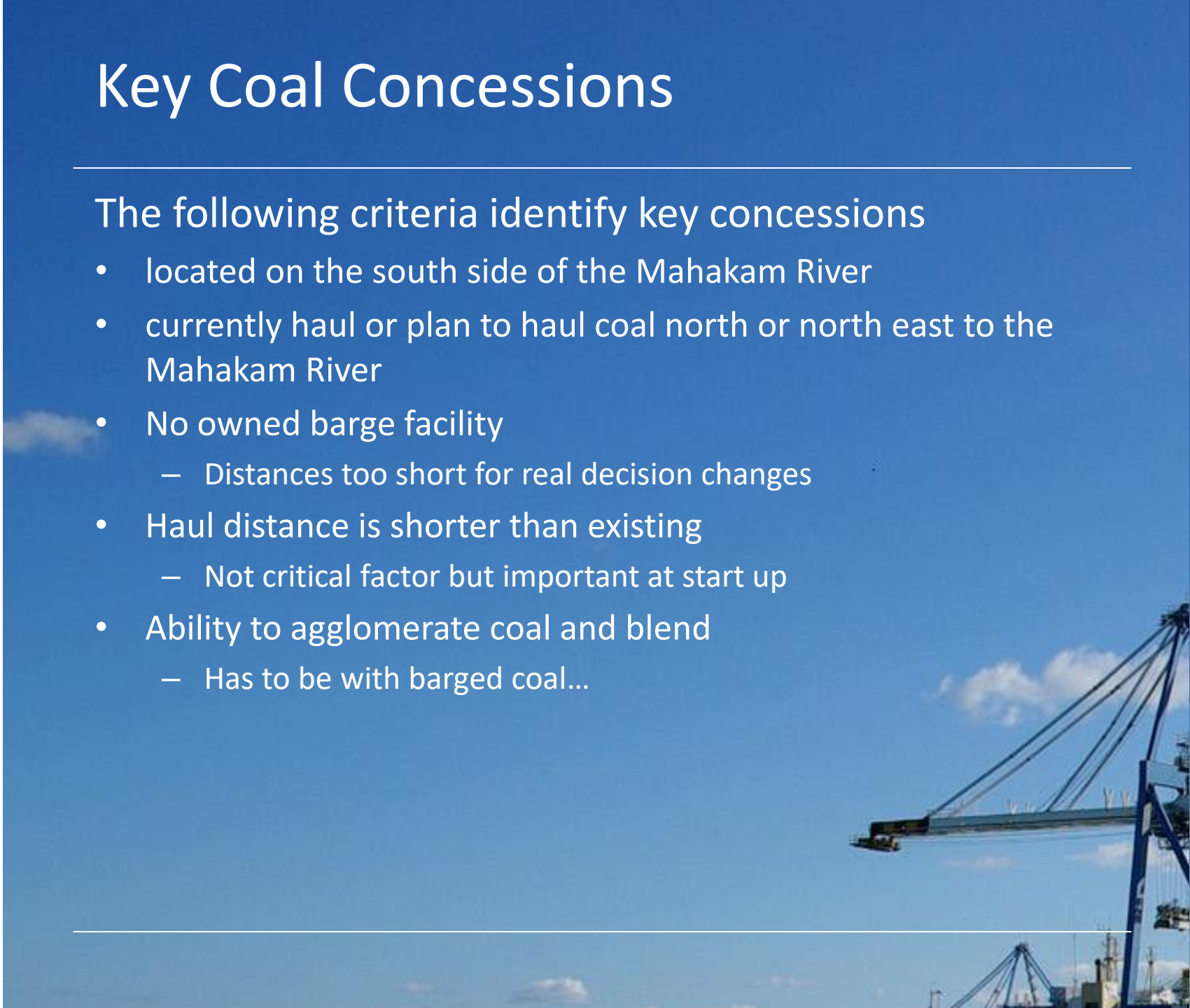
Key Coal Concessions

The following criteria identify key concessions

- located on the south side of the Mahakam River
- currently haul or plan to haul coal north or north east to the Mahakam River
- No owned barge facility
  - Distances too short for real decision changes
- Haul distance is shorter than existing
  - Not critical factor but important at start up
- Ability to agglomerate coal and blend
  - Has to be with barged coal…



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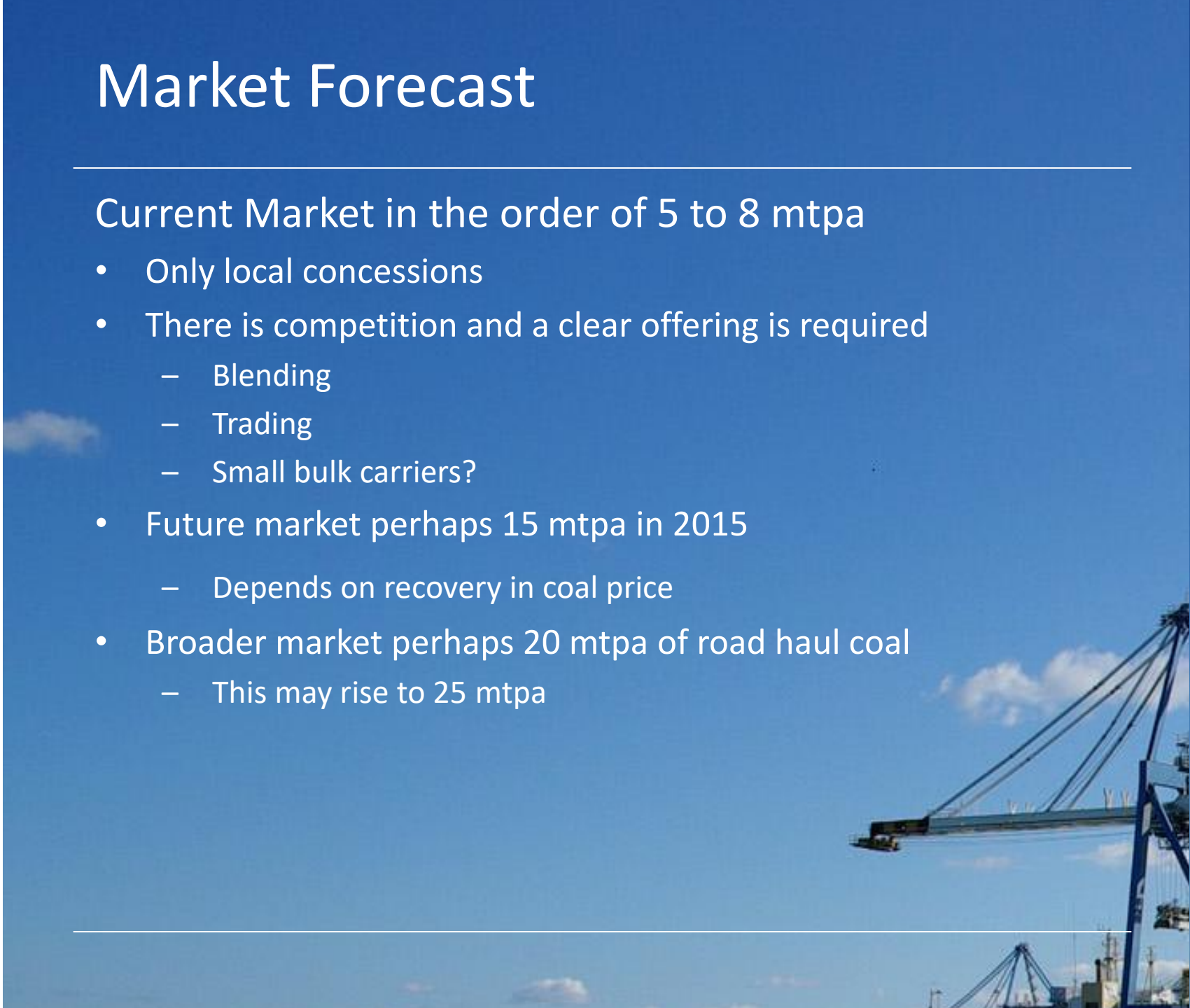
Market Forecast

Current Market in the order of 5 to 8 mtpa

- Only local concessions
- There is competition and a clear offering is required
  - Blending
  - Trading
  - Small bulk carriers?
- Future market perhaps 15 mtpa in 2015
  - Depends on recovery in coal price
- Broader market perhaps 20 mtpa of road haul coal
  - This may rise to 25 mtpa



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Tariff – Handling

- High bound scenario
  - based on the terminal being permitted to take in some of the economic and cost benefits the terminal delivers
  - US$ 3.0 /t upwards
- Anticipated scenario
  - matching overall costs/tariff charged by existing logistics
  - US$ 2.0 /t
- Low scenario
  - Based on cost saving to key concessions
  - US$ 1.0 /t

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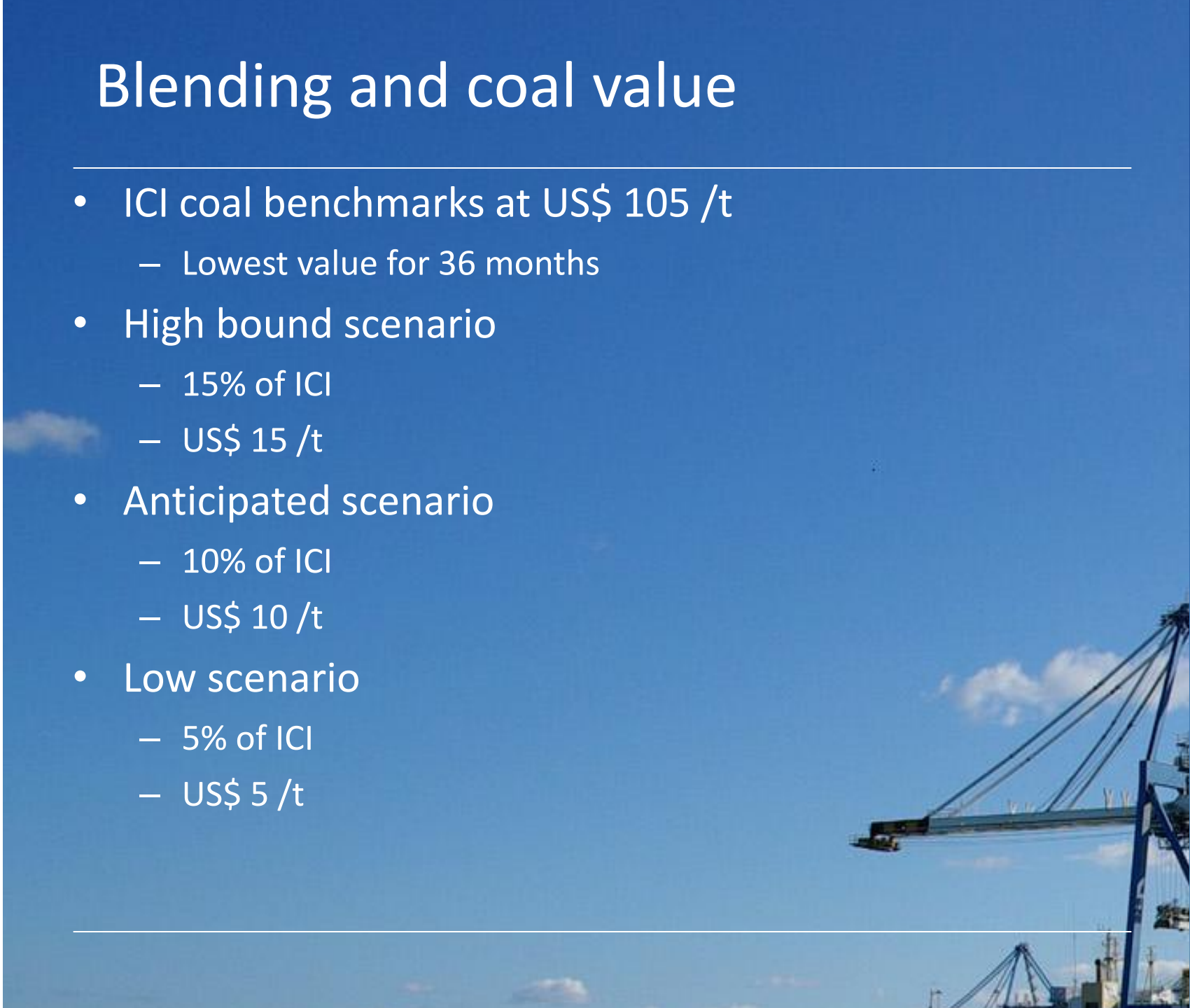
Blending and coal value

- ICI coal benchmarks at US$ 105 /t
  - Lowest value for 36 months
- High bound scenario
  - 15% of ICI
  - US$ 15 /t
- Anticipated scenario
  - 10% of ICI
  - US$ 10 /t
- Low scenario
  - 5% of ICI
  - US$ 5 /t



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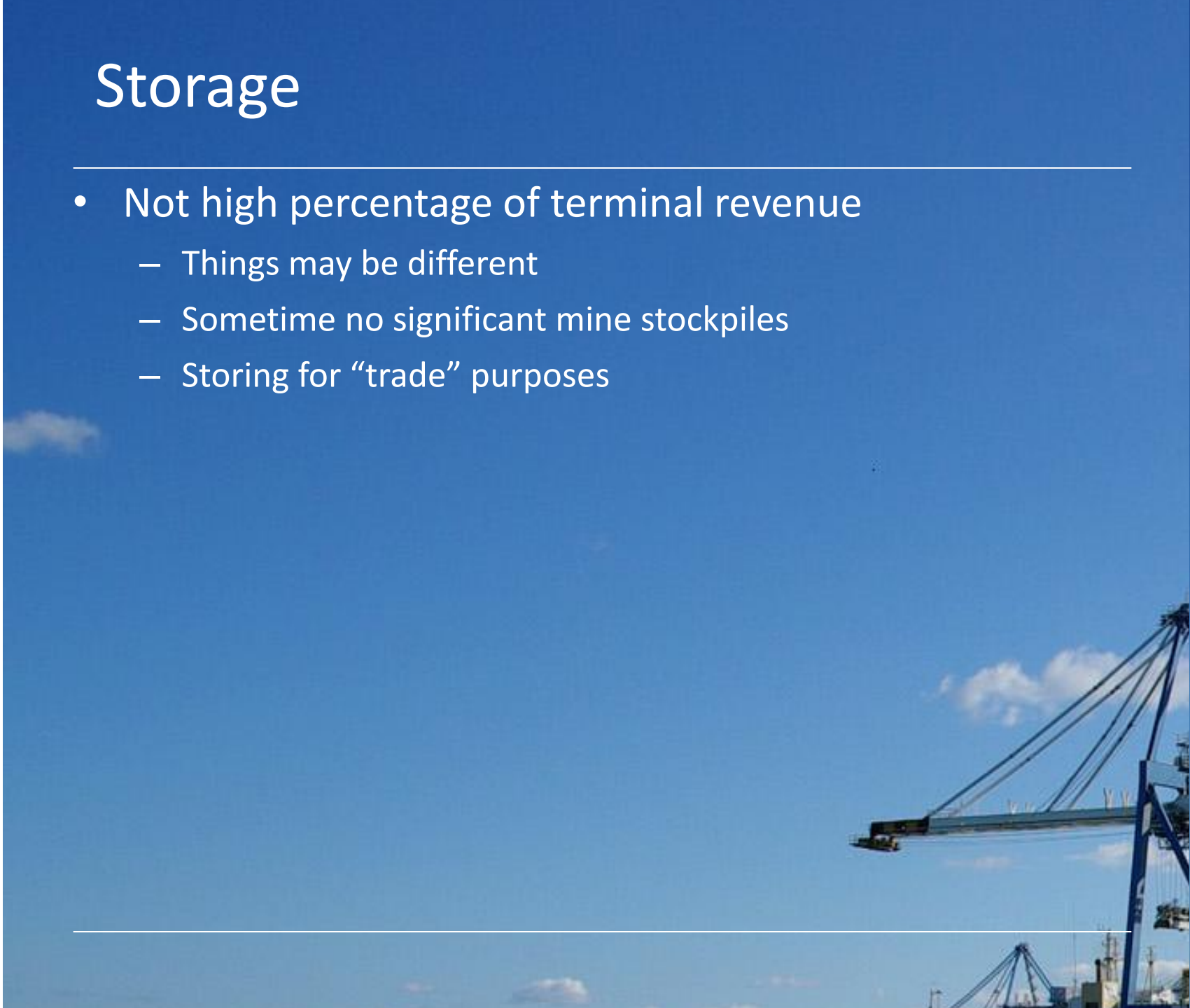
Storage

- Not high percentage of terminal revenue
  - Things may be different
  - Sometime no significant mine stockpiles
  - Storing for “trade” purposes



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Building the Market/Business Case

Customer	Product	Contract capacity ('000s cbm)	Length of contract (yrs)	Renewal option	Renewal date	Years to renewal (from 31 Dec 2006)	% share of contracted capacity	Customer since >5yrs	Customer since >10yrs
Contracts for existing capacity									
Customer A	CPP	160	3	✓	31-May-08	1yr 5mth	13.5%	✓	
Customer B	CPP	86	2	✓	31-Jul-08	1yr 7mth	7.2%		
Customer C	CPP	124	3	✓	31-Dec-09	3yr	10.5%	✓	✓
Customer D	CPP	43	1	✓	31-Dec-07	1yr	3.6%		
Customer E	CPP	122	5	✓	28-Feb-12	5yr 2mth	10.2%	✓	✓
Customer F	CPP	63	2	✓	31-Jul-08	1yr 7mth	5.3%		
Customer G	CPP	8	3		30-Nov-07	11mth	0.6%	✓	
Customer H	CPP	8	8		31-Dec-09	3yr	0.6%	✓	
Customer I	CPP	161	5		31-Aug-08	1yr 8mth	13.6%	✓	✓
Customer J	CPP	79	3	✓	31-Dec-09	3yr	6.7%		
Customer K	CPP	163	2	✓	31-Dec-07	1yr	13.8%	✓	✓
	FO	170	2	✓	31-Dec-07	1yr	14.3%	✓	✓
		1,186					**100%**		
Contracts for capacity under construction								Contract commencement	
Customer L	Biodiesel	29	15		NA	NA	NA		
		1,215							

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Contracting

- Finance, risk and security of return
- Length of contract
  - Need for security
  - Ability to take advantage of market conditions
- Key terms
  - Take or pay
  - Volume guarantee
  - Revenue guarantee
  - Rates per tonne
  - Volume discount (?)

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Contracting – Lateral Thinking

- If your counterparties are men of straw what can you do?

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Planning & CAPEX

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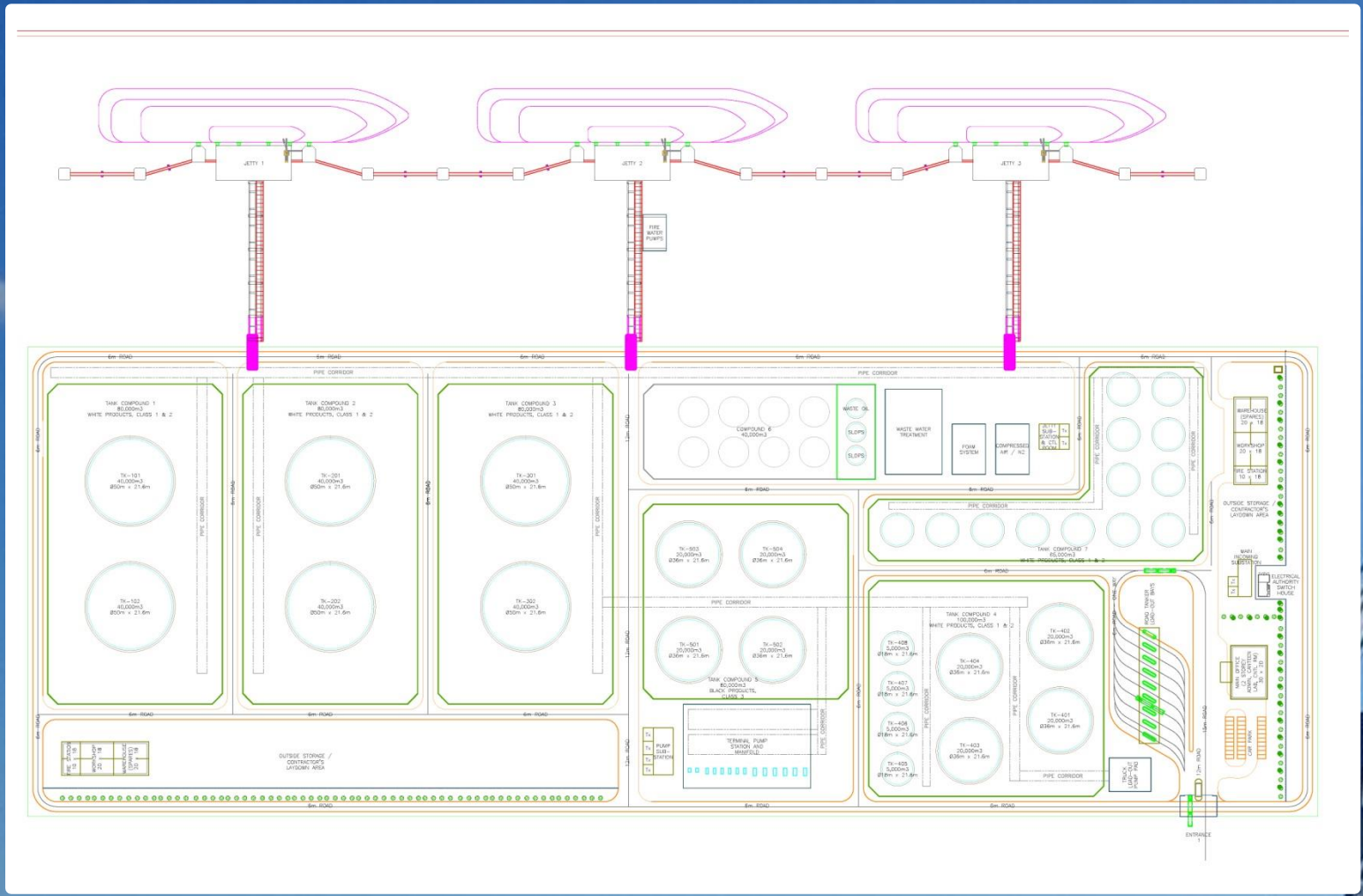
Physical & Ops. Planning



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Physical & Ops. Planning

- Layout decisions
  - Interior channel width, turning circles
  - Layout, equipment, terminals
- Dredging
  - Scale
  - Pump ashore/dump
  - Contaminated spoil?
- Breakwater
  - Wave climate requirements
- Form of structure
  - Suspended deck makes/reclaim example
  - Cost based decision
- Contract strategy…
  - Design, build, finance

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Design & Planning Parameters

- Design ship
  - 2,000 to 4,000 TEU
  - 280 m LOA
  - 32.8 m beam
  - Draft required 14 m
- Ship to shore
  - Mobile harbour cranes, more flexible
  - Gantries, statement of intent
- Storage yard
  - Reach stackers
  - Fork lift trucks
  - Rubber tired gantries

