Deckplanner

Planning offhore operations with game technology

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CEO - Goontech

Goontech – Key facts and figures

- Started as game development company Henchman & Goon in 2012
- Spin-out to Goontech in 2014
- 6 full-time employees, + small team in Ukraine
- Offices in Bergen and Oslo
- 5.5 million NOK revenue in 2018
- Owned by the founders (Bootstrapped)

Goontech - Industrial Projects

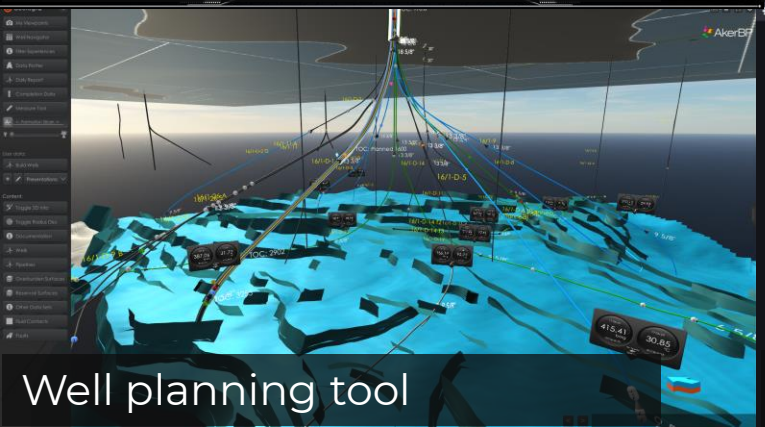
We use **data** to create visualization tools for decision support, resource management and optimized planning of operations.

Make data available to the end user, by turning it into meaningful **insight** and **information** that can be used for answering questions and thereby make decisions.


Manufcaturing dashboard


Oil and gas exploration

Solar thermal plant planner


Well planning tool

Personnel on-board

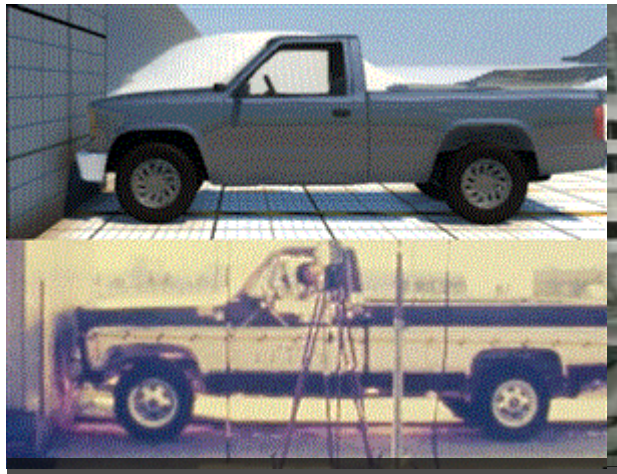
Road planning tool

What is game technology?

*"A game engine is the software that provides game creators with the necessary set of features to build games **quickly** and **efficiently**."*

Easy to work with:

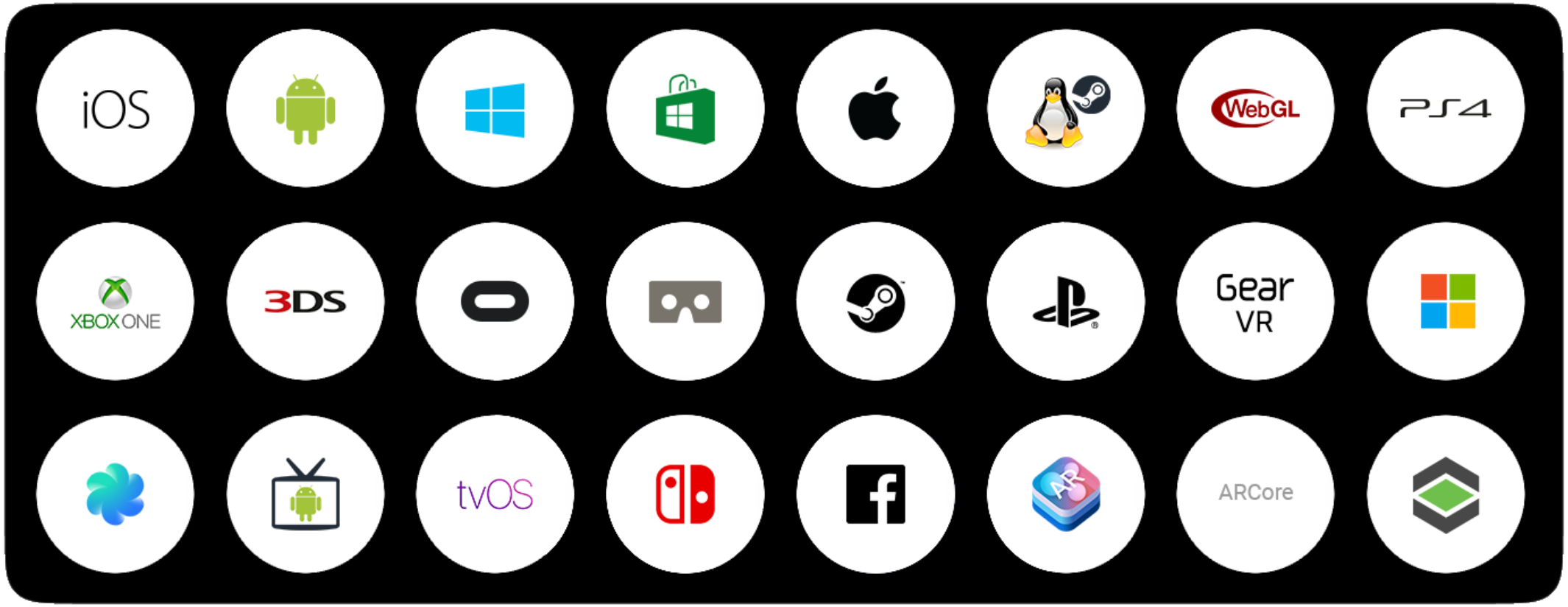
- 2D and 3D graphics
- Environment
- Physics
- Animation
- Interactivity
- Logic