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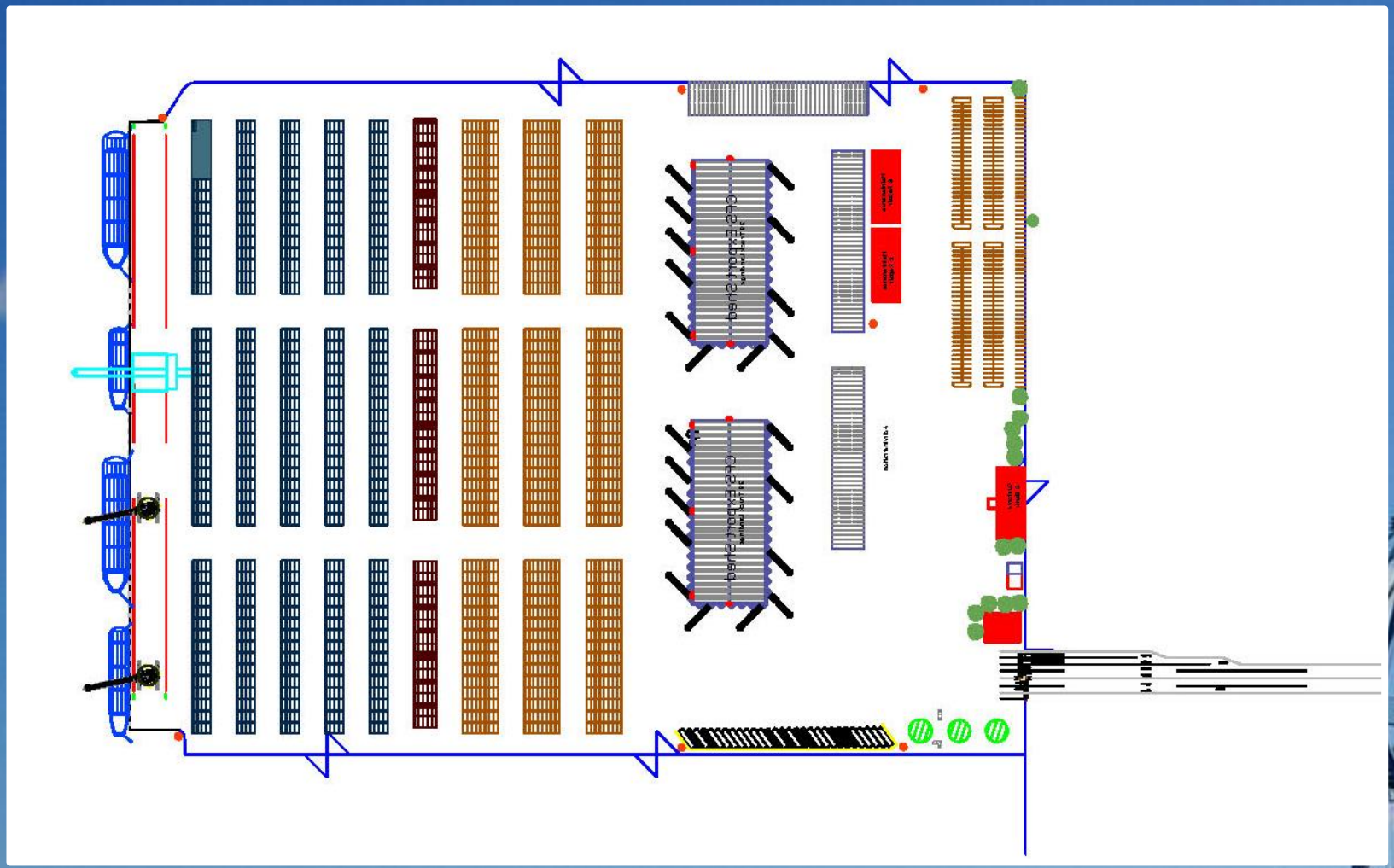
Initial layout



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Initial development strategy

- 2020 target volume 300,000 to 350,000 TEU
- Traffic to be 80% transhipment with 20% coming in or out as general cargo; 20% local traffic by road…
- Initial terminal area to be developed in phases over 20 years, 500 by 500m with target capacity 500,000 TEU/year
- Initial phase 320m long with yard depth of 250 to 320m
- A series of yard extensions and improvements
- A long term development area (for 20 years onward) to be reserved adjacent to the terminal this to be a 500 by 500m plot
- Logistics support areas required outside the terminal
- Initial ship to shore equipment MHCs rails built into terminal
- Initial yard equipment to be reach stackers and fork lifts
- A staged program to be developed to upgrade to gantries and RTGs over a five to twenty year period

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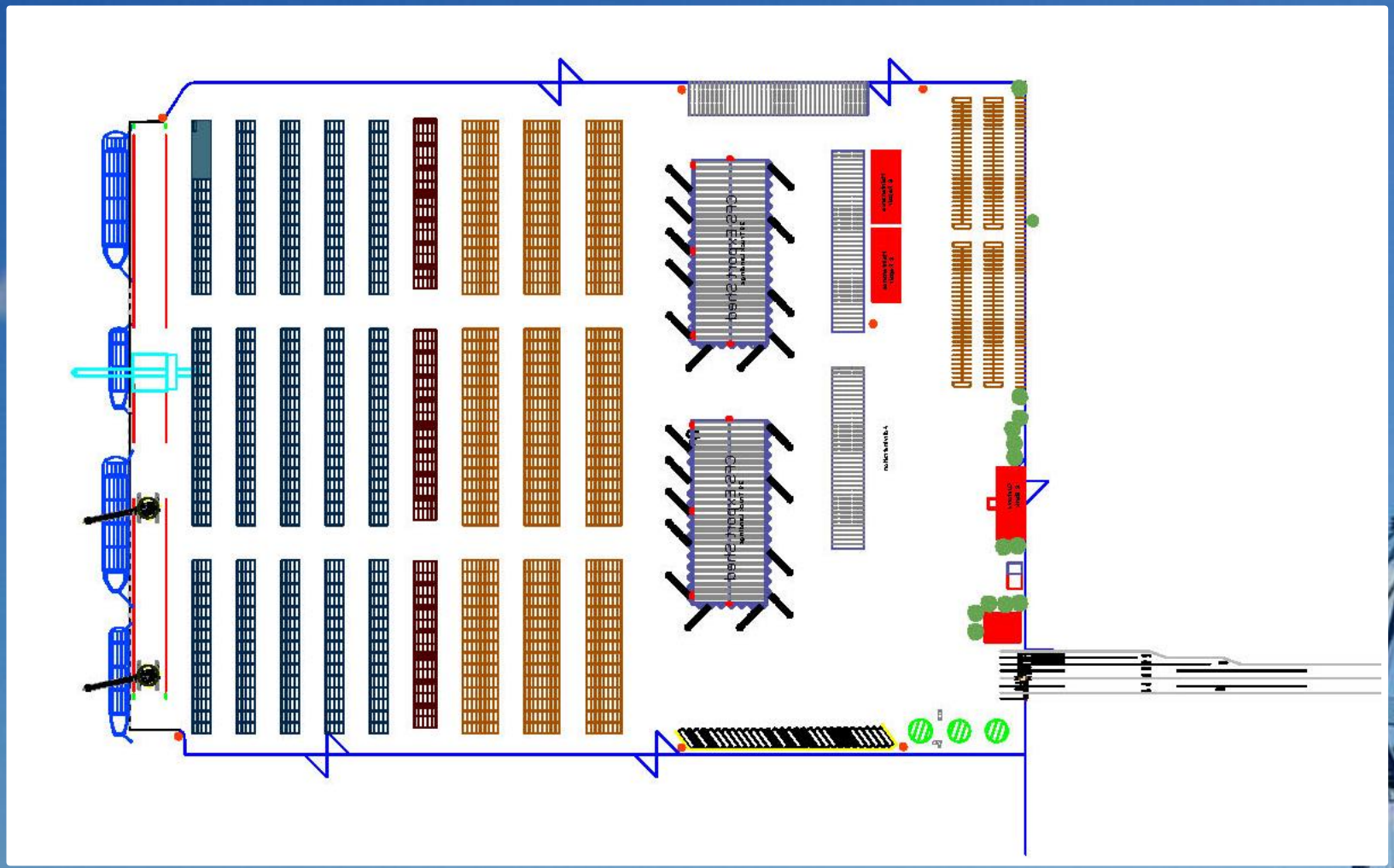
Initial layout



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Phase 1 Cost Estimate

No	Description	Unit	Rate	Quantity	US$
Infrastructure					
1	Dredging	m^3	$5	0	$0
2	Reclamation	m^3	$10	300,800	$3,008,000
3	Quay	M	$60,000	320	$19,200,000
4	Coastal Protection	M	$12,500	320	$4,000,000
5	Roads	M	$1,000	640	$640,000
6	Stack Yard	m^2	$80	134,400	$10,752,000
7	Buildings	m^2	$250	5,000	$1,250,000
8	Electrical	Sum	5%	-	$1,942,500
9	Miscellaneous	Sum	10%	-	$4,079,250
10	Access Road	Km	$500,000	5	$2,500,000
Equipment					
1	MHC	Nos.	$1,750,000	2	$3,500,000
3	Road Units	Nos.	$80,000	12	$960,000
4	EC	Nos.	$250,000	5	$1,250,000
5	TOS		$500,000	1	$500,000
				Total	**$53,581,750**

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Phase 2 Cost Estimate

No	Description	Unit	Rate	Quantity	US$
Infrastructure					
1	Dredging	m^3	$5	0	$0
2	Reclamation	m^3	$10	369,000	$3,690,000
3	Quay	M	$60,000	180	$10,800,000
4	Coastal Protection	M	$12,500	180	$2,250,000
5	Roads	M	$1,000	0	$0
6	Stack Yard	m^2	$80	147,600	$11,808,000
7	Buildings	m^2	$250	5,000	$1,250,000
8	Electrical	Sum	5%	-	$1,489,900
9	Miscellaneous	Sum	10%	-	$3,128,790
10	Access Road	Km	$500,000	0	$0
Equipment					
1	STS	Nos.	$6,000,000	3	$18,000,000
3	RTGs	Nos.	$1,250,000	5	$6,250,000
4	Road Units	Nos.	$80,000	12	$960,000
5	EC	Nos.	$175,000	2	$350,000
				Total	$60,476,690

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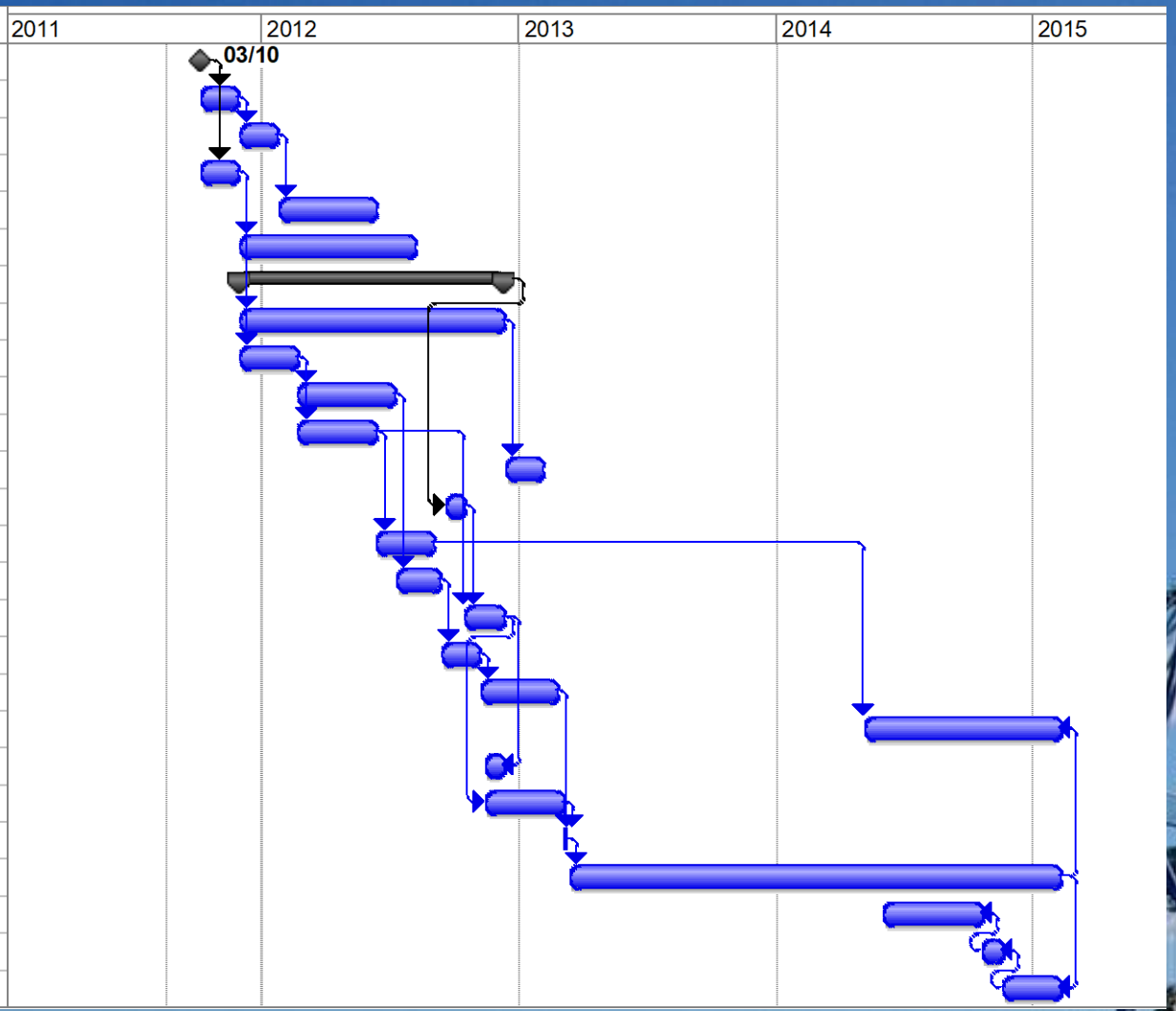
Initial program

ID	Task Name
1	Approve Action Plan for company
2	Form a development company
3	Inject US$ 4,000,000 as equity
4	Contract a Project Development Director
5	Sell 10% of the shares in the company
6	Agreement with the Province of West Papua
7	**Studies and Approvals**
8	AMDAL
9	Site Investigations
10	Detailed FS
11	Detailed Business Plan
12	Appoint an environmental and social advisor
13	Appoint a financial advisor
14	Recruit a business development team
15	Appoint a project management consultant
16	Review term sheets from banks for debt
17	Prepare tender documents on an EPC basis
18	Seek tenders for EPC contracts
19	Enter into contracts with shipping lines
20	Review term sheets from additional investors
21	Complete finance on bank loans
22	Award EPC contracts
23	Construction
24	Seek operations setup/support tenders
25	Takeover terminal from EPC contractor
26	Prepare commercial operations at the terminal



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Financial Assessment

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Financial Assessment

- The key elements financial assessment
  - The revenue of the development
  - The capital cost of the development
  - The operating margin of the development
- Revenue is the main risk
- Capital costs
  - Site conditions
  - +/- 25% maybe…
- Operating margin
  - Key risk from external financiers perspective?
  - 40% standard assumptions
  - JICT and others outperform
  - Check based on staffing etc… suggest Sorong to outperform

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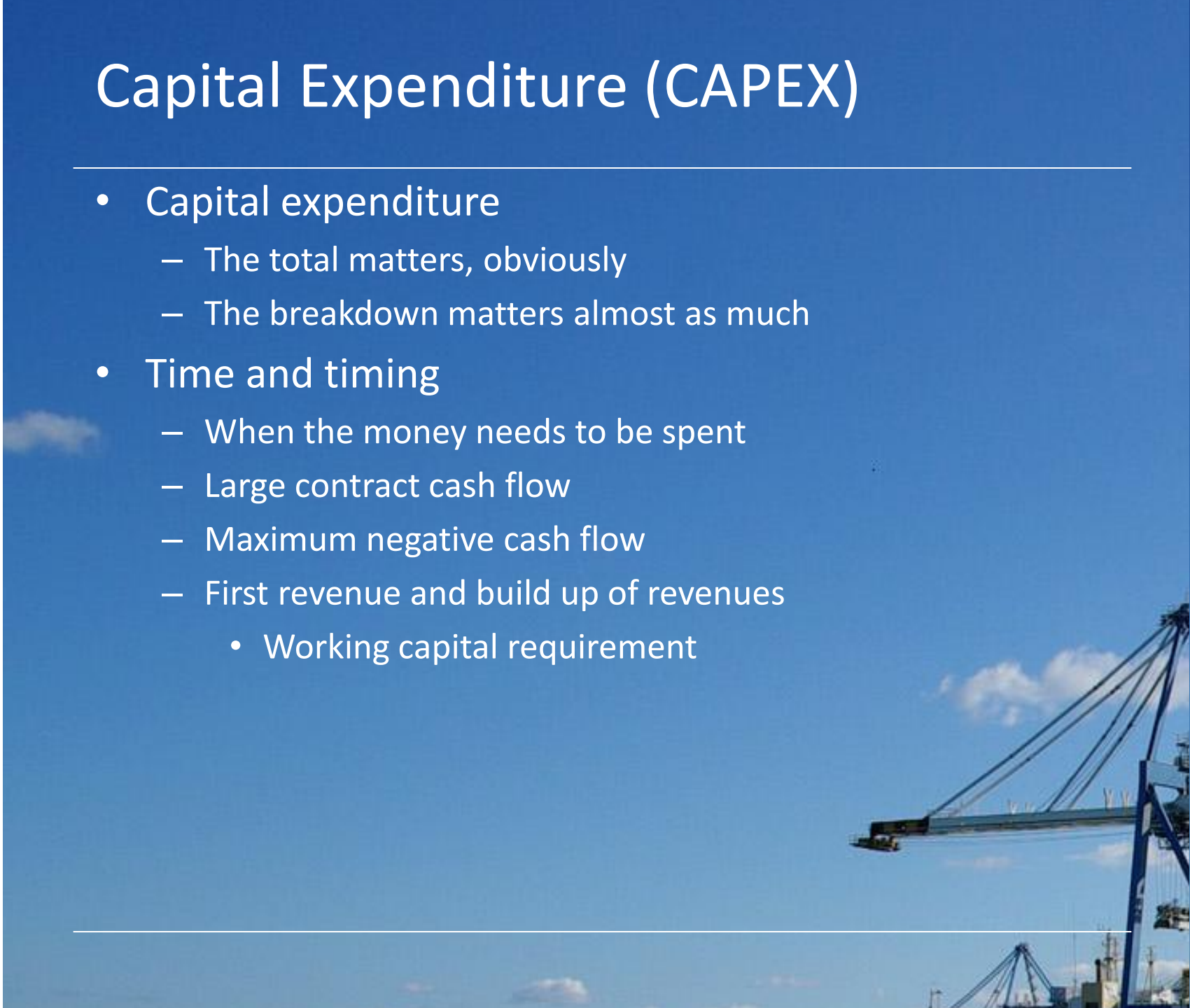
Capital Expenditure (CAPEX)

- Capital expenditure
  - The total matters, obviously
  - The breakdown matters almost as much
- Time and timing
  - When the money needs to be spent
  - Large contract cash flow
  - Maximum negative cash flow
  - First revenue and build up of revenues
    - Working capital requirement



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The nature of Capex

Description	US$ (million)	When	Cost overrun	Time overrun	Importance at Pre-FS
Studies	$ 1 or 2	Early and continuing	Small	High	Insignificant
Approvals	$ 5 to 10	Early	Small	High	Marginal
Dredging	$150	Construction	High	Moderate	Significant
Reclamation	$720	Construction	High	Moderate	Significant
Quay	$400	Construction	High	Moderate	Significant
Breakwater	$305	Construction	High	Moderate	Significant
Roads	$5	Construction	Moderate	Moderate	Marginal
Stack Yard	$160	Late	Moderate	Moderate	Marginal
Buildings	$63	Late	Small	Small	Marginal
Electrical	$90	Late?	Small	Small	Marginal
Equipment	$ 300	Late?	Small	Moderate	?
Reserves…	$190	-	-	-	-

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CAPEX Sensitivity

- Super-structure
  - Buildings
  - Tanks
  - Roads
- Equipment/M&E
  - Should be deterministic
- Sub structure
  - Reclamation
  - Foundations
  - Dredging
  - Cause of most cost and delay problems
    - Can be mitigated by procurement strategy
    - Design to minimize risk
    - Soil/Ground Investigations

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and its distribution

- Super-structure
  - 40%
- Equipment/M&E
  - 25%
- Sub structure
  - 35%

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Business and Financial Model

- Corporate finance
- Local capital markets
  - Equity Market
  - Bonds
  - Banks
  - Infrastructure funds/Private investors (major and small)
- International capital markets
  - Banks
  - Bonds
  - Infrastructure investors
- Multi-lateral institutions
- Bilateral aid
- Government…
- Construction financing…

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Business Plan - Mission

"to develop, operate and expand a container terminal to serve local container demand and to consolidate container demand across Eastern Indonesia whilst expanding the operating envelop of the company and creating an investment return for the company"

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Strategy – 1 of 3

- Form a development company to act as the focus for its commercial investment in the proposed terminal
- Inject US$ 4,000,000 as equity into the company to act as seed funding for the company
- Recruit or contract a Project Development Director to support the President Director of the development company as they lead the development company
- Sell 10% of the shares in the company to a co-investor for US$ 1,000,000. The co-investor to bring specific additional skills into the company
- Enter into an agreement with the local Province for them to acquire the land required for the terminal and lease over a long term period

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Strategy – 2 of 3

- Undertake appropriate studies and development work to secure appropriate approvals and to develop a detailed business plan
- Appoint an environmental/social advisor to present development effectively to the local communities
- Appoint a financial advisor
- Recruit a business development team
- Appoint a project management consultant to oversee the physical development of the terminal
- Review term sheets from banks for
- Prepare tender documents on an EPC basis
- Seek tenders on an EPC basis with structured finance

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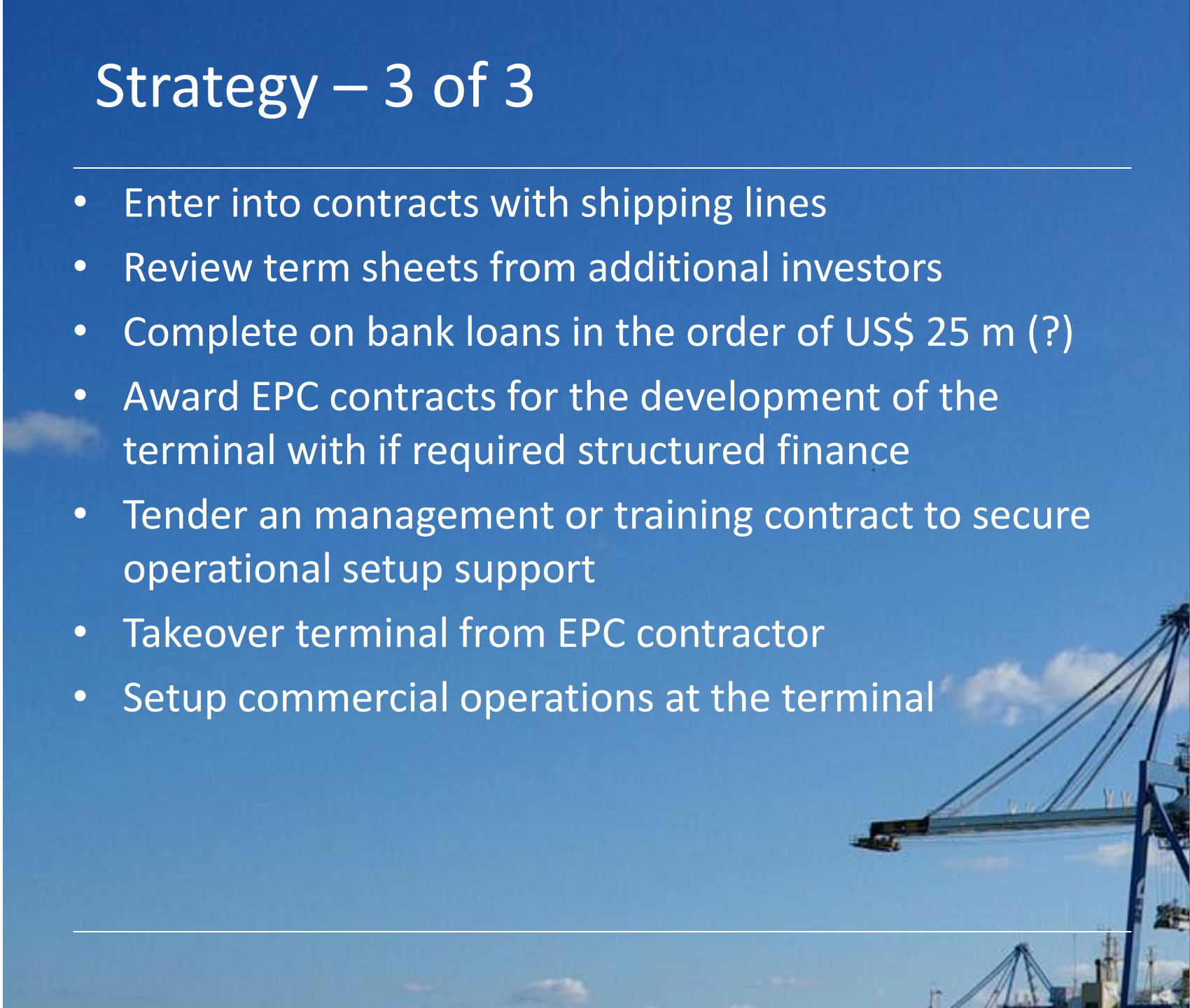
Strategy – 3 of 3

- Enter into contracts with shipping lines
- Review term sheets from additional investors
- Complete on bank loans in the order of US$ 25 m (?)
- Award EPC contracts for the development of the terminal with if required structured finance
- Tender an management or training contract to secure operational setup support
- Takeover terminal from EPC contractor
- Setup commercial operations at the terminal



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Marine Operations

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Acceptance of Ships

- Acceptance of ships
  - COMPLIANCE IS ALL
  - Estimated time of arrival
    - 28 day booking
    - 7 days warning
    - 24/48 hour updates….
  - Security
    - Where has the ship come from?
    - Who is on board?
    - Carrying what? Checked by whom?
  - Operational
    - How is the ship loaded?
    - What equipment does it have?
  - Bureaucratic
    - National Government
    - Port Authority

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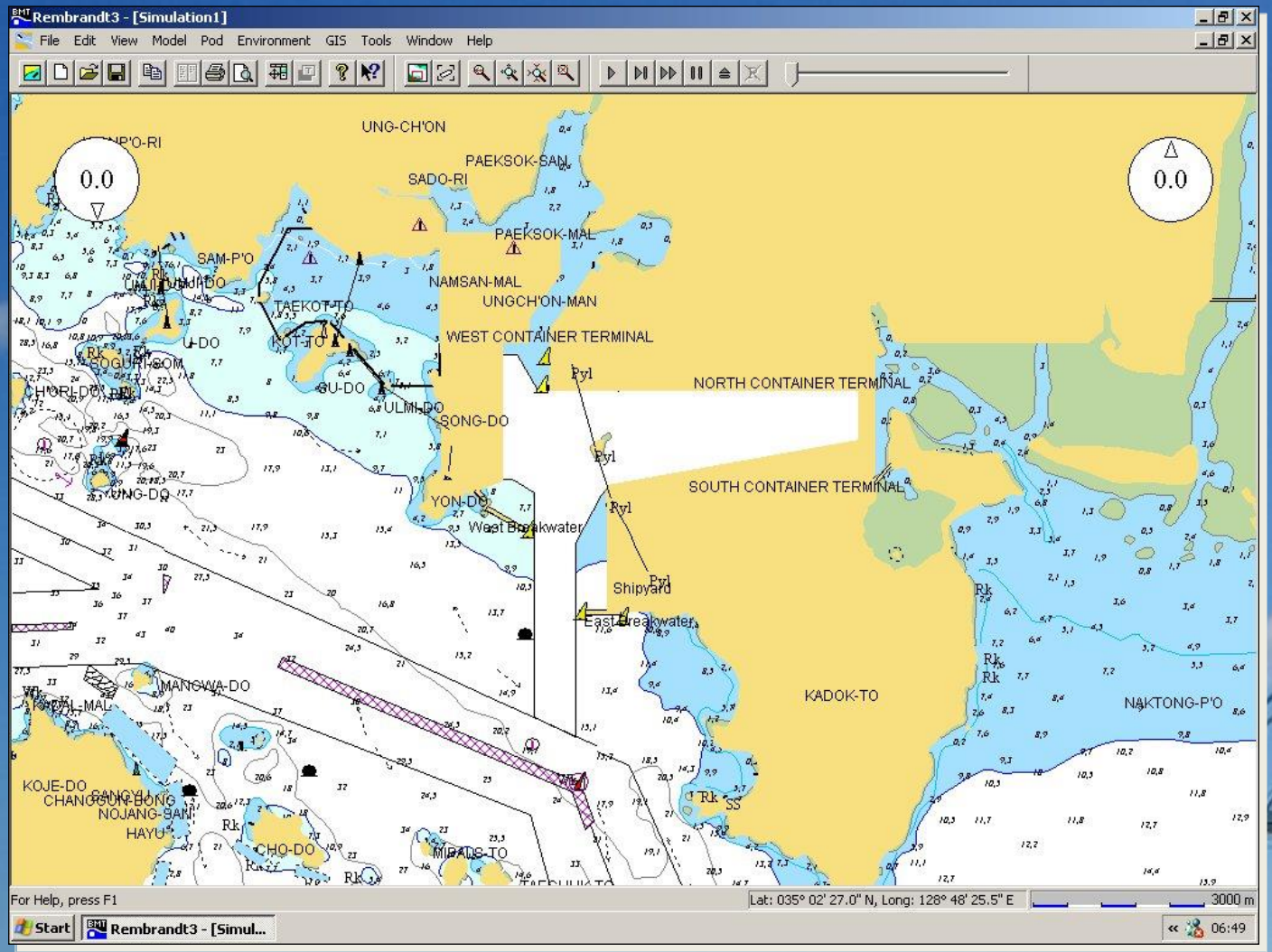
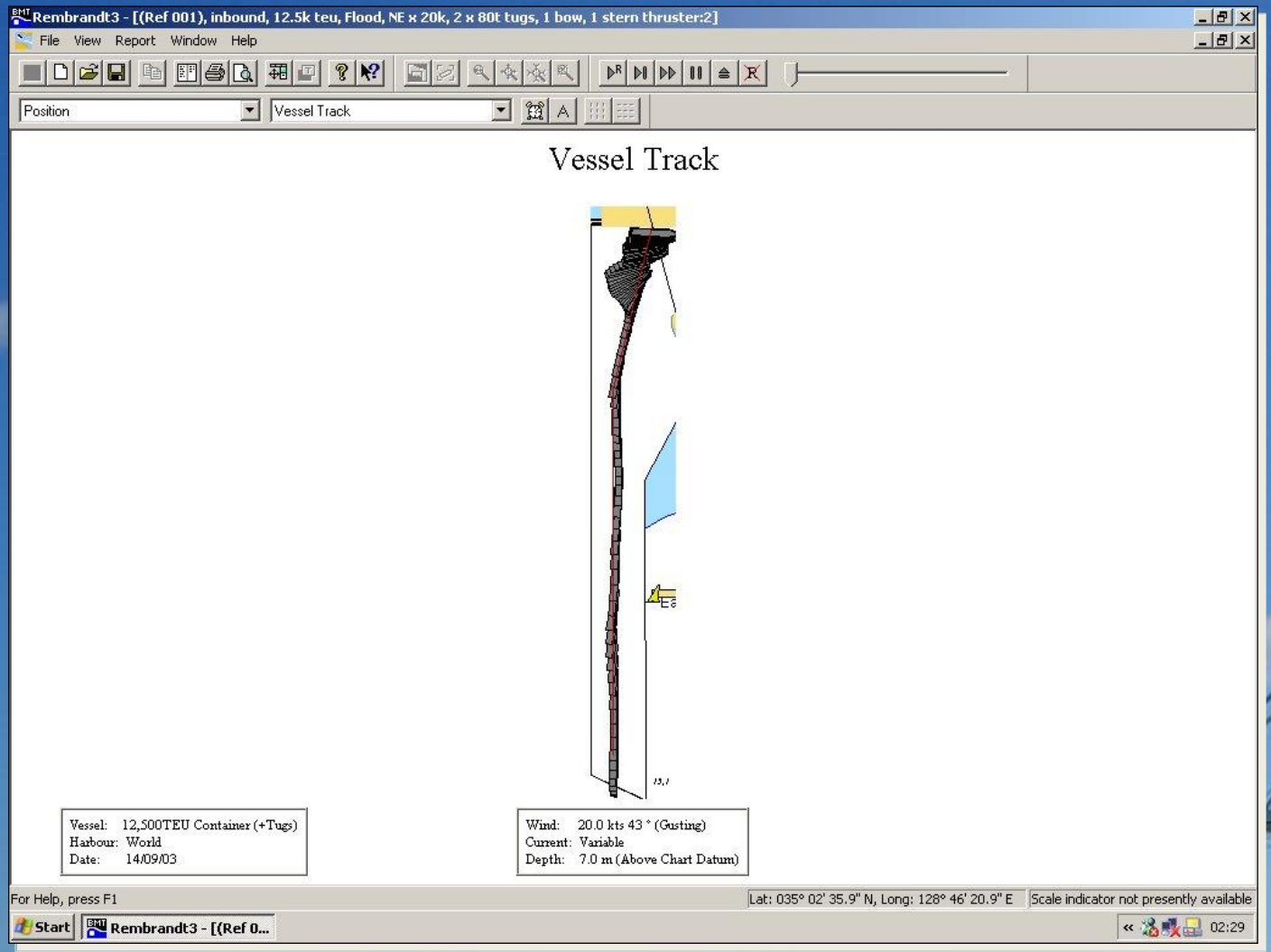
SOP/EOP

- Approach and maneuvering of ships
  - Standard Operating Procedures (SOP)
  - Emergency Operating Procedures (EOP)
  - Development and implementation
- SOP
  - The procedures required for ships to safely approach
  - All states of tide, current, wind, waves
  - Set limits on tide, current, wind, waves
  - Set limits on draft, length etc…
  - Set tug requirements
  - Safety zones
  - Standard passage plans
- EOP
  - What to do when it all goes wrong


Rembrandt3 - [Simulation1]
File Edit View Model Pod Environment GIS Tools Window Help
UNG-CH'ON
PAEKSOK-SAN
SADO-RI
PAEKSOK-MAL
NAMSAN-MAL
UNGCH'ON-MAN
SAM-P'O
TAEKOT-TO
KOT-TO
WEST CONTAINER TERMINAL
NORTH CONTAINER TERMINAL
SOUTH CONTAINER TERMINAL
SONG-DO
YON-DO
West Breakwater
East Breakwater
Shipyard
KADOK-TO
NAKTONG-P'O
MANGWA-DO
KOJE-DO
CHANGSUN-BONG
NOJANG-SAN
HAYU
CHO-DO
MIRUK-TO
0.0
0.0
For Help, press F1
Lat: 035° 02' 27.0" N, Long: 128° 48' 25.5" E
3000 m
Start
Rembrandt3 - [Simul...
06:49


Rembrandt3 - [(Ref 001), inbound, 12.5k teu, Flood, NE x 20k, 2 x 80t tugs, 1 bow, 1 stern thruster:2]
File View Report Window Help
Position
Vessel Track
Vessel Track
Vessel: 12,500TEU Container (+Tugs)
Harbour: World
Date: 14/09/03
Wind: 20.0 kts 43 ° (Gusting)
Current: Variable
Depth: 7.0 m (Above Chart Datum)
For Help, press F1
Lat: 035° 02' 35.9" N, Long: 128° 46' 20.9" E
Scale indicator not presently available
Start
Rembrandt3 - [(Ref 0...
02:29

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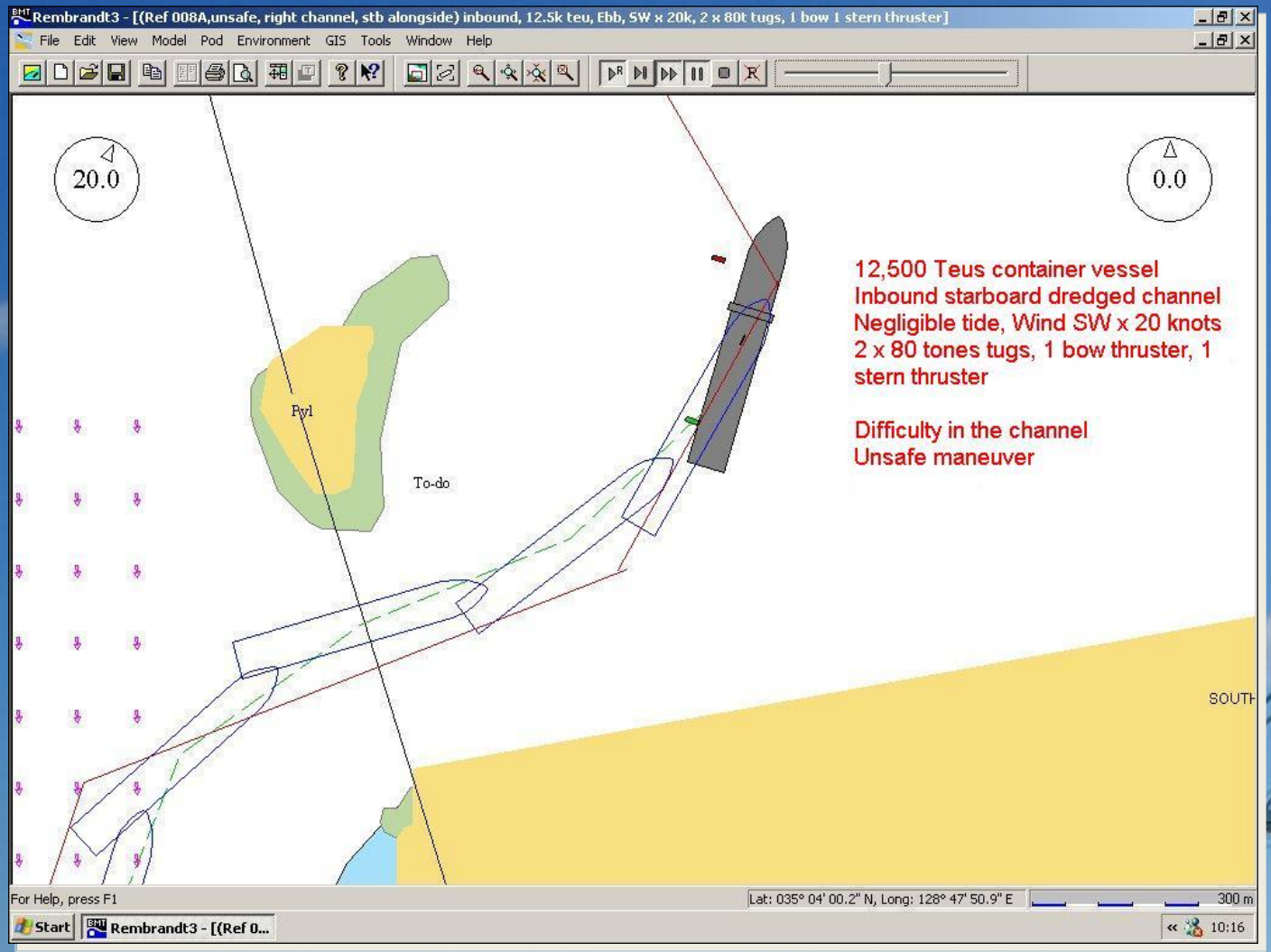

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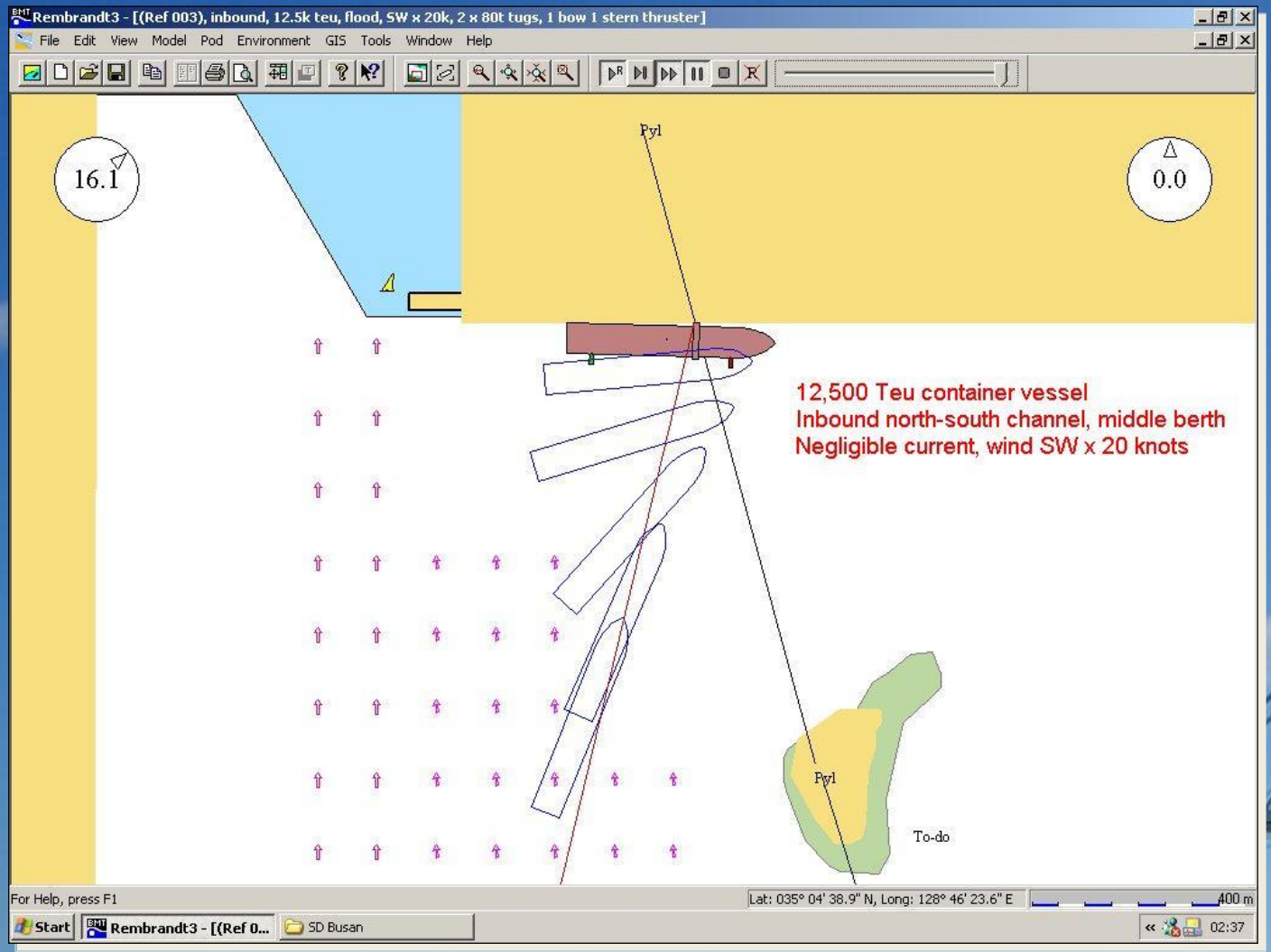

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Pilots and Masters

- Pilot
  - May not plan arrival far in advance
  - May be restricted in knowledge of ship
  - Understands tidal, visual and motion clues
  - Predicts course deviation and reacts in advance
  - Part of the port team (port focus)
- Master
  - Can plan for specific arrival well in advance
  - Understands ship
  - Reacts to course deviation
  - Leads his team on board (ship focus)
  - Commercial pressure on speed

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Marine Operations

- The players and their roles
  - Harbour Master
  - Port Captain
  - Ships Master
  - Pilot
  - Mooring Master/Gang

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Improving Marine Operations

- Take a holistic view on safety
  - Harbour Master
  - Terminal Manager
- Mooring and navigation aids
  - VTS/VTMS
  - Laser monitoring
  - Position indicators (visual)
  - Current meters
  - Digital tidal atlas
- Dynamic Under Keel Clearance
  - Measurements
  - Forecasts
  - Integrated analysis

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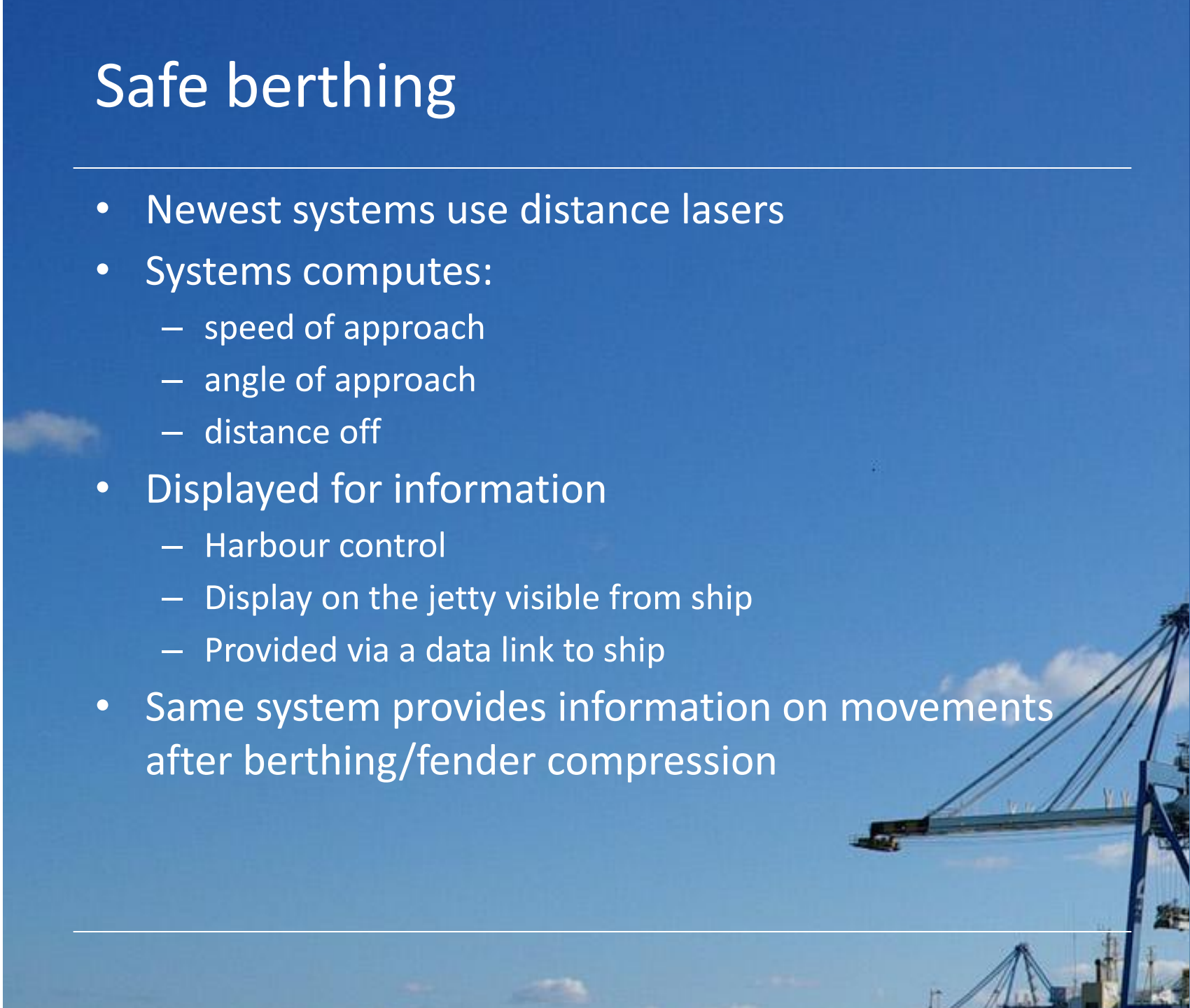
Safe berthing

- Newest systems use distance lasers
- Systems computes:
  - speed of approach
  - angle of approach
  - distance off
- Displayed for information
  - Harbour control
  - Display on the jetty visible from ship
  - Provided via a data link to ship
- Same system provides information on movements after berthing/fender compression



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Take a Holistic View of Safety