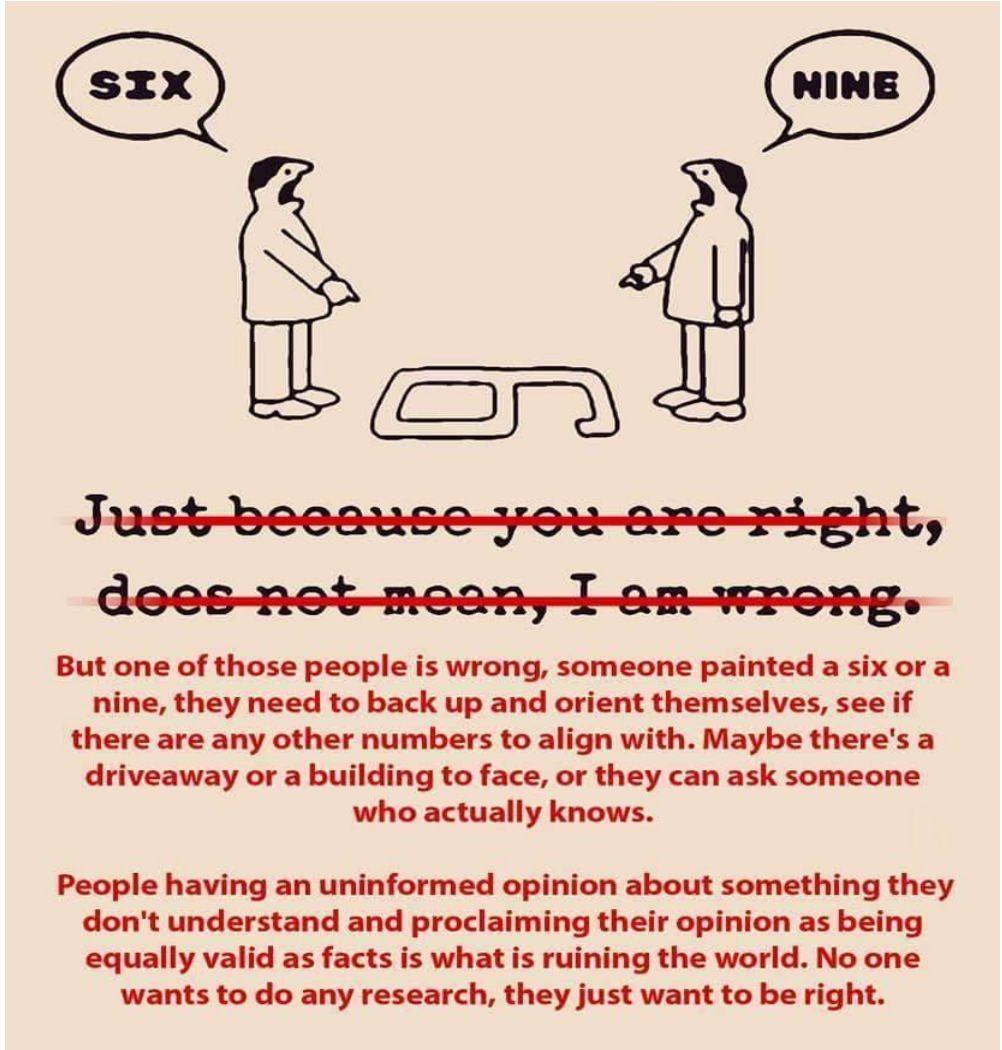
«Realistic» physics

Unrealstic physics

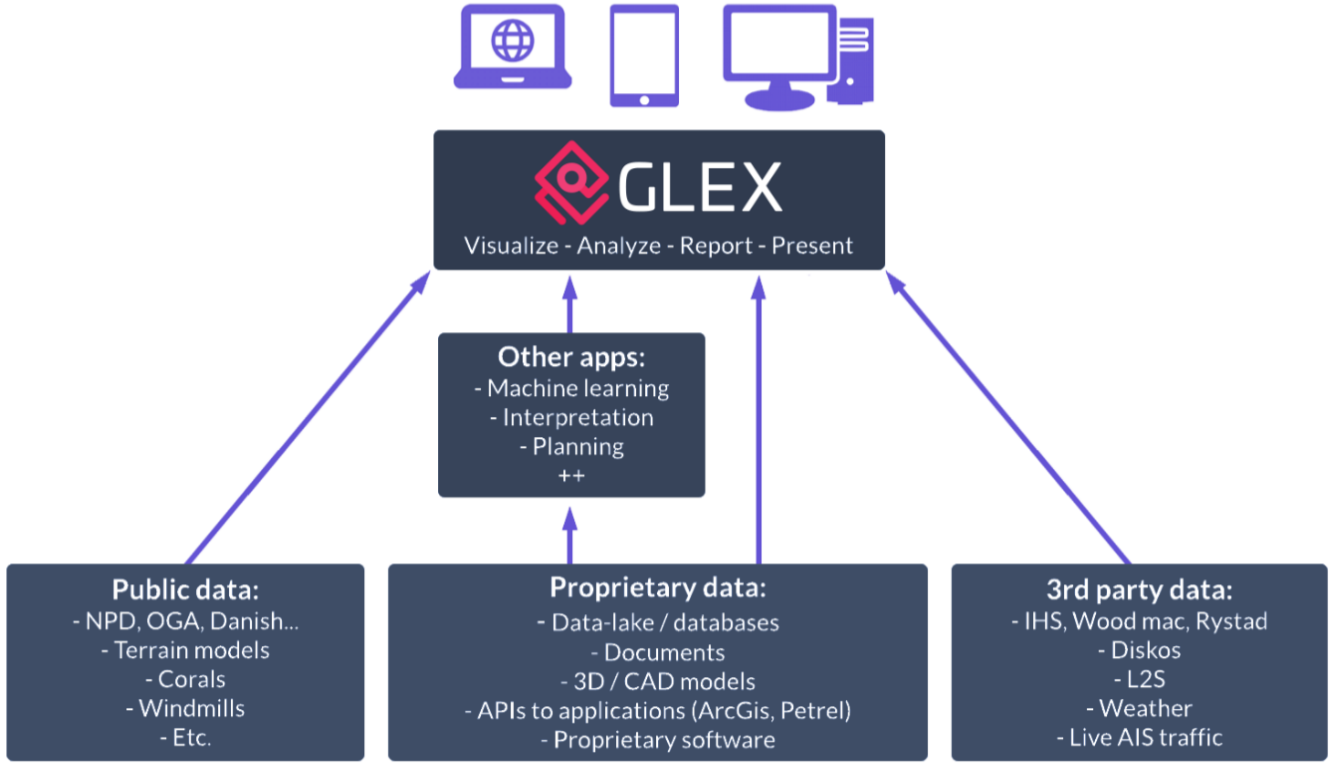
Data available on all platforms



Why is visualization important?



Data has **zero** value until it informs a decision



Cognite

Statoil OMNIA – Statoil data platform
DATA, ANALYTICS AND SOLUTIONS FOR THE FUTURE

ARUNDO

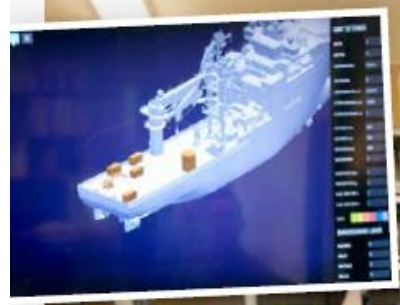
Visual collaboration tool for mobilization and seafastening calculations