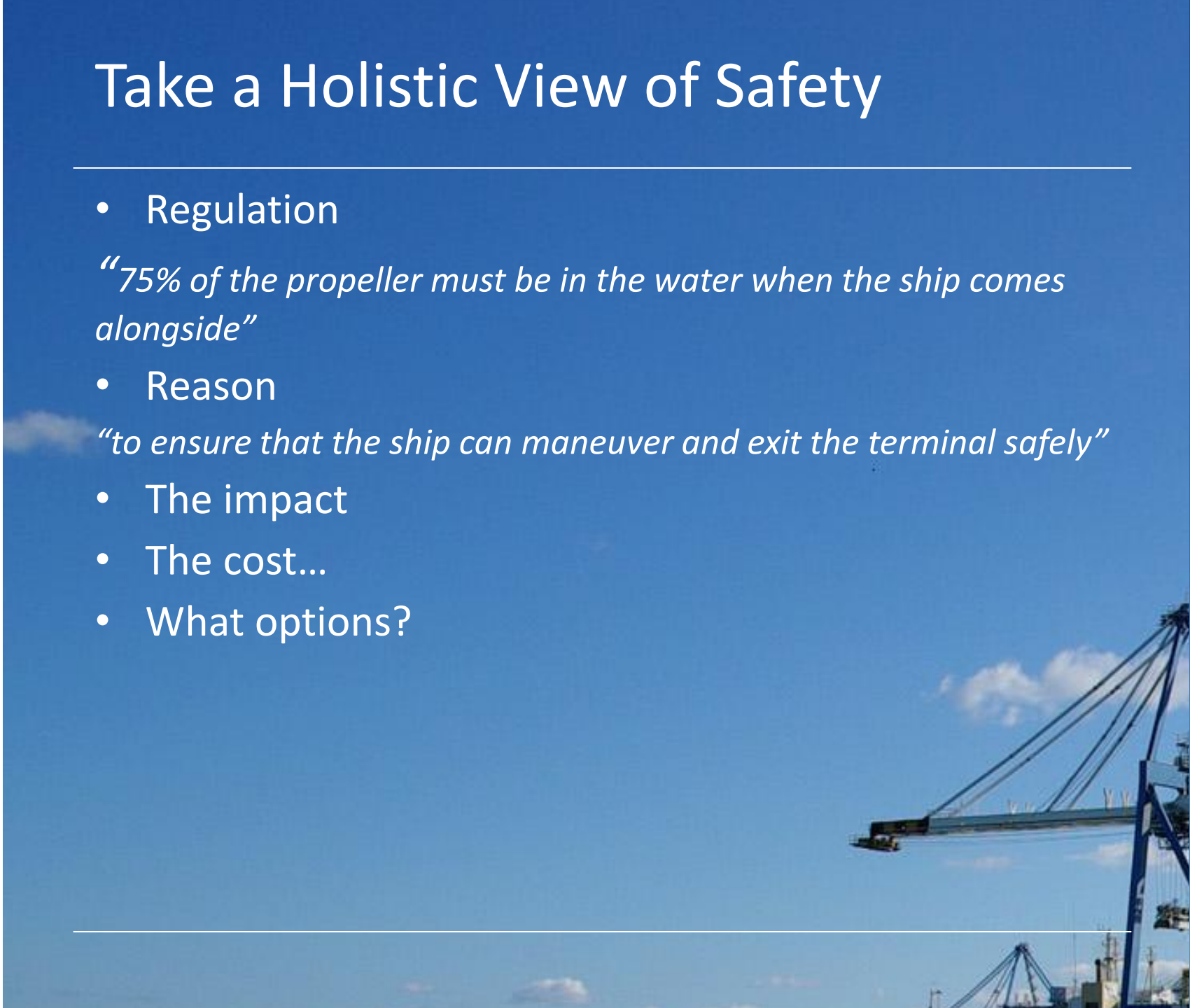
- Regulation

"75% of the propeller must be in the water when the ship comes alongside"

- Reason

"to ensure that the ship can maneuver and exit the terminal safely"

- The impact
- The cost…
- What options?



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Under Keel Clearance

- Under Keel Clearance
  - from lowest part of hull to sea bed
- International Guidelines – PIANC
  - 10% of draft, say 1.8 to 2.0 m
- Important Factors
  - Swell/Sea state
  - Tidal cycle
  - Channel layout
  - Speed of ship (squat)
  - Nature of seabed

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Economics and UKC

- 0.5m additional draft
  - 12,000 t
  - US$ 2m to 20m in sales
  - 5 to 20% lower freight rate
  - 50 ship terminals it all adds up…
- Risk
  - Grounding
  - Closure of terminal
  - Environmental disaster
  - Insurance?

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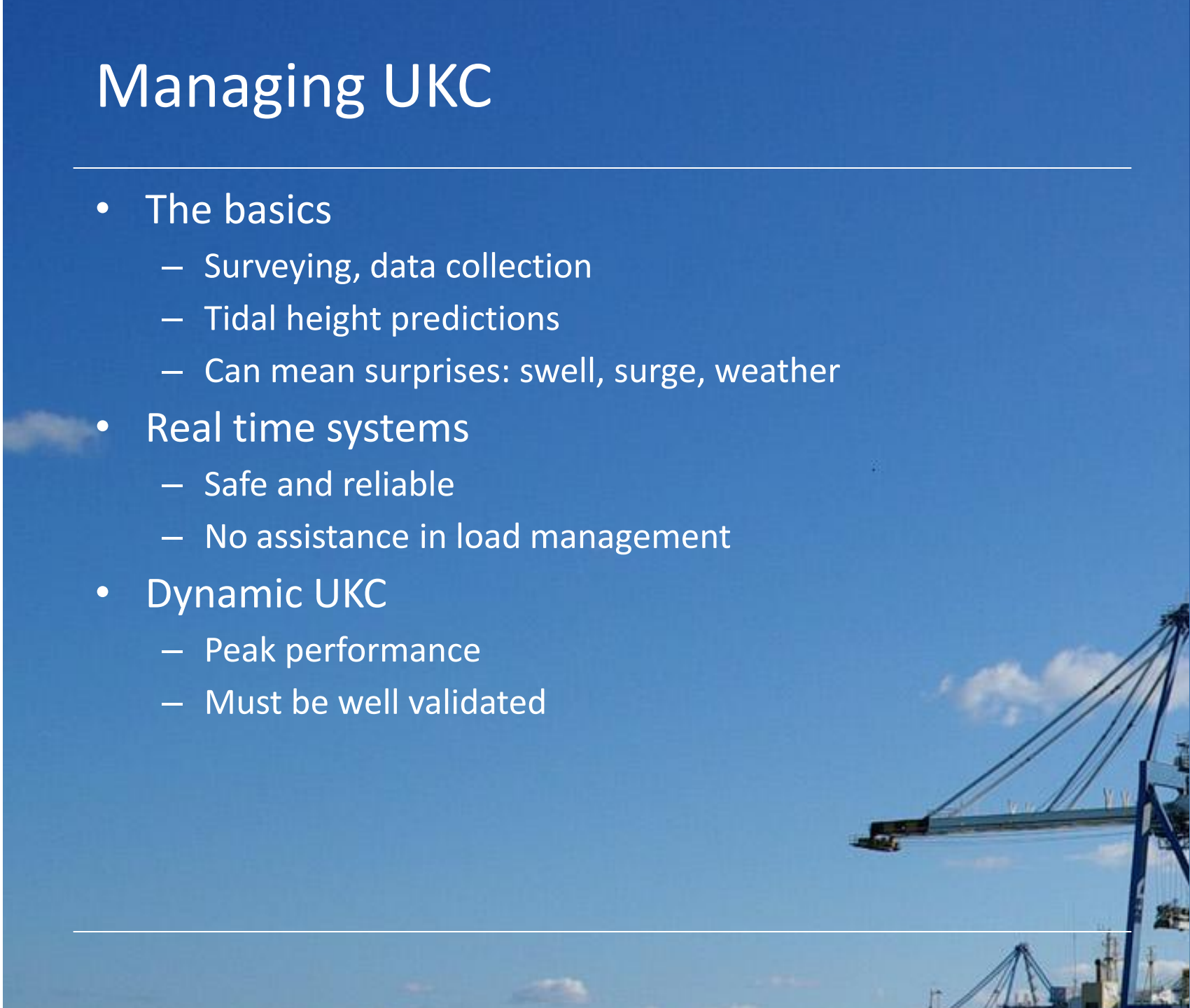
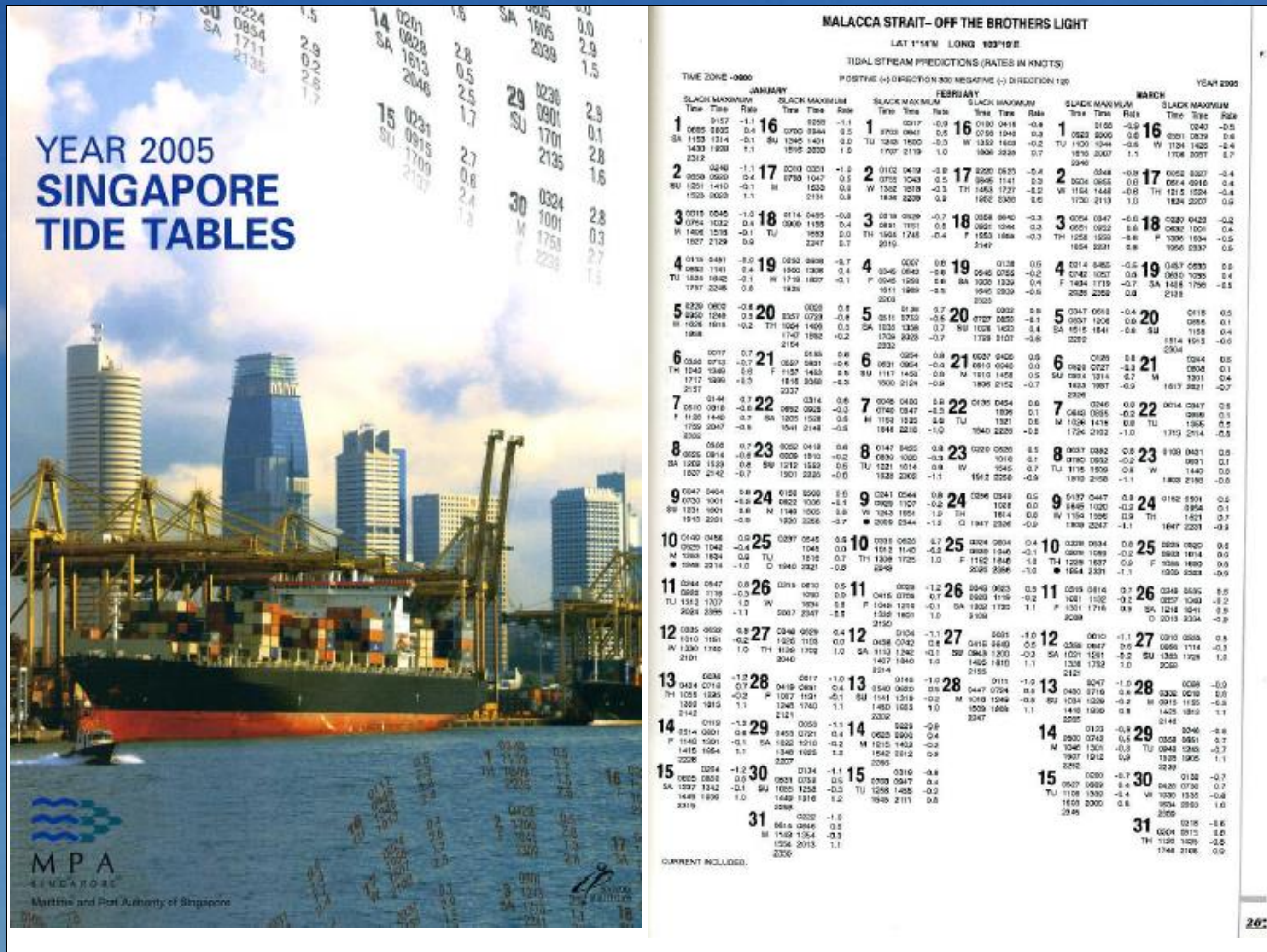
Managing UKC

- The basics
  - Surveying, data collection
  - Tidal height predictions
  - Can mean surprises: swell, surge, weather
- Real time systems
  - Safe and reliable
  - No assistance in load management
- Dynamic UKC
  - Peak performance
  - Must be well validated



The Basics


YEAR 2005
SINGAPORE
TIDE TABLES
MPA
Maritime and Port Authority of Singapore
MALACCA STRAIT– OFF THE BROTHERS LIGHT
TIDAL STREAM PREDICTIONS (RATES IN KNOTS)
JANUARY
FEBRUARY
MARCH
YEAR 2005

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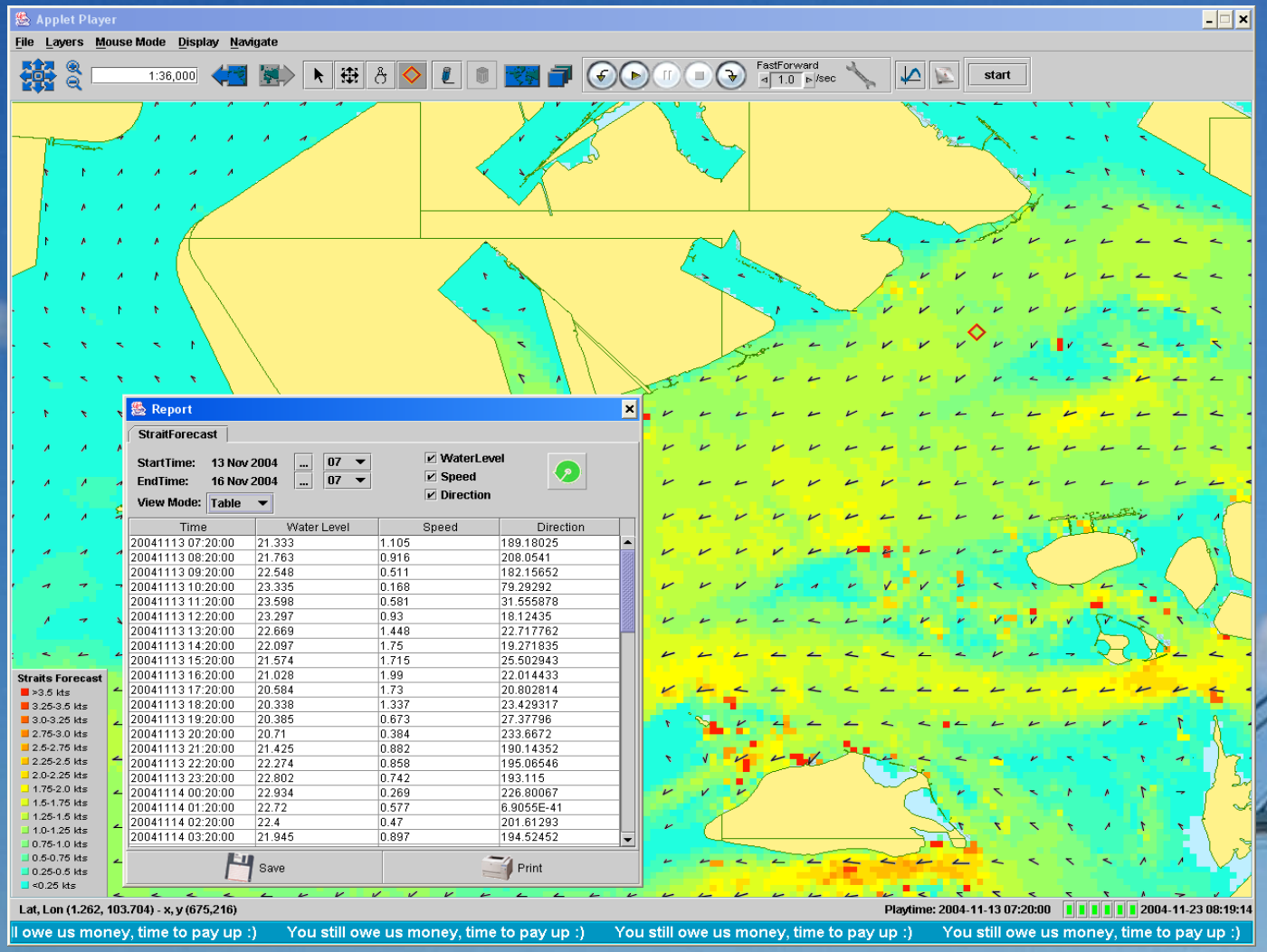
Digital Tidal Atlas



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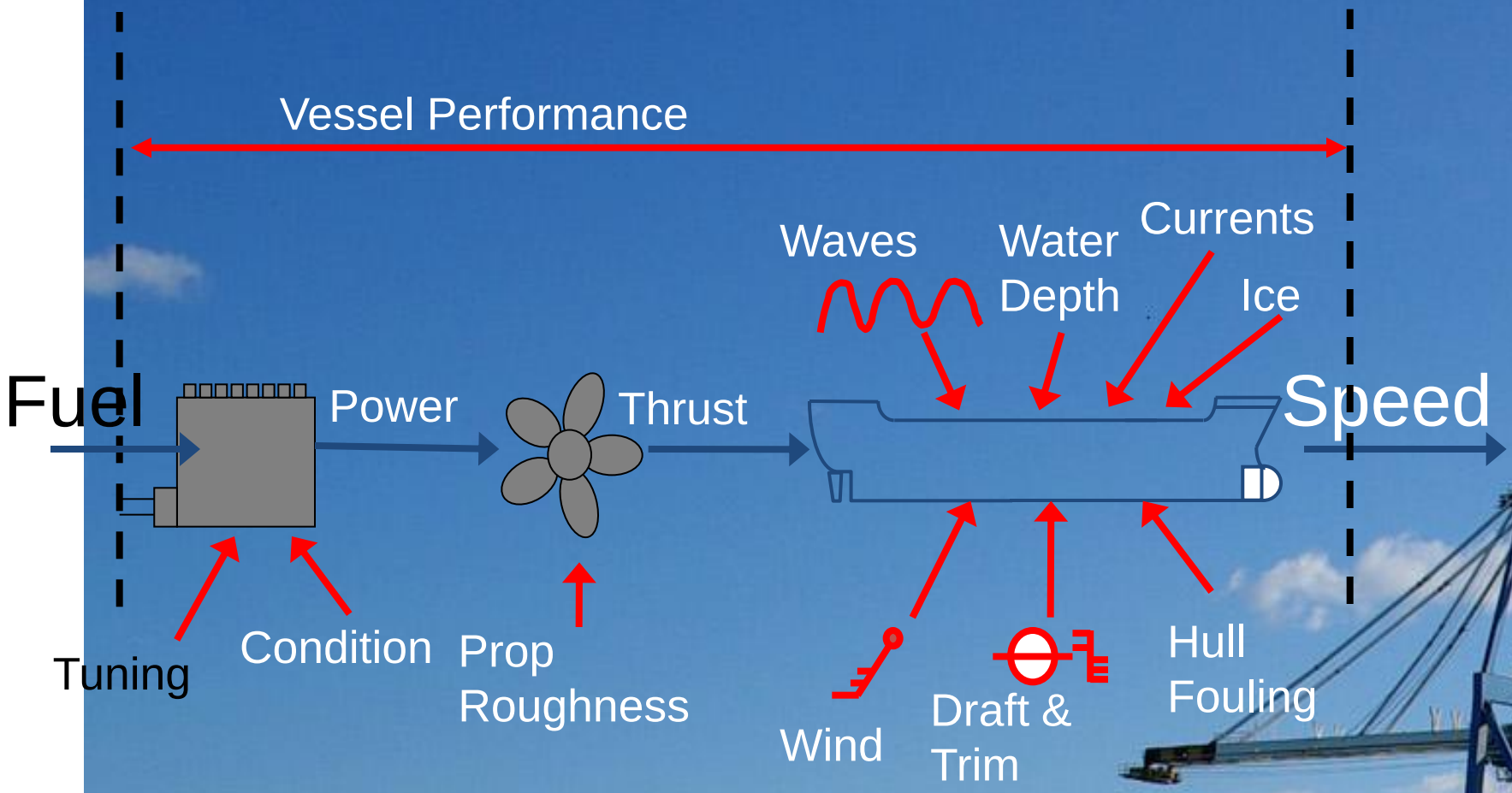
And what about the ship...



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Contracting – Lateral Thinking

- If your counterparties are men of straw what can you do?

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Maintenance

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Contracting – Lateral Thinking

- If your counterparties are men of straw what can you do?

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Terminal Equipment

- The Equipment
  - Tanks
  - Pipes, Valves etc…
  - Loading Arms
  - Sensors, support systems
- Maintenance
  - Reliability Centered Maintenance
- Operational Performance
  - Automation and Training

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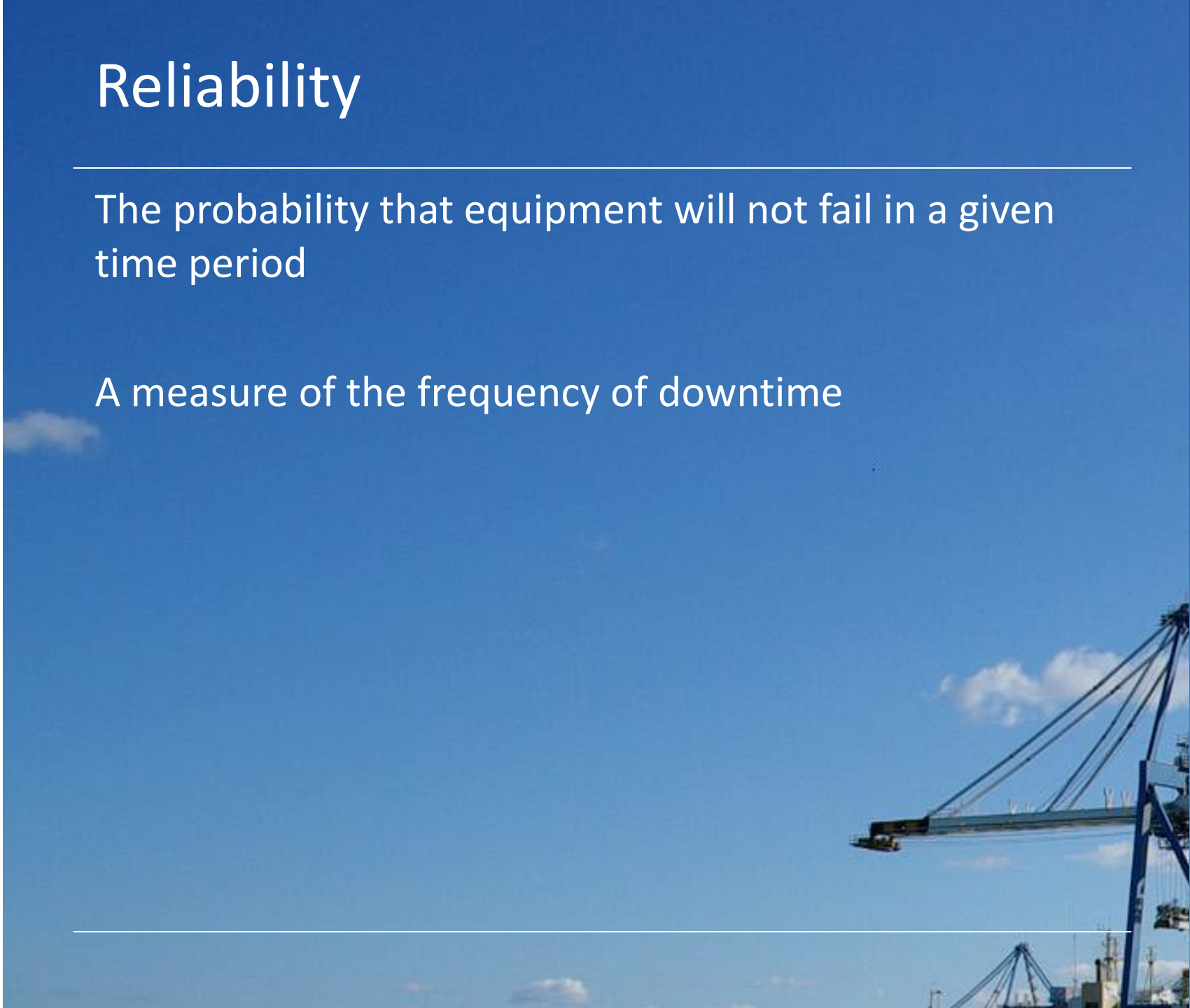
Reliability

The probability that equipment will not fail in a given time period

A measure of the frequency of downtime



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Maintenance

Any activity carried out on an asset in order to ensure that the asset continues to perform its intended functions

Repairs to the asset

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Our vital equipment…

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There is a lot of it…

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and it can be complicated

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What is RCM

Reliability Centered Maintenance (RCM) is a methodology used to determine the right maintenance tasks to ensure that any physical asset or system continues whatever its users want it to do, in its present operating context

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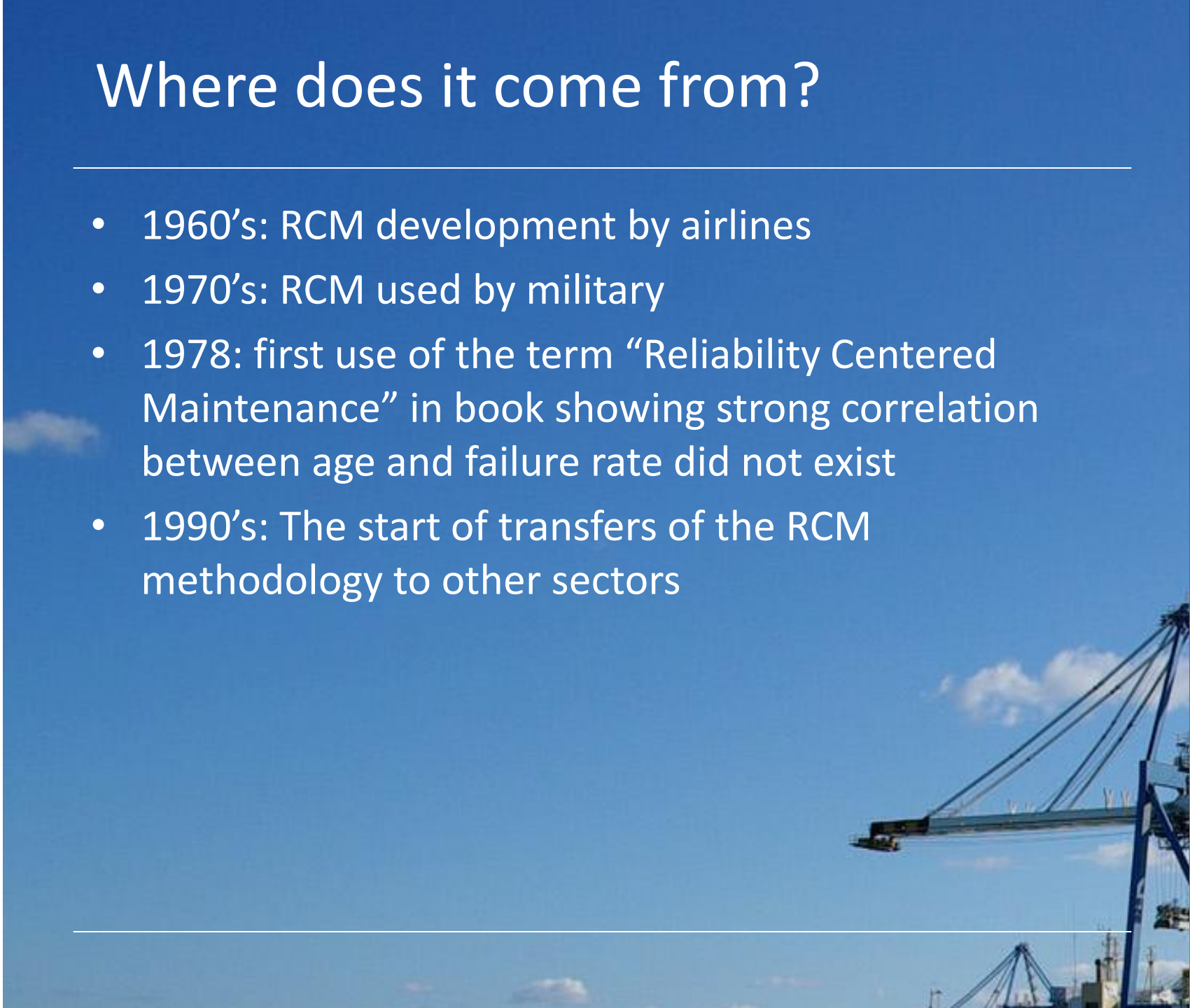
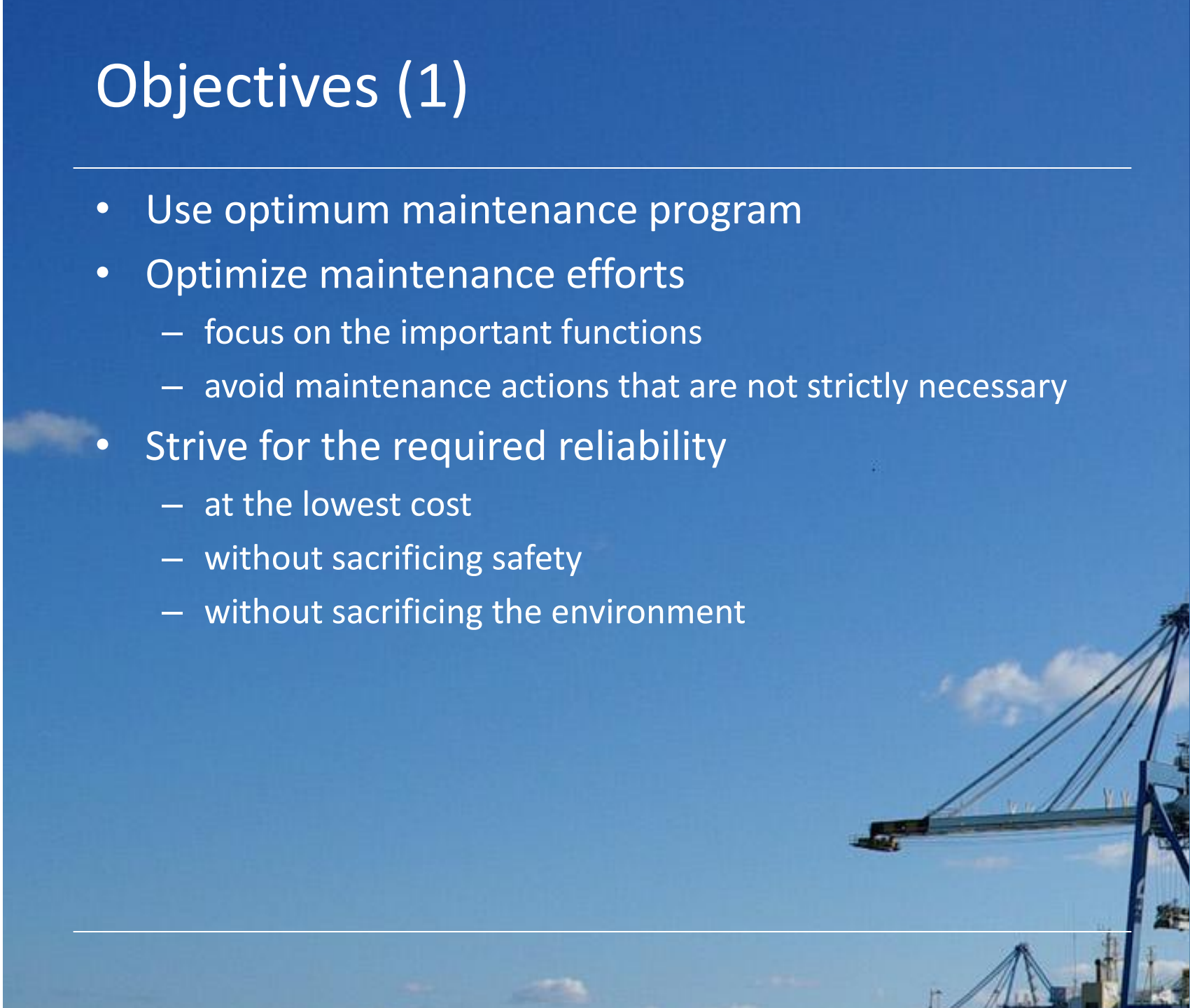
Where does it come from?

- 1960's: RCM development by airlines
- 1970's: RCM used by military
- 1978: first use of the term "Reliability Centered Maintenance" in book showing strong correlation between age and failure rate did not exist
- 1990's: The start of transfers of the RCM methodology to other sectors



Objectives (1)

- Use optimum maintenance program
- Optimize maintenance efforts
  - focus on the important functions
  - avoid maintenance actions that are not strictly necessary
- Strive for the required reliability
  - at the lowest cost
  - without sacrificing safety
  - without sacrificing the environment



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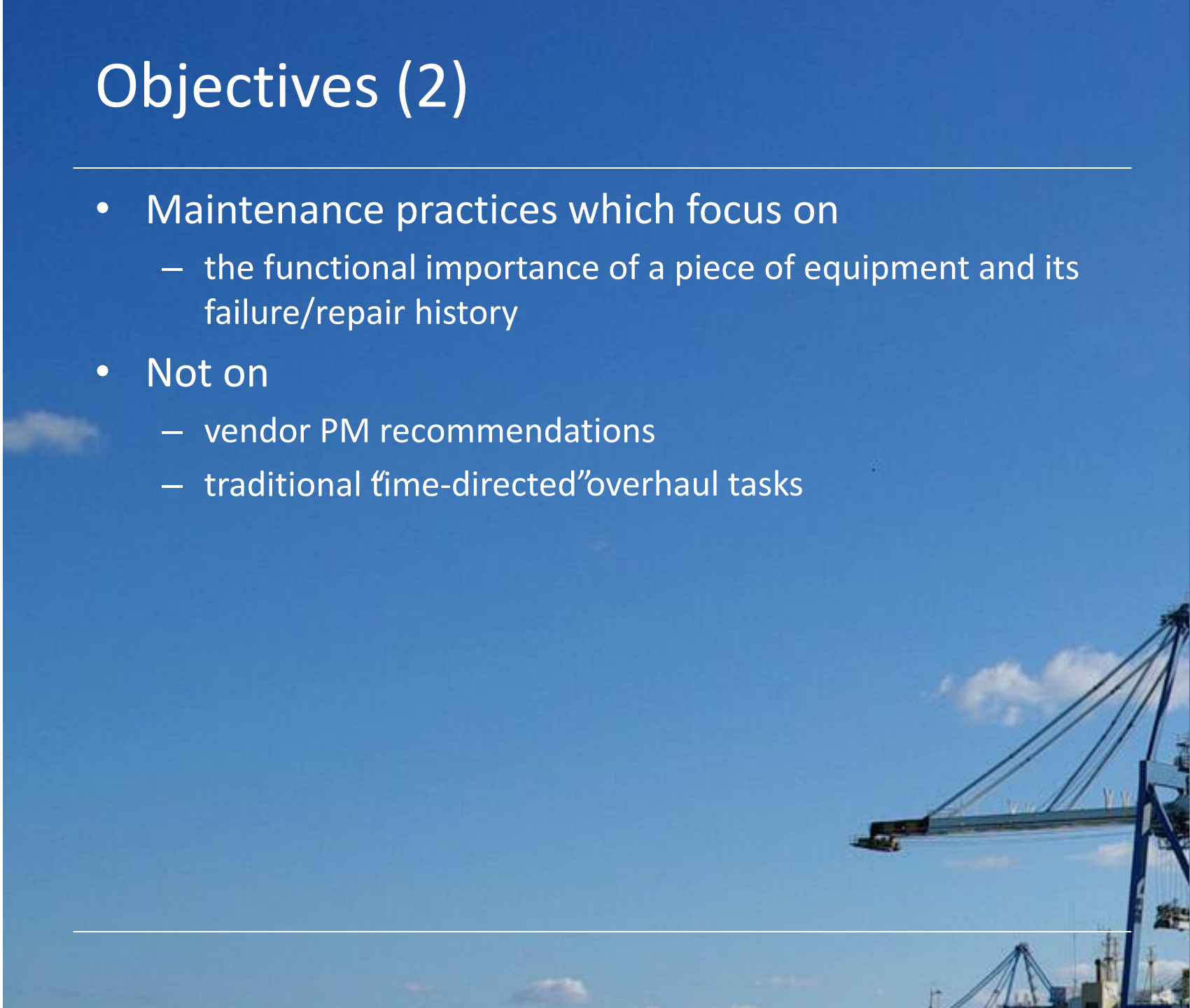
Objectives (2)

- Maintenance practices which focus on
  - the functional importance of a piece of equipment and its failure/repair history
- Not on
  - vendor PM recommendations
  - traditional "time-directed" overhaul tasks



RCM principles

- Maintenance is business oriented (not only technical oriented):
  - operations efficiency
  - quality
  - cost
  - safety
  - environment

Functional Orientation

- RCM focuses on preserving the functions of equipment, not on preserving the equipment itself
- Equipment function: what users wants
- 2 function categories
  - primary functions: speed, output, product quality
  - secondary functions: safety, comfort, environmental integrity

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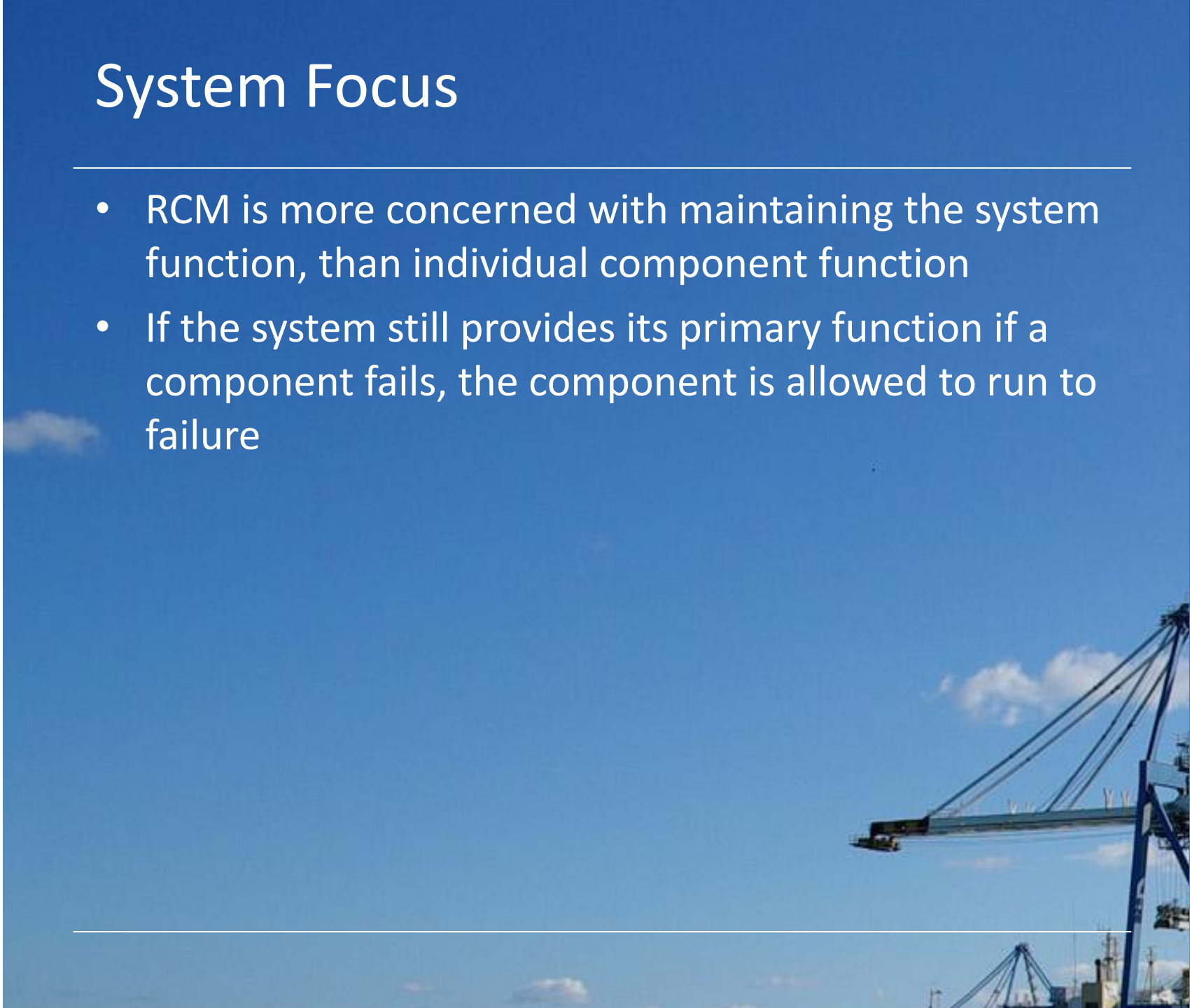
System Focus

- RCM is more concerned with maintaining the system function, than individual component function
- If the system still provides its primary function if a component fails, the component is allowed to run to failure



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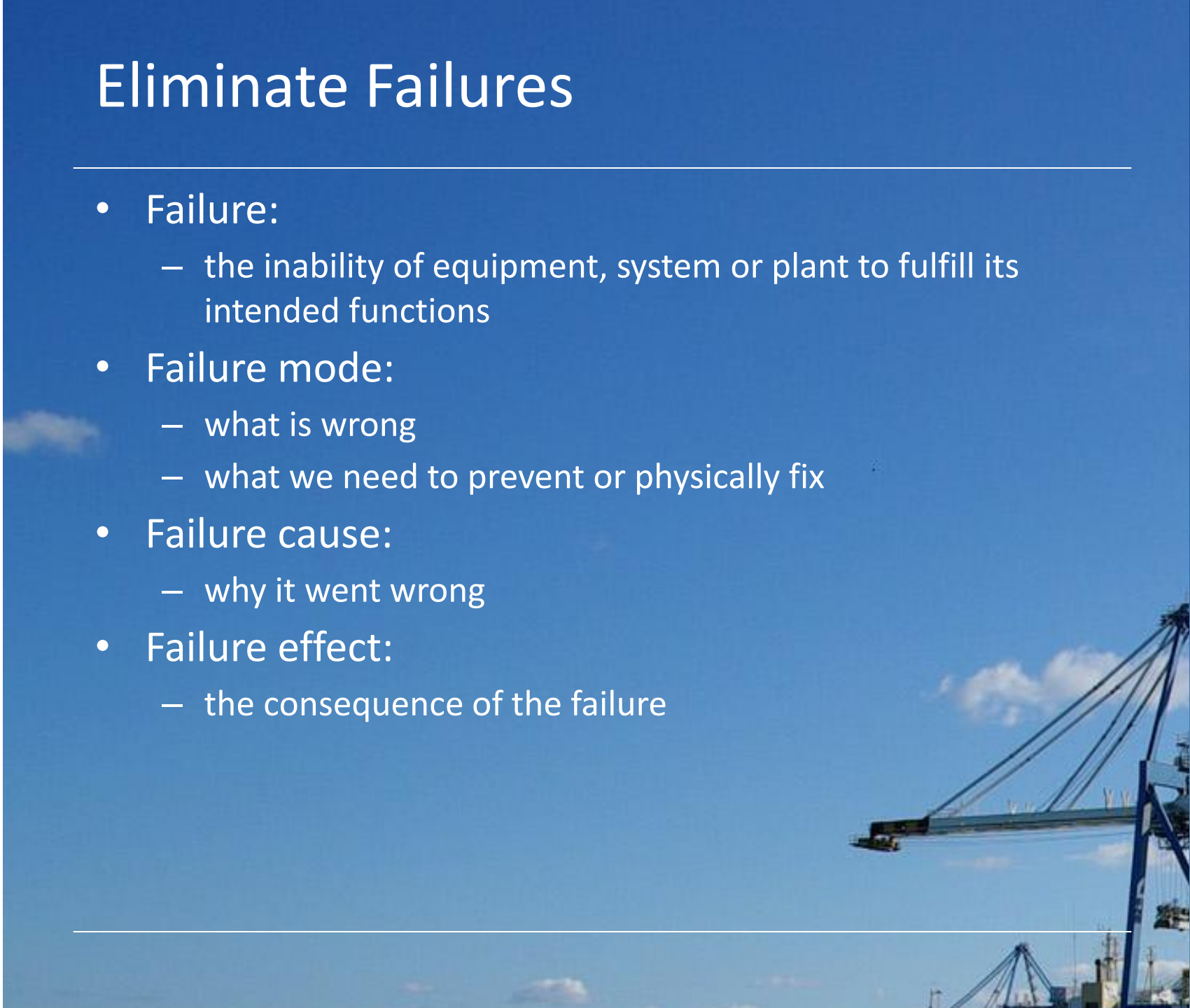
Investigate how equipment fails

- Failure patterns:
  - the relationship between the probability of failure of an item, and its age (see Maintenance Management Guide)
  - RCM seeks to know the probability of failures at specific ages

Eliminate Failures

- Failure:
  - the inability of equipment, system or plant to fulfill its intended functions
- Failure mode:
  - what is wrong
  - what we need to prevent or physically fix
- Failure cause:
  - why it went wrong
- Failure effect:
  - the consequence of the failure



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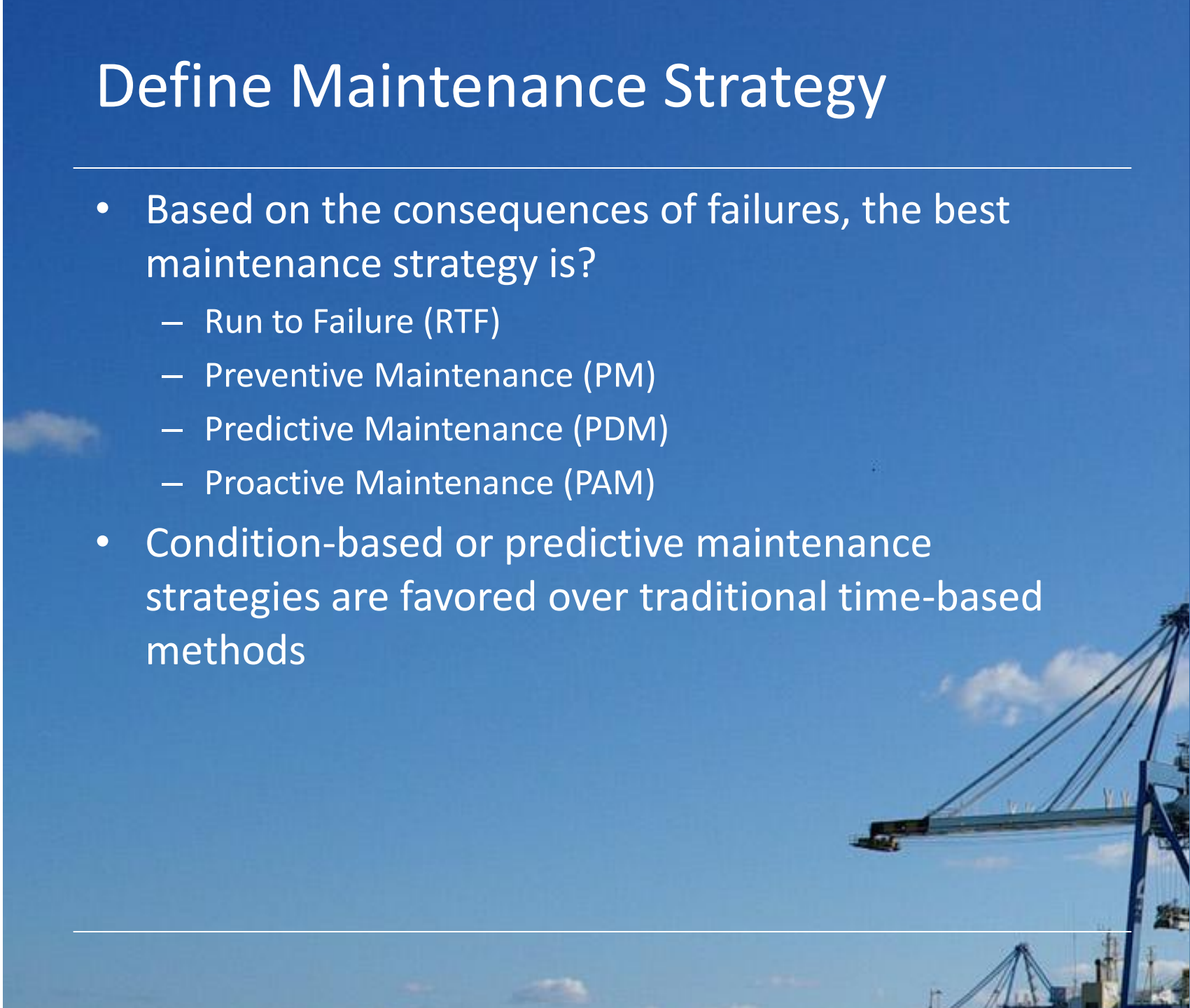
Define Maintenance Strategy

- Based on the consequences of failures, the best maintenance strategy is?
  - Run to Failure (RTF)
  - Preventive Maintenance (PM)
  - Predictive Maintenance (PDM)
  - Proactive Maintenance (PAM)
- Condition-based or predictive maintenance strategies are favored over traditional time-based methods



Recognize Design Limitations

- A maintenance program can only maintain the level of reliability inherent in the system design
- No amount of maintenance can overcome poor design
- Maintenance knowledge is fed back to designers to improve the next design

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RCM is an ongoing task

- The full benefit of RCM is only achieved when operation and maintenance experience is continuously fed back into the analysis process.