MobiDeck

GOONTECH

TU
TEKNISK UKEBLAD
FOR DEG SOM SKAPER FREMTIDEN
1117
164. ÅRGANG
19. DESEMBER 2017

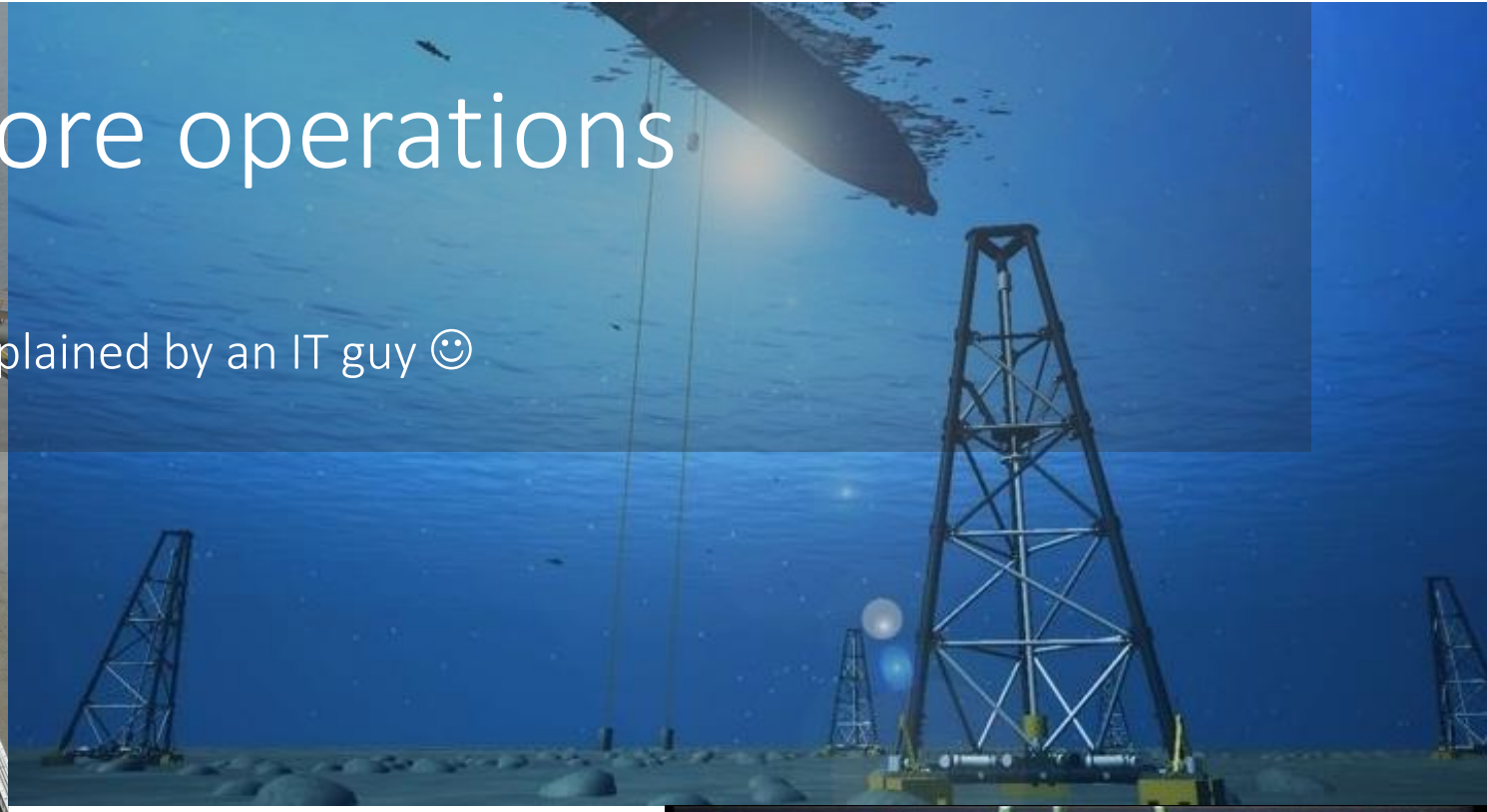
JOHN SVERRE GUNDERSEN FANT OPP ENKLERE SIKRING AV LAST TIL SJØS:



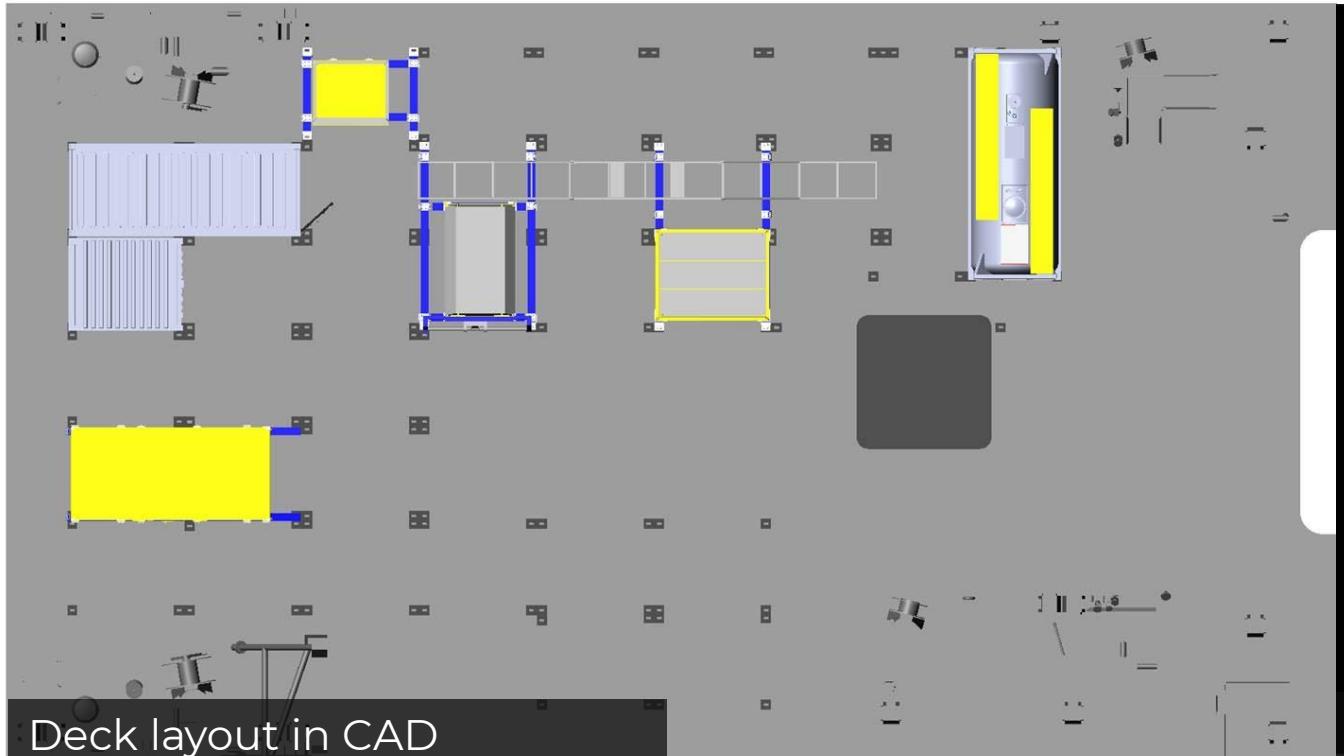
FIKK IDEEN DA HAN MISTET OLJEJOBBEN

Offshore operations

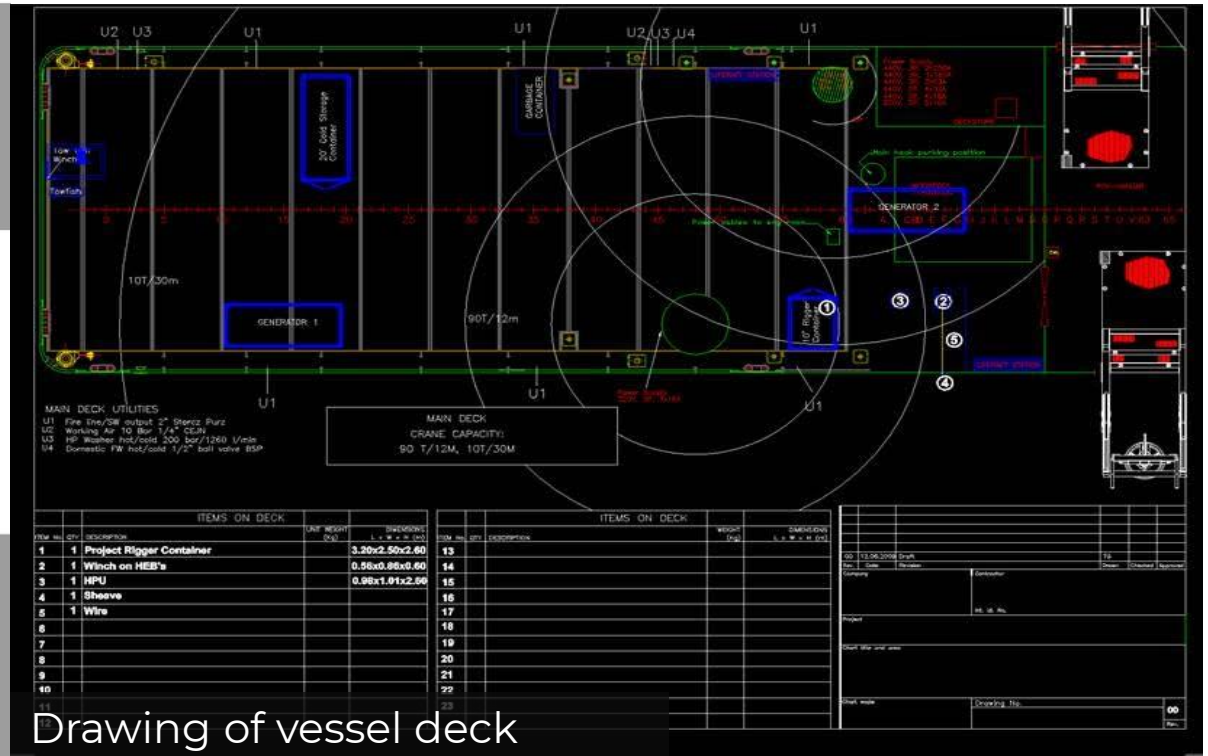
Explained by an IT guy ☺



Current tools for layouts - CAD



Deck layout in CAD



Drawing of vessel deck

Current tools for seafastening

Match-CAD and Excel

App-2A: Accl Calcs Reel-Fwd - Ops Case

The vessel accleration calculation is based on DNV Rules for Ships, July 2012, part 3, chapter 1, section 4.