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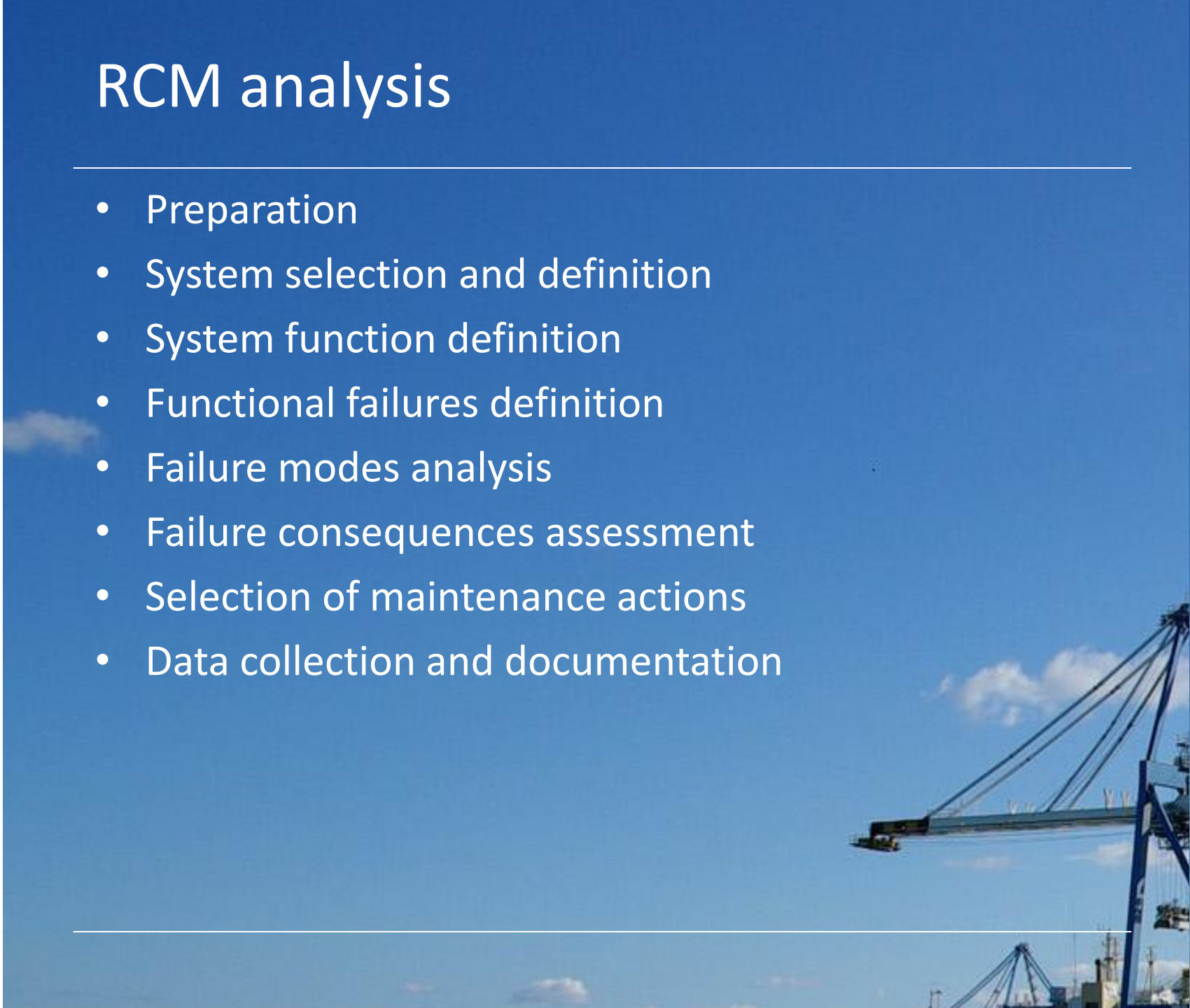
RCM analysis

- Preparation
- System selection and definition
- System function definition
- Functional failures definition
- Failure modes analysis
- Failure consequences assessment
- Selection of maintenance actions
- Data collection and documentation



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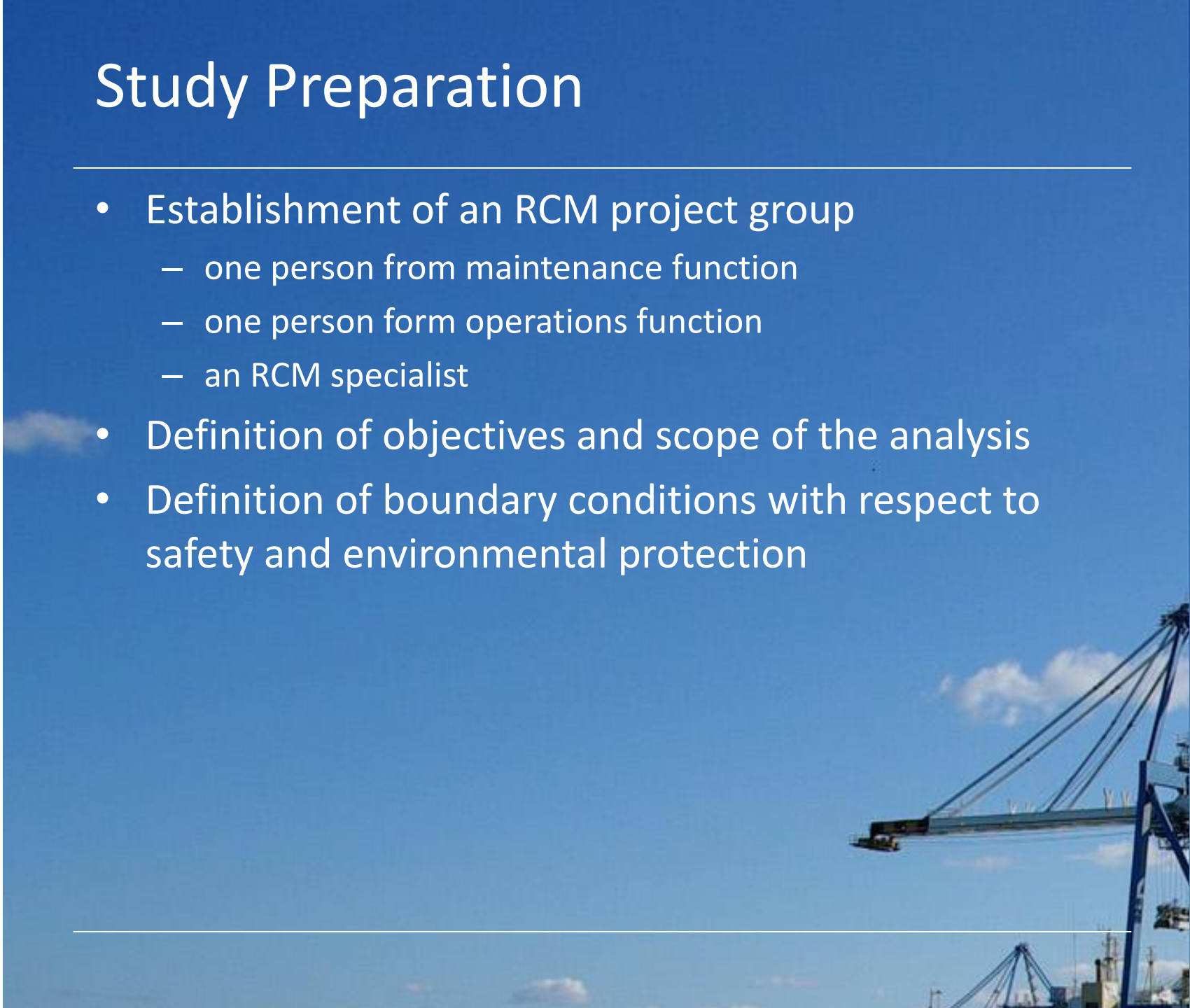
Study Preparation

- Establishment of an RCM project group
  - one person from maintenance function
  - one person form operations function
  - an RCM specialist
- Definition of objectives and scope of the analysis
- Definition of boundary conditions with respect to safety and environmental protection



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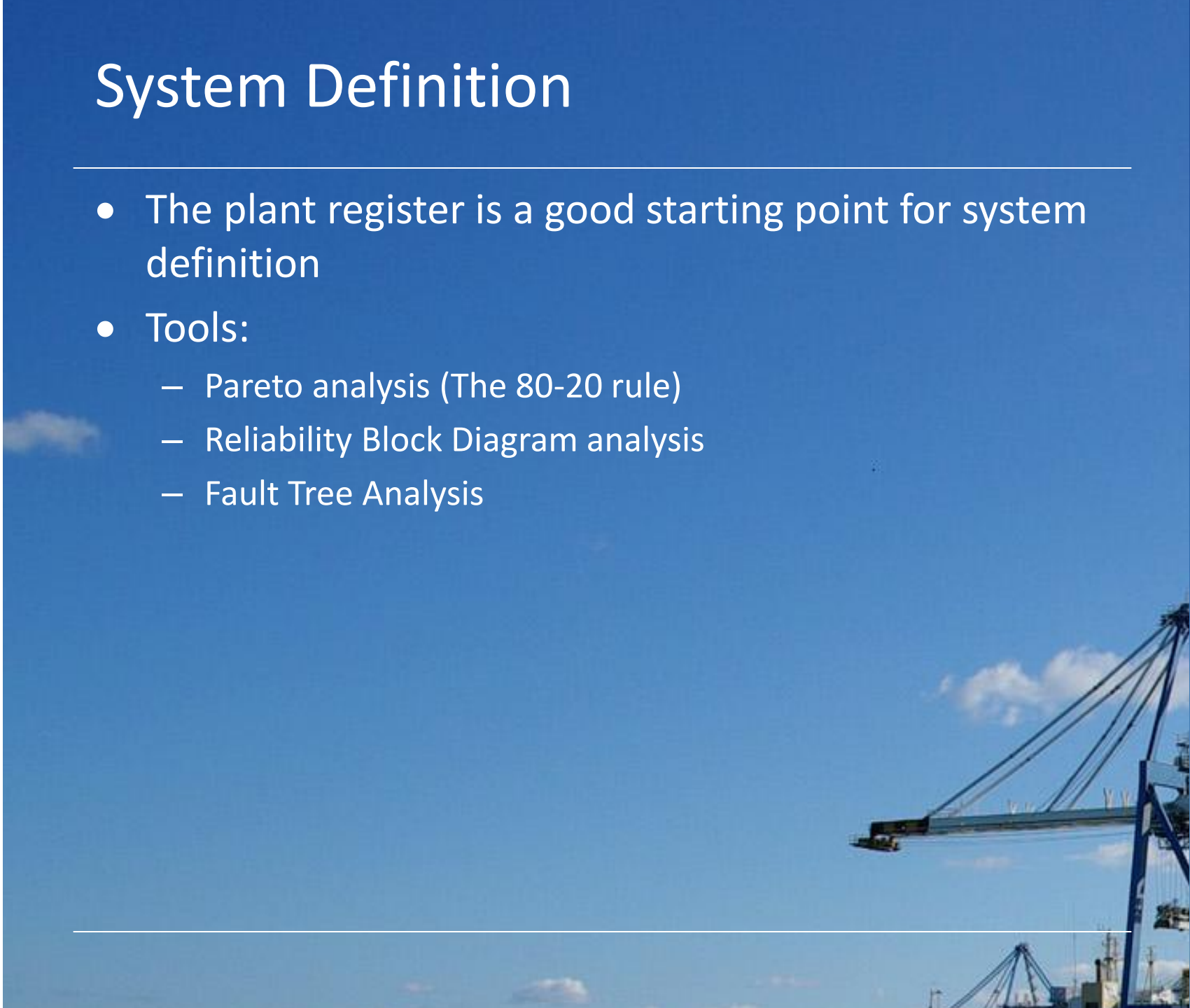
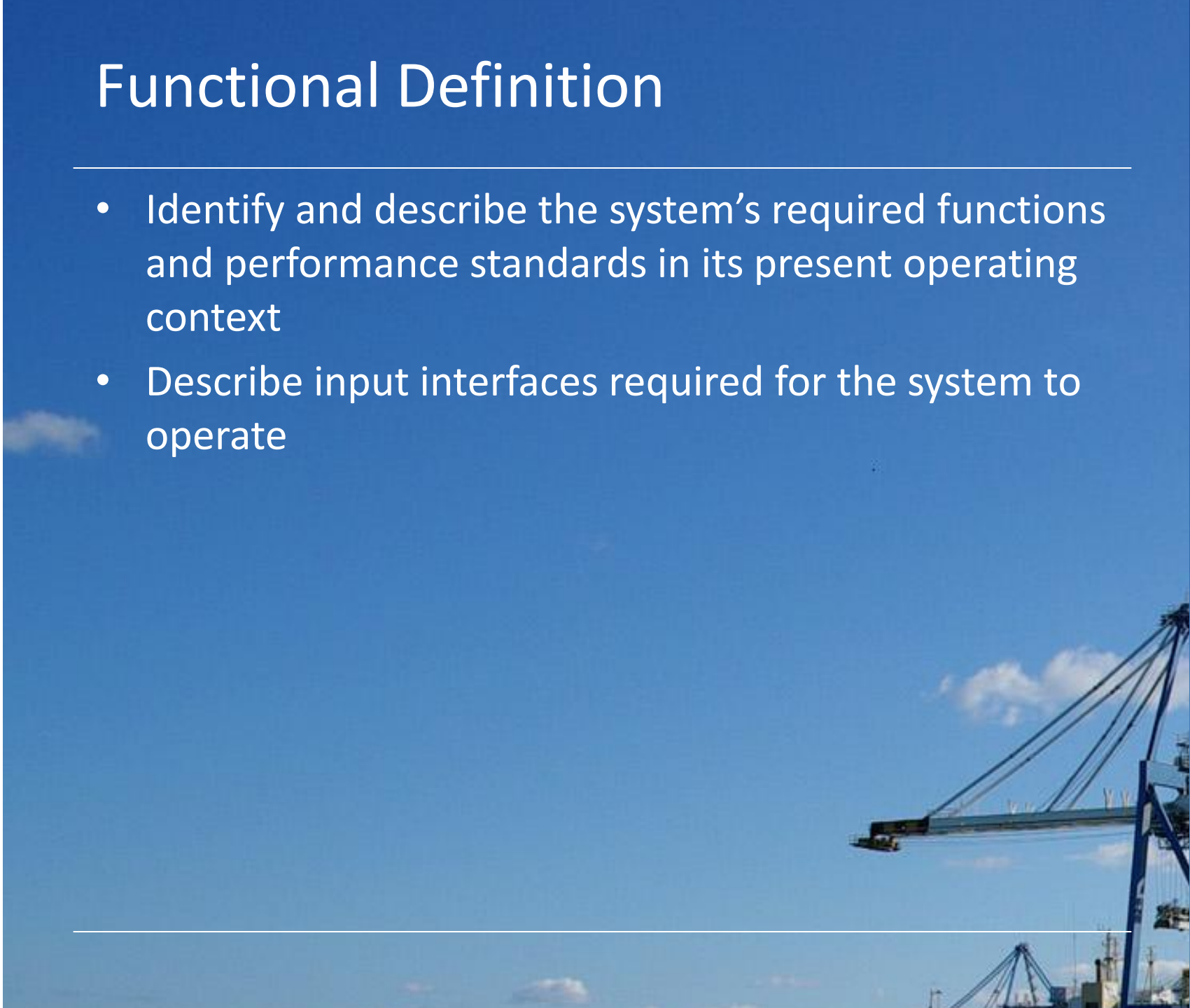
System Definition

- The plant register is a good starting point for system definition
- Tools:
  - Pareto analysis (The 80-20 rule)
  - Reliability Block Diagram analysis
  - Fault Tree Analysis



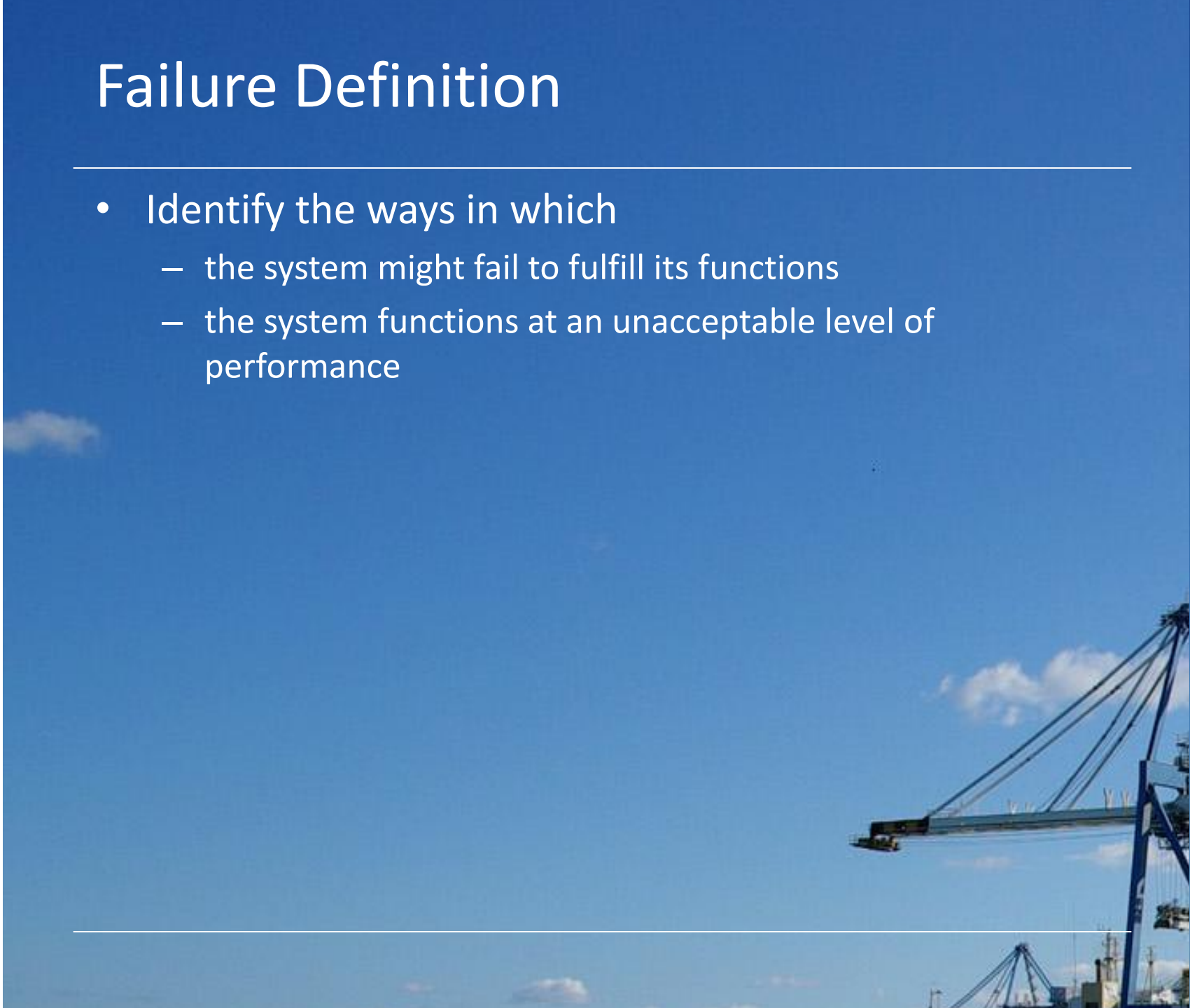
Functional Definition

- Identify and describe the system's required functions and performance standards in its present operating context
- Describe input interfaces required for the system to operate



Failure Definition

- Identify the ways in which
  - the system might fail to fulfill its functions
  - the system functions at an unacceptable level of performance



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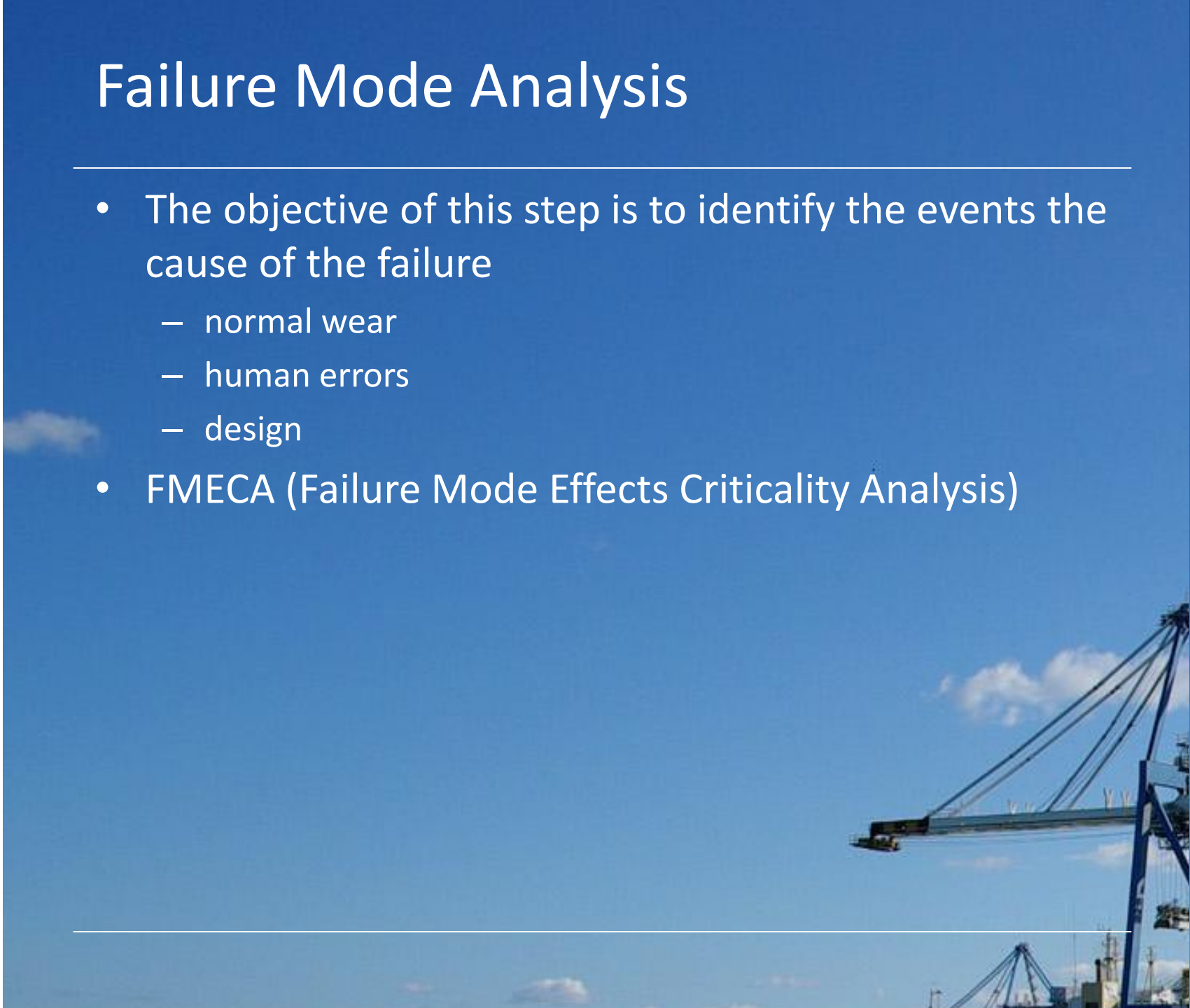
Failure Mode Analysis

- The objective of this step is to identify the events the cause of the failure
  - normal wear
  - human errors
  - design
- FMECA (Failure Mode Effects Criticality Analysis)



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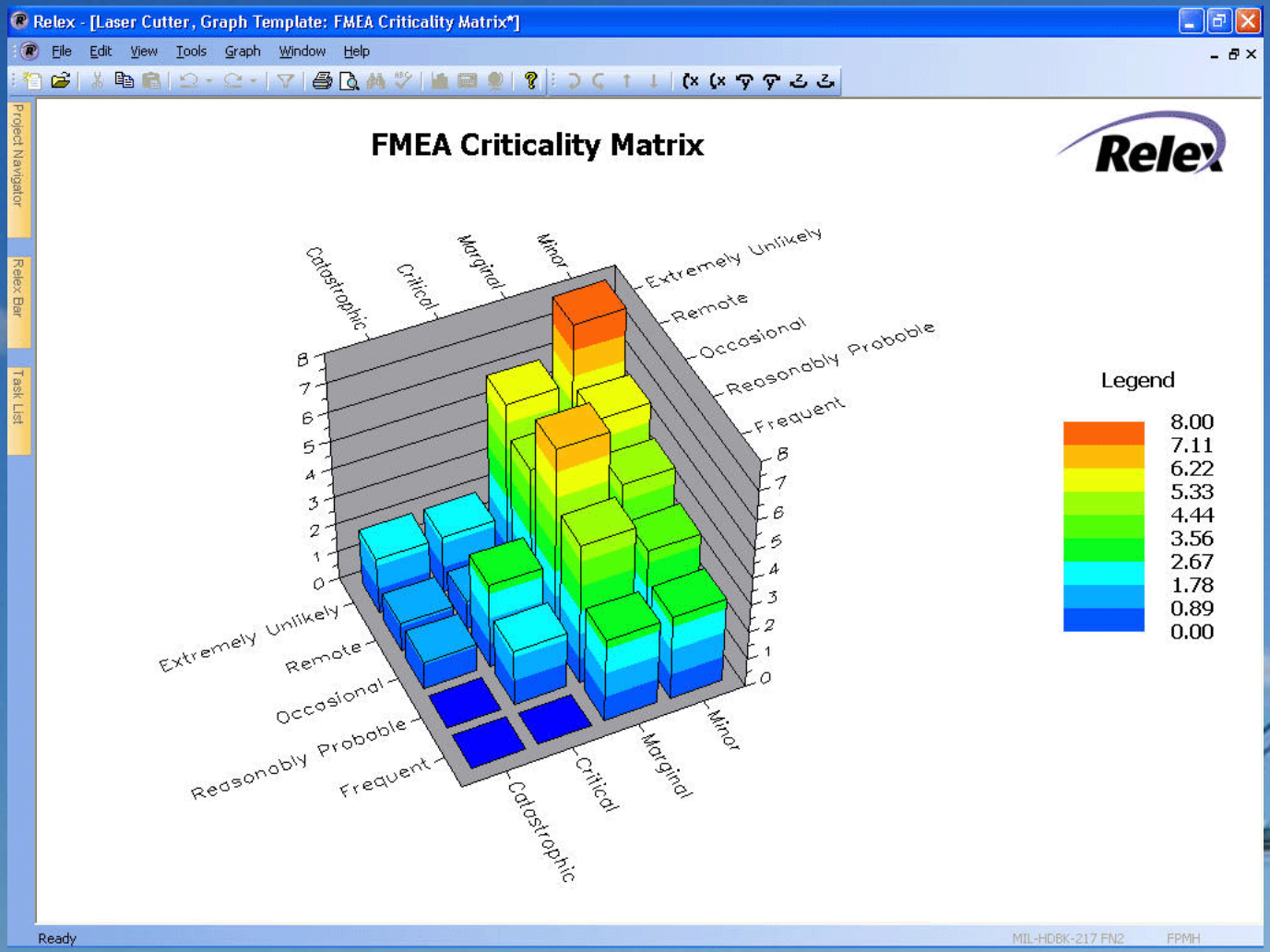
FMEA/FMECA



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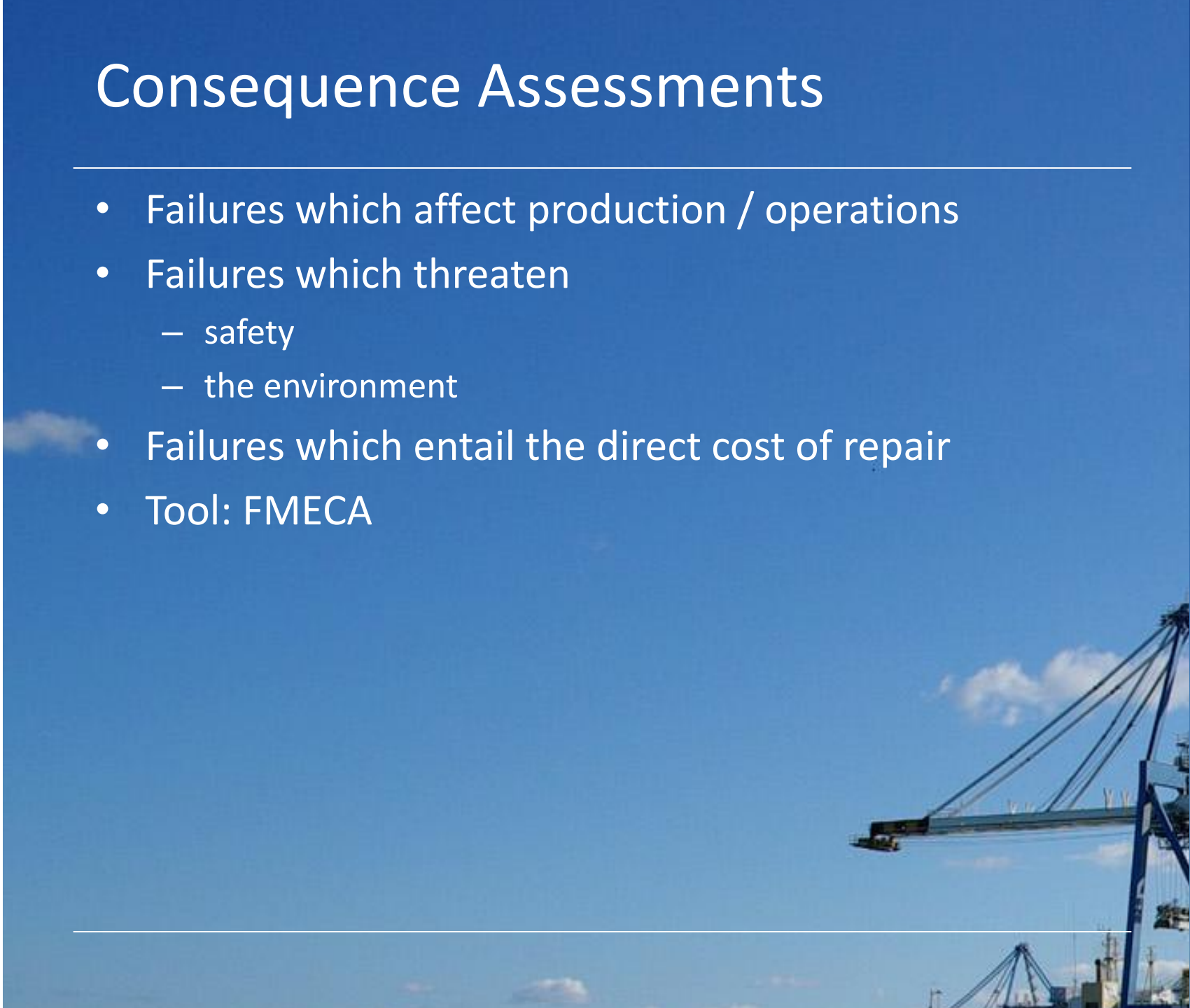
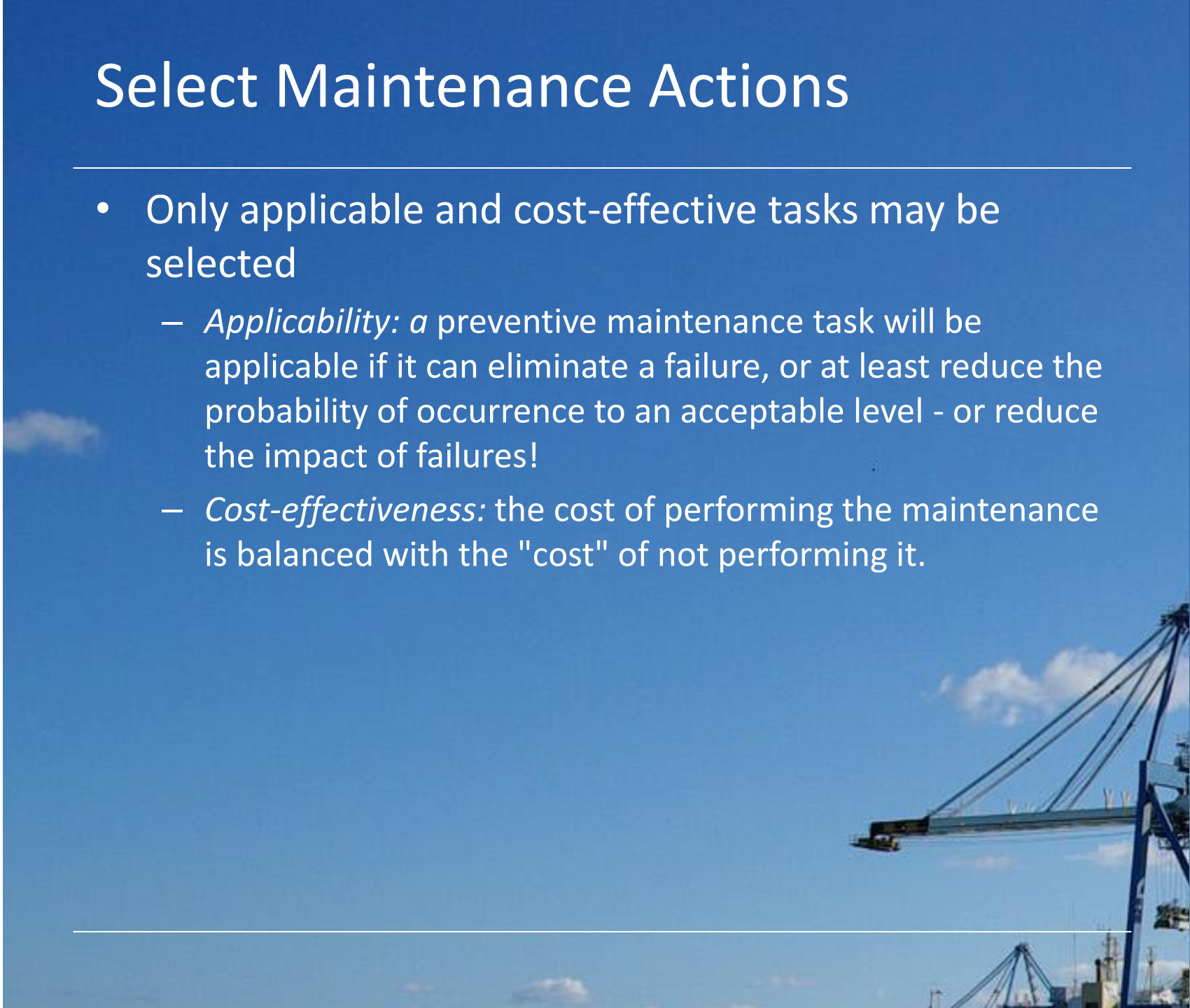
Consequence Assessments

- Failures which affect production / operations
- Failures which threaten
  - safety
  - the environment
- Failures which entail the direct cost of repair
- Tool: FMECA



Select Maintenance Actions

- Only applicable and cost-effective tasks may be selected
  - *Applicability: a* preventive maintenance task will be applicable if it can eliminate a failure, or at least reduce the probability of occurrence to an acceptable level - or reduce the impact of failures!
  - *Cost-effectiveness:* the cost of performing the maintenance is balanced with the "cost" of not performing it.



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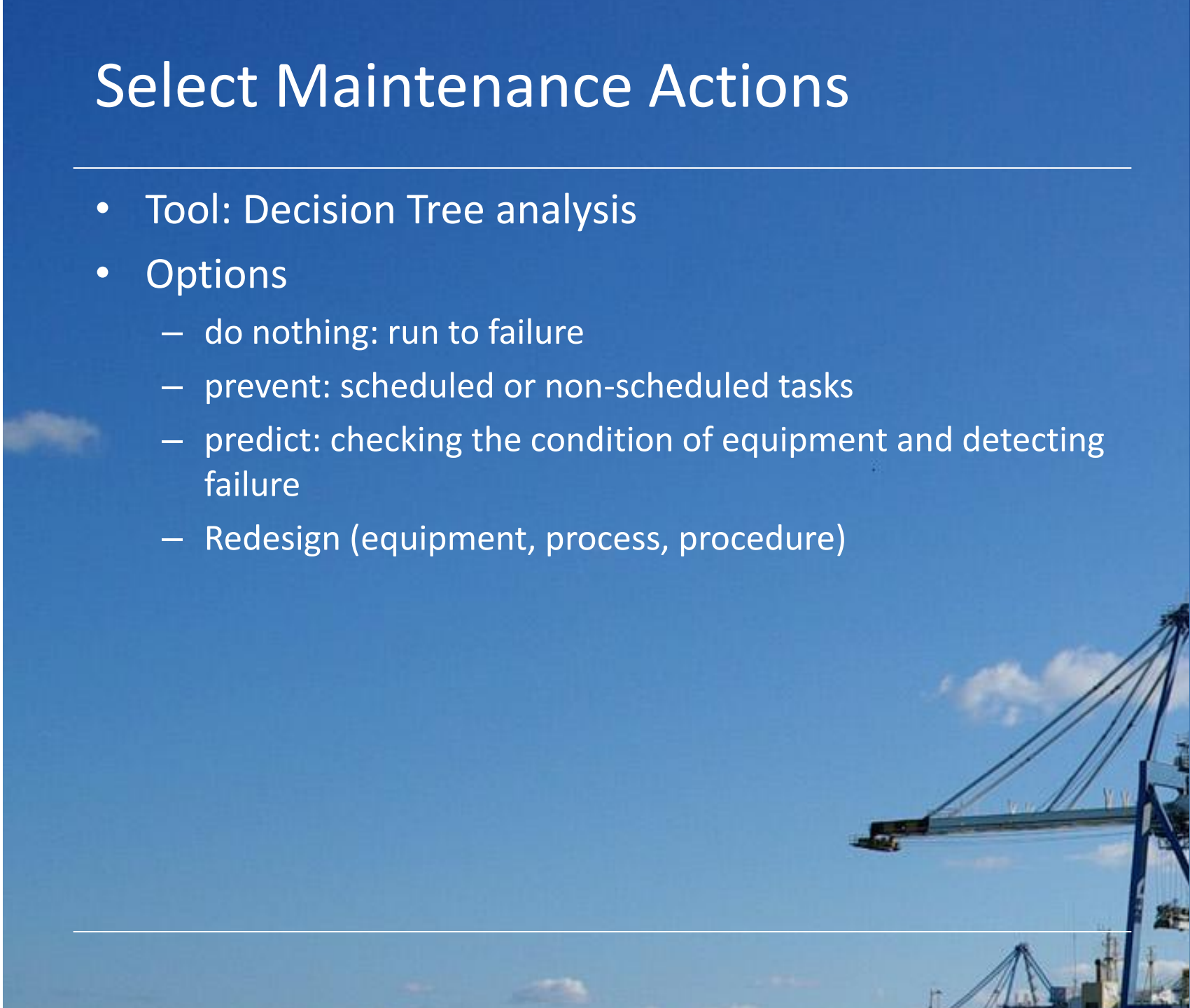
Select Maintenance Actions

- Tool: Decision Tree analysis
- Options
  - do nothing: run to failure
  - prevent: scheduled or non-scheduled tasks
  - predict: checking the condition of equipment and detecting failure
  - Redesign (equipment, process, procedure)



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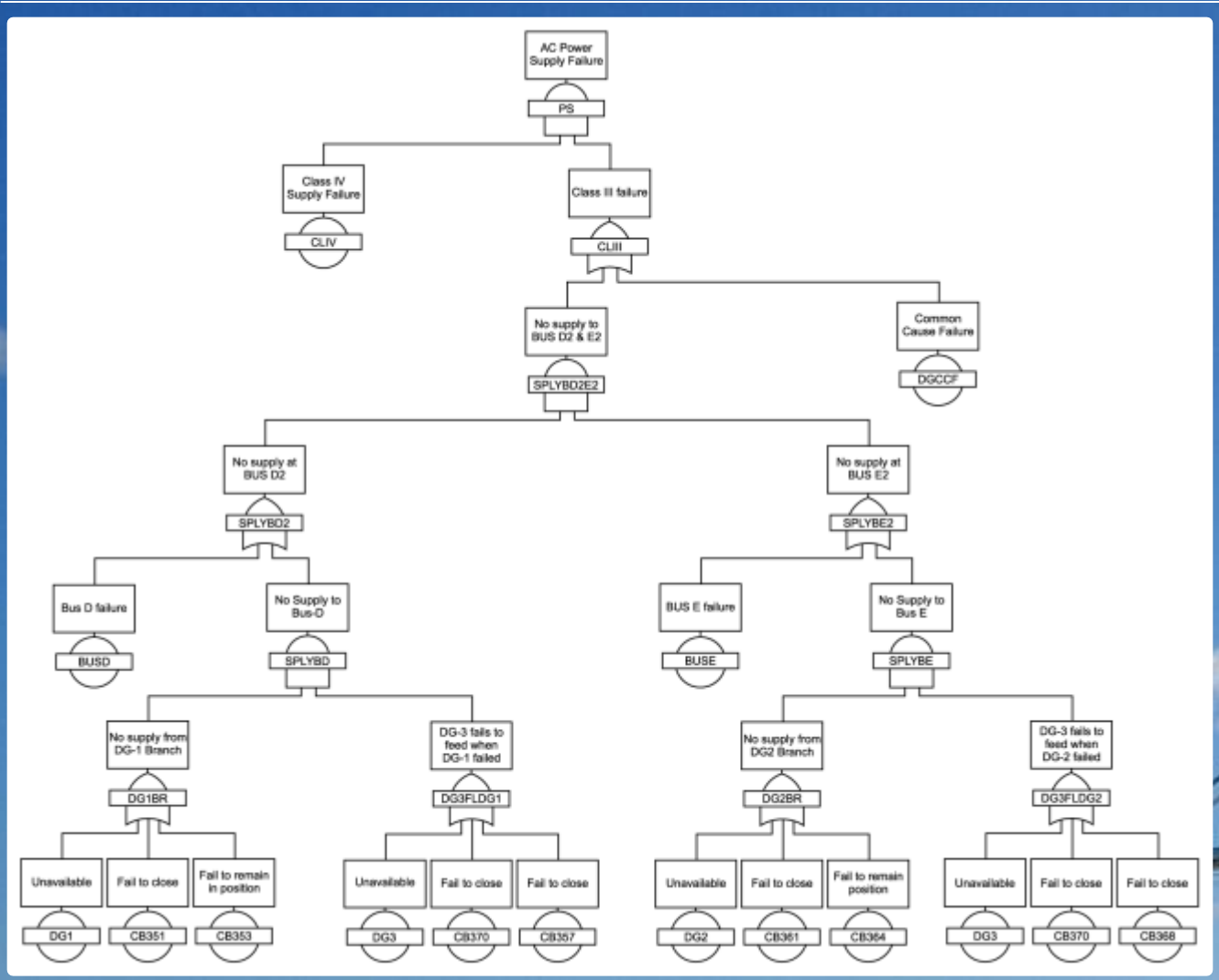
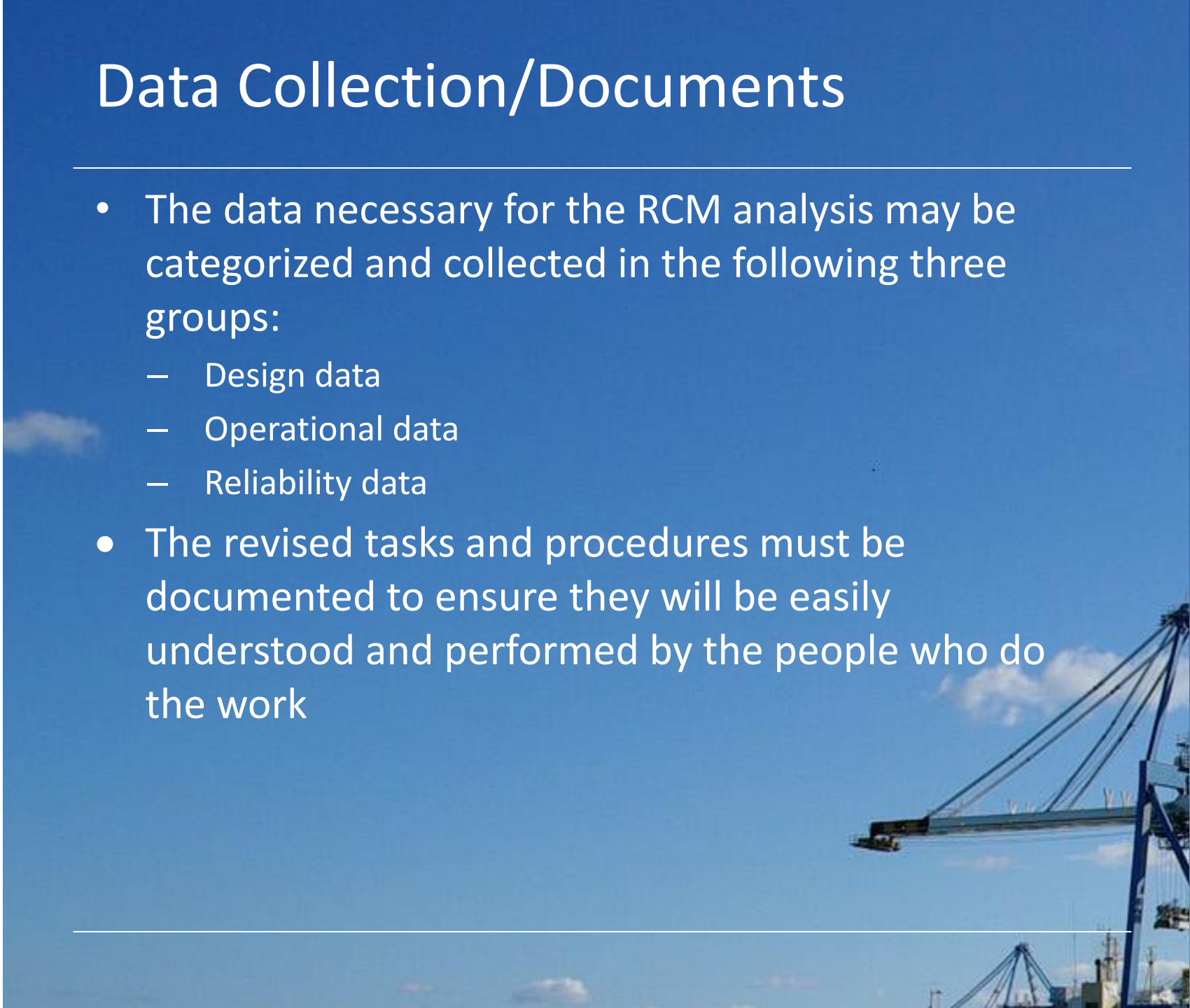
Decision Trees