Constant

Gravity	$g = 9.807 \frac{m}{s^2}$	
Seawater density	$\rho_{SW} := 1025\ kg \cdot m^{-3}$	

Vessel Parameters:

Vessel name	Normand Vision	
Length between Perpendiculars	$L := 144.6\ m$	$L_1 := \frac{L}{1\ m}$
Moulded breadth	$B := 27\ m$	
Moulded summer draft	$T := 8.5\ m$	
Moulded Depth	$D := 12\ m$	
Moulded displacement	$\Delta := 23549\ tonne$	
Maximum Service speed	$V := 2\ knot$	$V_1 := \frac{V}{1\ knot}$
Block coefficient	$C_B := \frac{\Delta}{\rho_{SW} \cdot L \cdot B \cdot T}$	$C_B = 0.69$

Vessel center of motion

Longitudinal (from AP)	$X_{COM} := 0.45 \cdot L$	$X_{COM} = 65.1\ m$
Transverse (assumed at CL)		$Y_{COM} := 0\ m$
Vertical from Baseline	$Z_{COM} := min\left(\left(\frac{D}{4} + \frac{T}{2}\right), \frac{D}{2}\right)$	$Z_{COM} = 6\ m$

Cargo Location

Longitudinal COG position (from AP)	$X_{cargo} := 35\ m$	
Transverse COG position (from CL)	$Y_{cargo} := 2\ m$	
Vertical COG position (from deck)	$Z_{cargo} := 5.3\ m$	

Cargo COG position relative to COM

Longitudinal	$X_{cargo} - X_{COM}$	$X = 30.1\ m$

Calculations in Math-CAD

	ULSa						ULSb					
	Transverse motion of unit			Logitudinal motion of unit			Transverse motion of unit			Logitudinal motion of unit		
Logitudinal dynamic load (Fl=al*mw)	Vertical load max	Vertical load min	Horizontal load	Vertical load max	Vertical load min	Horizontal load	Vertical load max	Vertical load min	Horizontal load	Vertical load max	Vertical load min	Horizontal load
31,71	50,42	30,73	24,14	49,10	32,05	11,10	49,50	12,92	44,83	47,04	15,38	20,61
34,12	52,62	28,53	24,49	51,34	29,81	11,94	53,58	8,84	45,49	51,21	11,21	22,18
31,31	56,45	23,66	23,83	55,14	24,97	10,96	61,26	0,36	44,26	58,83	2,80	20,35
33,69	60,57	19,55	24,18	59,31	20,81	11,79	68,91	-7,28	44,91	66,57	-4,94	21,90
15,43	29,54	9,94	11,74	26,37	13,11	5,40	33,38	-3,01	21,81	27,49	2,87	10,03
16,60	30,77	8,71	11,91	27,72	11,76	5,81	35,67	-5,31	22,13	30,01	0,36	10,79
15,50	31,76	7,90	11,80	28,57	11,08	5,42	37,41	-6,90	21,91	31,49	-0,99	10,07
16,67	33,61	6,05	11,97	30,54	9,11	5,84	40,84	-10,34	22,23	35,15	-4,65	10,84
20,54	42,09	10,47	15,64	37,87	14,69	7,19	49,58	-9,15	29,04	41,74	-1,31	13,35
22,10	44,54	8,02	15,86	40,48	12,08	7,73	54,13	-13,70	29,46	46,59	-6,16	14,36
7,85	14,62	5,47	5,98	13,21	6,89	2,75	16,22	-0,77	11,10	13,59	1,86	5,10
8,45	15,23	4,86	6,06	13,87	6,22	2,96	17,36	-1,90	11,26	14,82	0,63	5,49
14,45	33,01	16,01	11,00	30,11	18,91	5,06	31,27	-0,29	20,43	25,89	5,09	9,40
23,21	43,82	11,38	16,66	39,66	15,55	8,12	51,35	-8,89	30,94	43,62	-1,16	15,09
113,90	139,10	63,15	55,66	128,60	73,65	26,58	112,12	-28,92	103,37	92,63	-9,43	49,36
188,52	210,99	57,79	84,19	196,48	72,30	43,99	245,64	-38,89	156,36	218,69	-11,94	81,69
113,91	134,71	67,57	55,67	124,21	78,07	26,58	103,95	-20,73	103,38	84,46	-1,24	49,36
188,54	199,62	69,18	84,20	185,11	83,70	43,99	224,51	-17,74	156,37	197,56	9,22	81,70