Data Collection/Documents

- The data necessary for the RCM analysis may be categorized and collected in the following three groups:
  - Design data
  - Operational data
  - Reliability data
- The revised tasks and procedures must be documented to ensure they will be easily understood and performed by the people who do the work



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RCM Benefits (1)

- Cost saving
  - shift from time based to condition based work
  - improved operation performance
- Rationalization
  - unnecessary preventive work is eliminated
- Improved safety
- Improved environmental integrity

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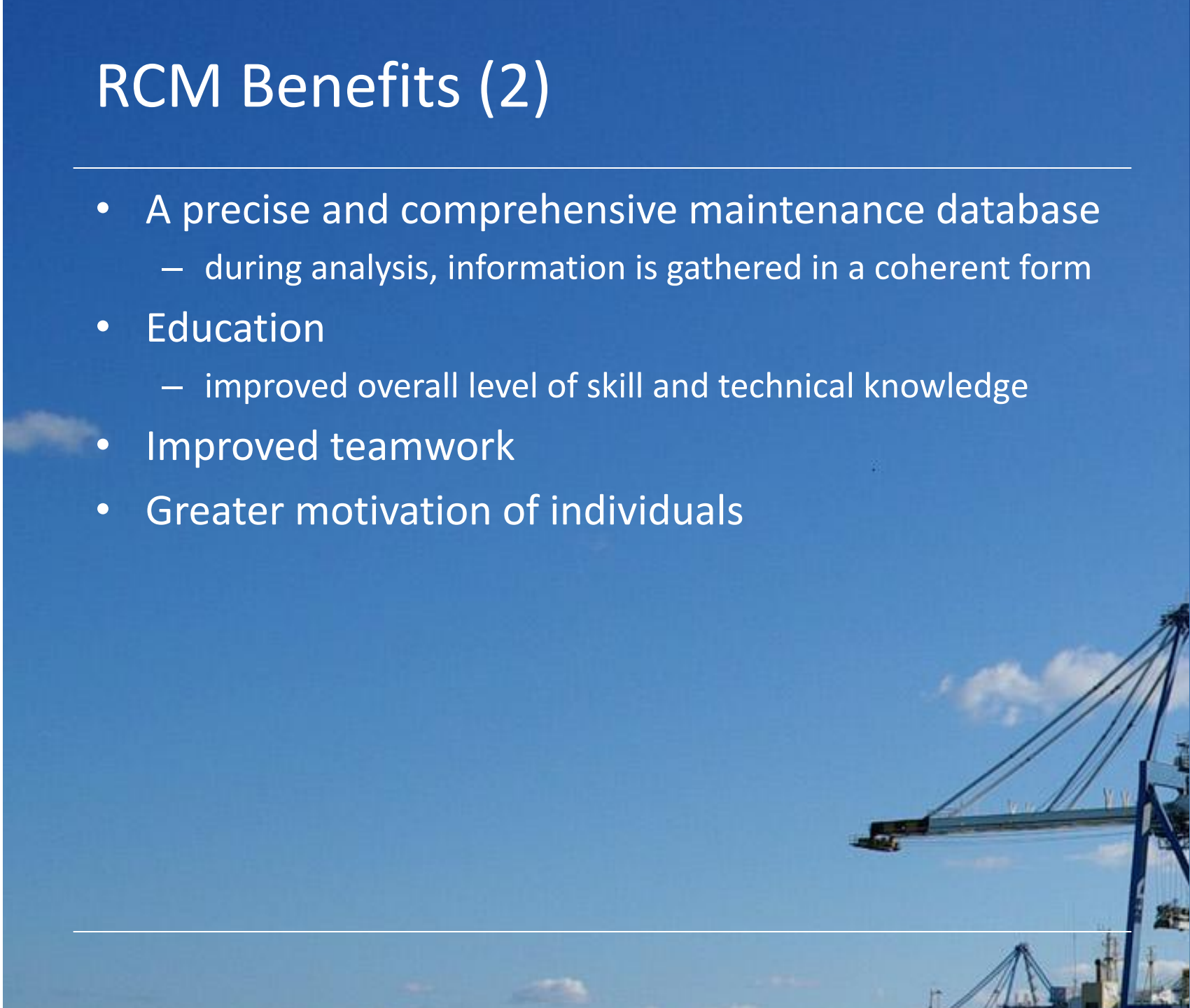
RCM Benefits (2)

- A precise and comprehensive maintenance database
  - during analysis, information is gathered in a coherent form
- Education
  - improved overall level of skill and technical knowledge
- Improved teamwork
- Greater motivation of individuals



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Regulations and Approvals

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Regulations

- Same for everyone?
- Impacts on structure of business important
  - Fuel subsidies
  - Restrictions on what can be done
- Need to consider potential for change
- Represents a risk
- Offers delays

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Regulatory Models

- There are many different Port Authority models
- The key components of the models are:
  - Land ownership
  - Terminal Infrastructure
  - Cranes/Yard Equipment
  - Quayside operations
  - Landside operations
- Last twenty years has seen much port reform
  - More private sector operators
  - Concessions for terminals
  - More private investment in terminals

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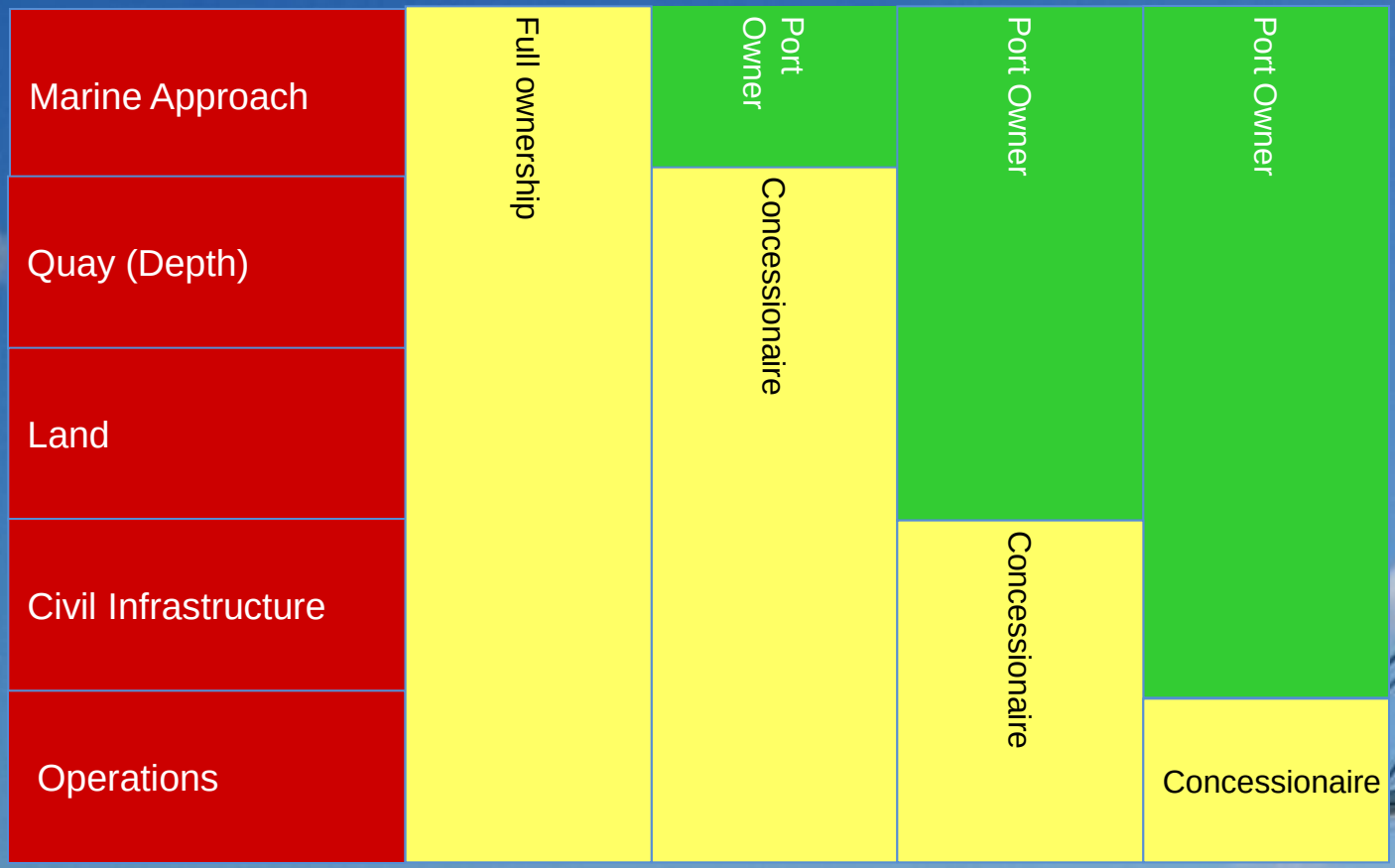
Regulatory Structures



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Standard(ish) options

Mode of Ownership	Land Area	Terminal Infrastructure	Cranes / Yard Equipment	Quayside Operations	Landside Operations
100% state owned & Operated	State owned	Port Authority, build and own	State owned	Port Authority	Port Authority
"Suitcase" Stevedores	State owned	Port Authority, build and own	State owned	Port Authority	Private Stevedores
Terminal Services Agreements	State Owned	Port Authority, build and own	Some State Owned	Private Stevedores	Private Stevedores
Leased terminals	State owned	Port Authority, build and own	Private or rented from Port Authority	Terminal operator	Terminal operator
Concession agreement	State owned	Port Authority, build and own	Privately owned	Terminal operator	Terminal operator
BOT concession	State owned	Construction privately funded	Privately owned	Terminal operator	Terminal operator
100% privately owned	Privately owned	Privately owned	Privately owned	Terminal operator	Terminal operator

Has become best practice for ports

Example Structures

- Government owned and operated ports
  - Central, provincial or city owned?
  - Central, provincial or city regulated?
  - Regulation and operations mixed
  - Lack of accountability
- Government regulated, privately operated
  - How tight the regulation?
  - Tariff, competition
- Government regulation, landlord, private operations
- Many structures and confusion generally reigns

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Approvals and more…

- Agreements with Ministries and Port Authorities
  - In place
  - Needs tight legal wording
    - Remove doubt
  - Needs to cover
    - Scale and location
    - Duration
    - Termination
    - Payments
- Environmental
  - Social
  - Environment
  - Gap assessment for Equator Principles
    - Gaps need to be filled
    - Commitments and implementation of mitigation critical

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other approvals

- Land rights
- Company Law
  - Right for foreigners to own
- Work place and union positions
- Health & Safety Law

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Indonesian example

- Agreement with MOT or Law 17/2008
  - Needs tight legal wording
  - DGST HQ
  - Adpel
  - Must tie in Port Authority
- Ocean Law
  - Adat or Law 27/2007
  - Fisheries and fishing of local communities
  - Implications unclear
- PPP Regulations
  - Tender regulations 61/2005
- Negative investment list
  - Oil, 95%?
  - Others 49%?

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and the environment…

- Amdal – in place before construction
  - Cannot proceed until:
    - SEA complete (Local Government)
    - REA complete
  - Minimum time frame
    - 12months
    - More realistic 18 months
  - Advanced studies
    - Drainage/Hydraulics
    - Land acquisition/Resettlement
  - Scope and sub-division
    - Can be critical to success

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Stakeholders

- Stakeholder Management
  - How to deal with stakeholders effectively and respond to their needs to ensure your interests are defended
- Legal and regulatory controls
  - How legal and regulatory authorities can be managed and assisted to deliver effective ports and terminals
- Protecting the environment
  - What do you really need to do, how to contribute and how can you try and avoid being blamed for problems you did not create
- Overcoming NIMBY
  - Trying to engage and gain the support of local residents and maintaining this as you expand and develop over time

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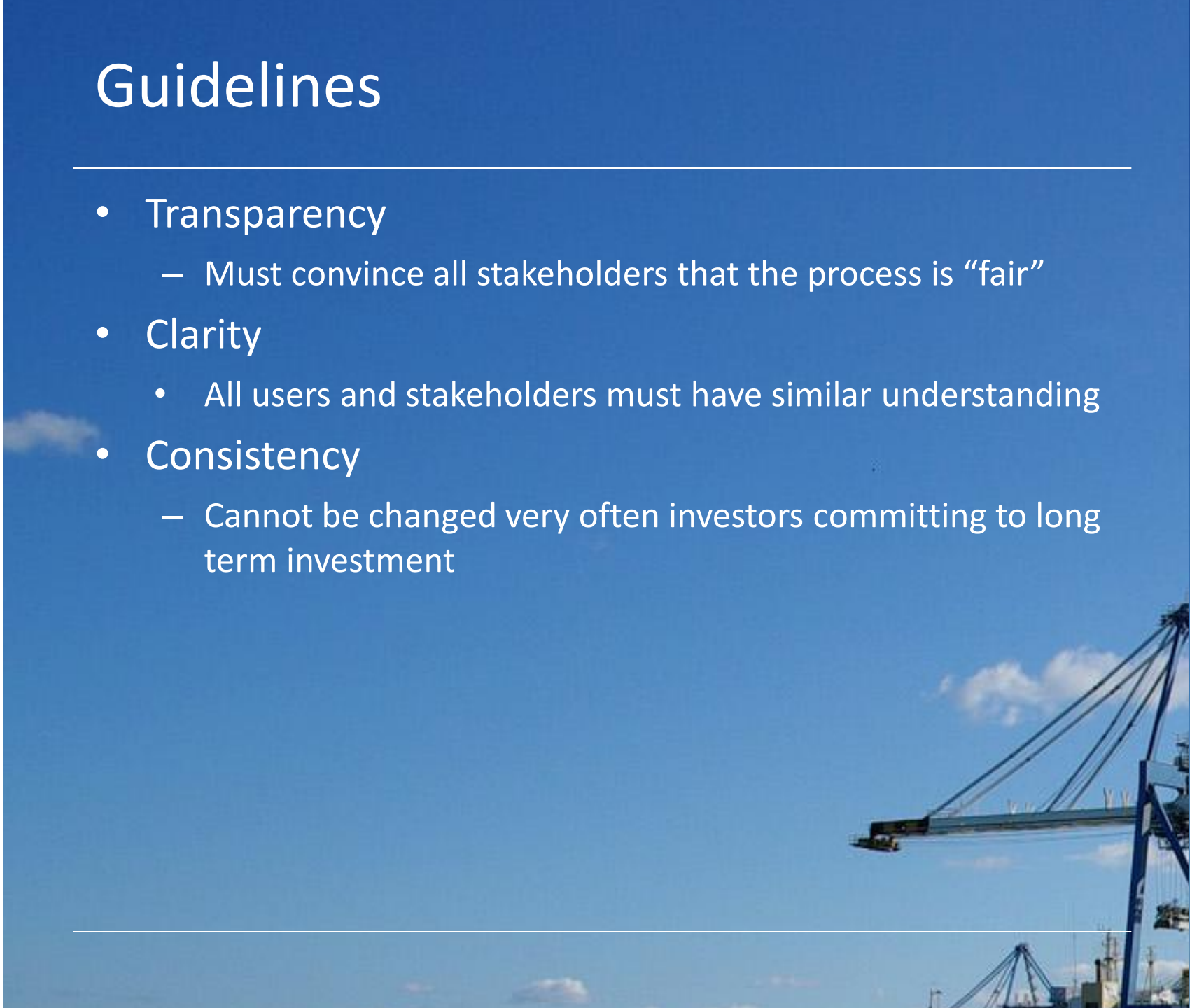
Guidelines

- Transparency
  - Must convince all stakeholders that the process is “fair”
- Clarity
  - All users and stakeholders must have similar understanding
- Consistency
  - Cannot be changed very often investors committing to long term investment



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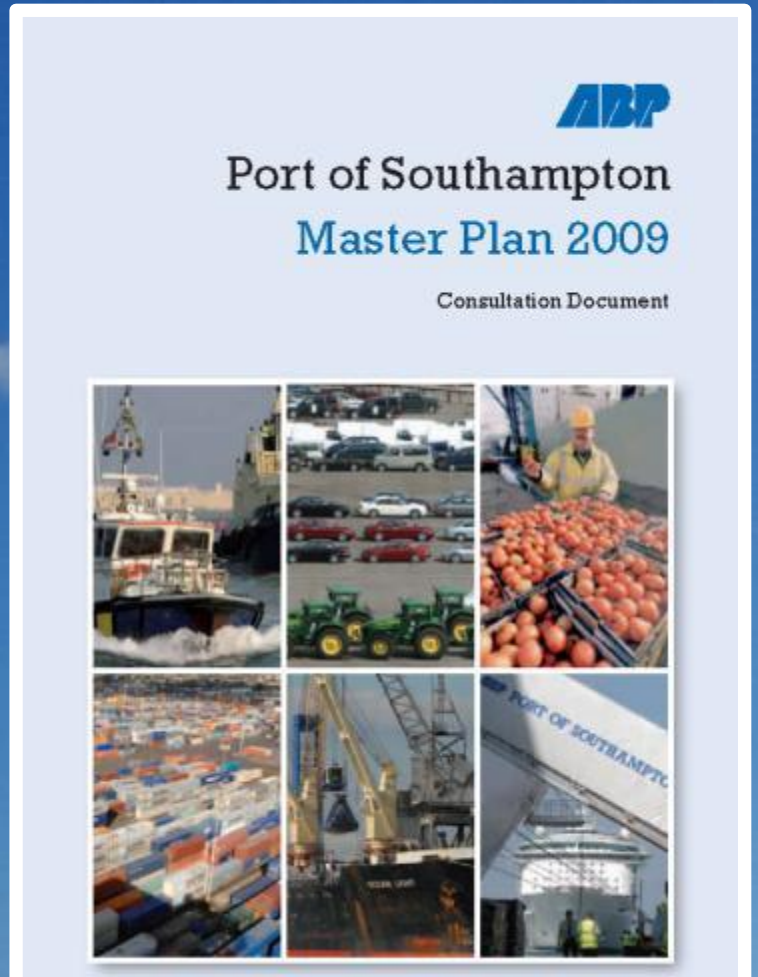
Port of Southampton



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Port of Southampton

- Consultation
  - Web based process
  - Open Meetings
  - Direct engagement of key stakeholders
- Aim of process
  - Identify/accommodate opposition views
  - To reduce opposition to final plan
- Detailed published proposals
  - Seeking detailed responses
- Defined program and process

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Old Port of Brisbane

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New Port of Brisbane

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Community Involvement

PORT of BRISBANE
Here for the future

ABOUT THE PORT | CONTACT US | PORT DIRECTORY | SITE MAP

SEARCH

COMMUNITY

- THE CORPORATION
- OPERATIONS
- COMMUNITY
  - INTRODUCTION
  - SPONSORSHIPS
  - COMMUNITY INITIATIVES
  - VISITORS CENTRE
  - SCHOOLS
  - PORT TOURS
  - NEWS
  - CONSULTATIVE COMMITTEE
- HEALTH, SAFETY AND ENVIRONMENT

FUNCTIONS AND CONFERENCES
DINING OUT
TV ADS
LOCATION

VISITORS CENTRE

Located by the lake on Whimbrel Street, the Port of Brisbane Visitors Centre offers visitors a number of unique experiences.

You can wander through the static and interactive display area and learn about the operations of a working port. If you want to explore further you can also take a tour of the port.

You can enjoy a light meal, or simply coffee and cake, at the Eco Café, or dine in the On the Lake restaurant, with views over the water and abundant bird life.

The centre offers conference and meeting facilities and has a 100-seat theatrette, with a large-screen video projection system, ideal for presentations.

The Centre's opening hours are **Monday to Friday from 9am to 4pm**.

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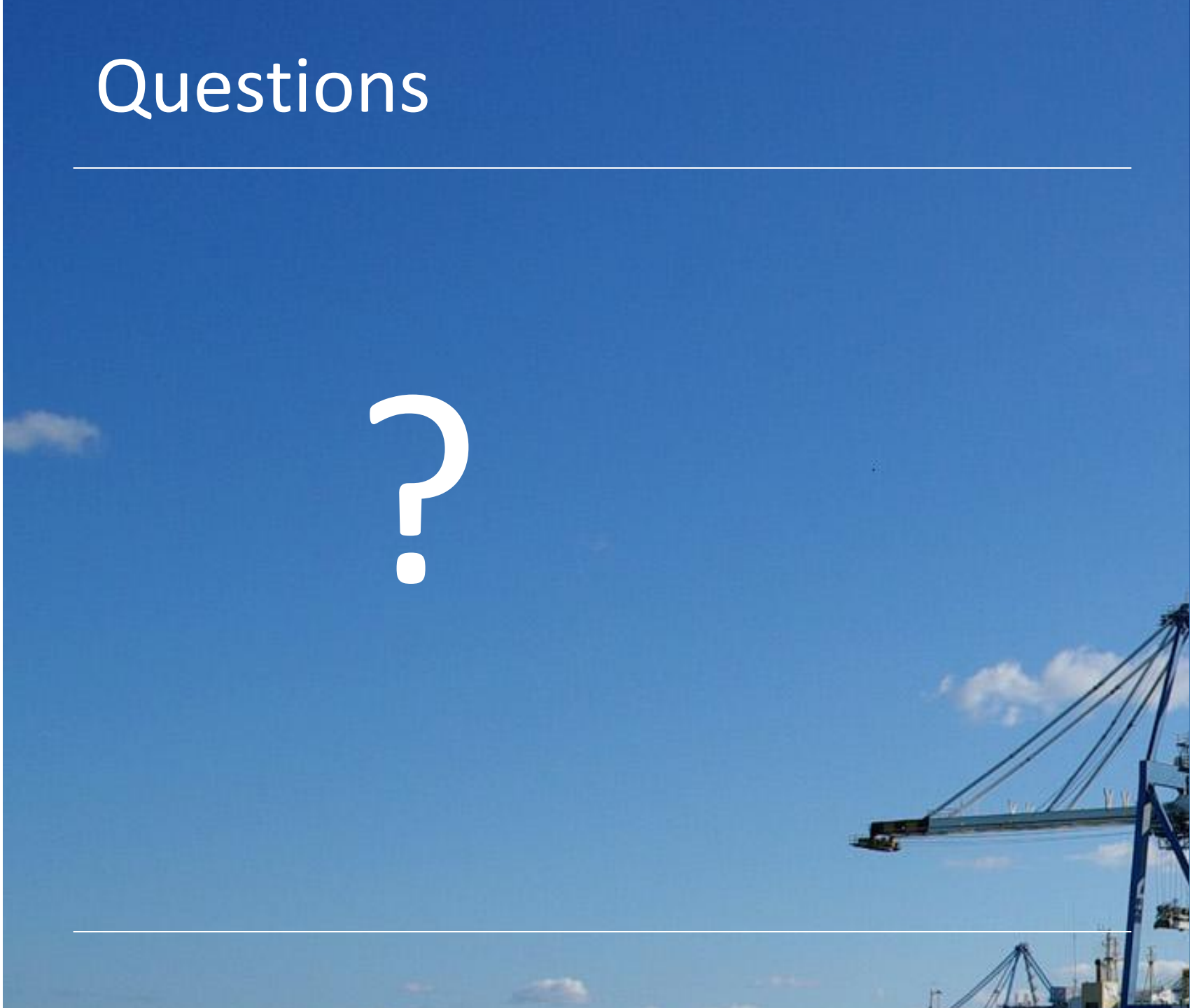
Questions



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Thank you for your attention