	B500								
	Roll acceleration:	COG over waterline		Pitch period:	Pitch angle:	Pitch acceleration:		Comb. Vert Accel	Comb. Trans Accel	Comb Long. Accel
	ar=Ø*((2*3,14)/Tr)^2*Rr	z=z0+VCOG	arz=ar	ar=Ø*((2*3,14)/Tr)^2*z	Tp=1,8*sqrt(L/g)	q=0,25*a0/Cb	ap=q*((2*3,14)/Tp)^2*Rr	apx=ap	av=max(sqrt((azJ^2+(ApzJ^2); Sqrt(az^2+arz^2)	at=sqrt(ay^2+(g*sin(Ø)+ary)^2	al=sqrt(ax^2+(g*sing(Ø)+apx)^2
	0,010	5,019		0,056	5,298	8,491	0,052		0,106	3,320	5,420	2,492
	0,010	5,019		0,056	5,298	10,971	0,067		0,138	4,289	5,499	2,681
	0,015	5,019		0,056	5,298	8,491	0,555		0,106	6,355	5,420	2,492
	0,015	5,019		0,056	5,298	10,971	0,717		0,138	8,211	5,499	2,681
	0,070	5,019		0,056	5,298	8,491	0,158		0,106	3,629	5,420	2,492
	0,070	5,019		0,056	5,298	10,971	0,204		0,138	4,689	5,499	2,681
	0,070	5,019		0,056	5,298	8,491	0,456		0,106	5,546	5,420	2,492
	0,070	5,019		0,056	5,298	10,971	0,589		0,138	7,166	5,499	2,681
	0,034	5,019		0,056	5,298	8,491	0,456		0,106	5,546	5,420	2,492
	0,034	5,019		0,056	5,298	10,971	0,589		0,138	7,166	5,499	2,681
	0,031	5,019		0,056	5,298	8,491	0,137		0,106	3,544	5,420	2,492
	0,031	5,019		0,056	5,298	10,971	0,177		0,138	4,579	5,499	2,681
	0,032	5,019		0,056	5,298	8,491	0,257		0,106	4,135	5,420	2,492
	0,032	5,019		0,056	5,298	10,971	0,332		0,138	5,343	5,499	2,681
	0,054	6,980		0,078	5,298	8,491	0,364		0,148	4,843	5,631	2,689
	0,034	6,980		0,078	5,298	10,971	0,470		0,191	6,265	5,707	2,982
	0,054	6,980		0,078	5,298	8,491	0,164		0,148	3,654	5,631	2,689
	0,034	6,980		0,078	5,298	10,971	0,212		0,191	4,721	5,707	2,982

	B200			B300			B400		
	Wave Cofficient			Common acceleration parameter:	Surge acceleration	Combined sway/yaw acceleration:	Heave acceleration:	Roll period	Keel Value	Roll angle (single amplitude):
Vessel name	Cw=0,079*2*L	Cv=min(sqrt(L)*(1/50);0,2	Cvl=min(V/sqrt(L);0,8	a0=(3*Cw)/L+Cv*Cvl	ax=0,2*g*a0*sqrt(Cb)	ay=0,3*g*a0	az=(0,7*g*a0)/sqrt(Cb)	Tr=2*k√sqrt(GM)	k=1	Ø=((50(1,2-0,025)*Tr)*k)/(B+75)
Olympic Commander	6,73	0,18	0,80	0,39	0,06	0,12	0,33	13,18	1	27,77
Olympic Commander	6,73	0,18	1,41	0,50	0,08	0,15	0,43	13,18	1	27,77

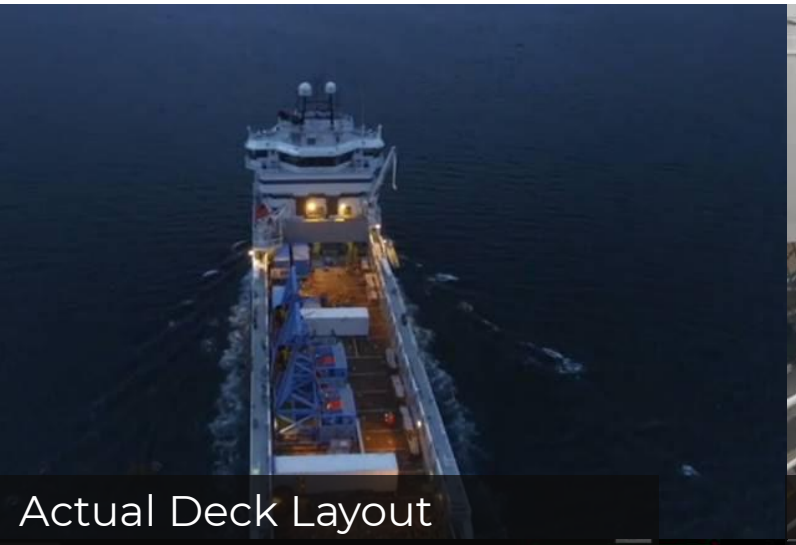
Vessel name	Length,LPP(L)	Width (B)	Vessel block coefficient (Cb)	Roll radius of gyration (kr)	Metacenter height (GM)	Max Service Speed (V)
Olympic Commander	85	20	0,65	7,8	1,4	0
Olympic Commander	85	20	0,65	7,8	1,4	13

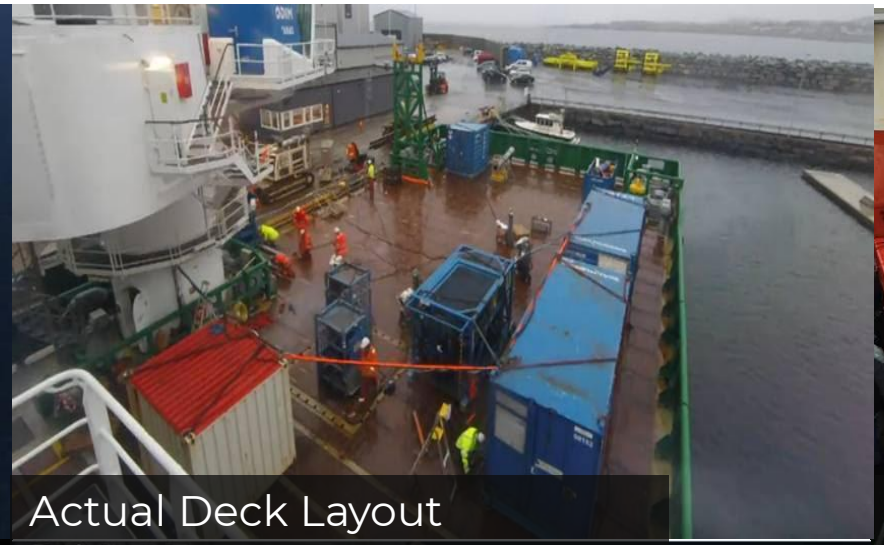
Calculations in Excel

Deckplanner

Demo

Example mobilizations


Actual Deck Layout


Actual Deck Layout

Actual Deck Layout

Deck plan in Deckplanner

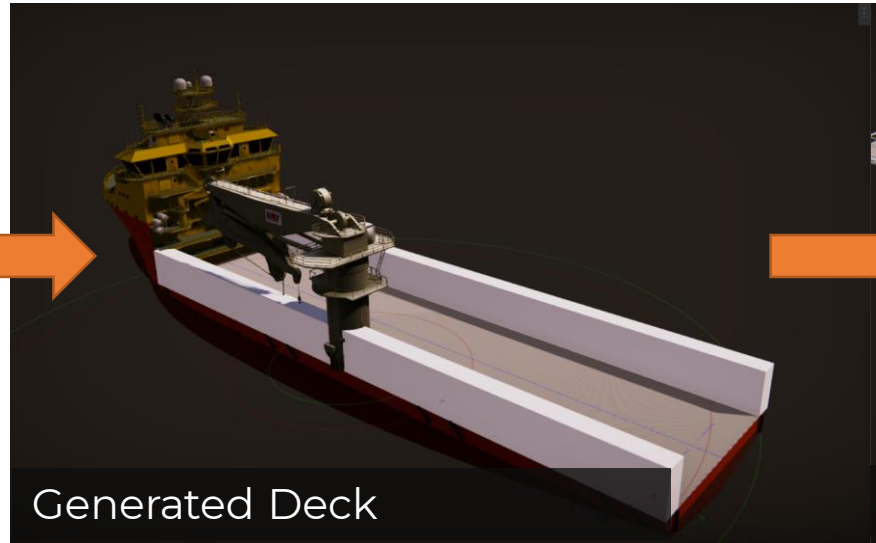
Deck plan in Deckplanner


Deck plan in Deckplanner

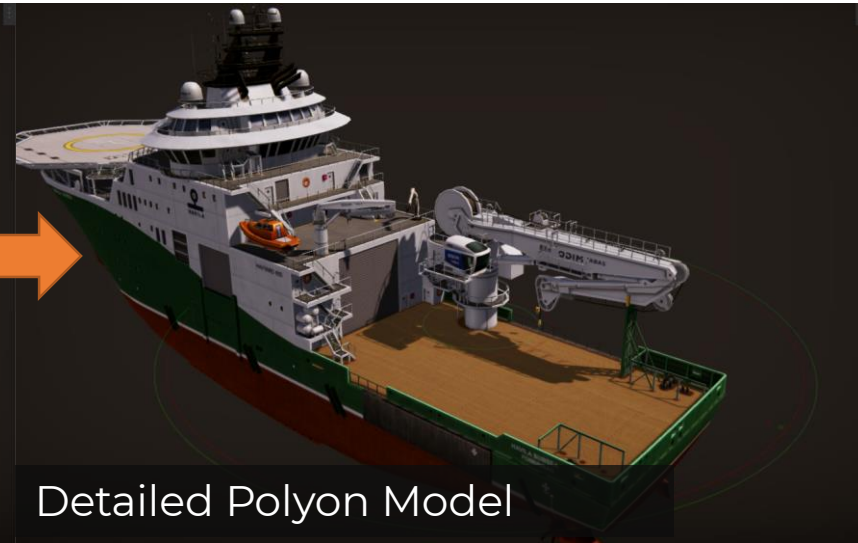
Data is available – but….

- Hard to get access due to organizational barriers
- Necessary conversion of data is very labor intensive
- Uncertainty around legal framework for data sharing

CAD model



Generated Deck



Detailed Polyon Model


Thank you!
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