



An Open Architecture Approach to NEC

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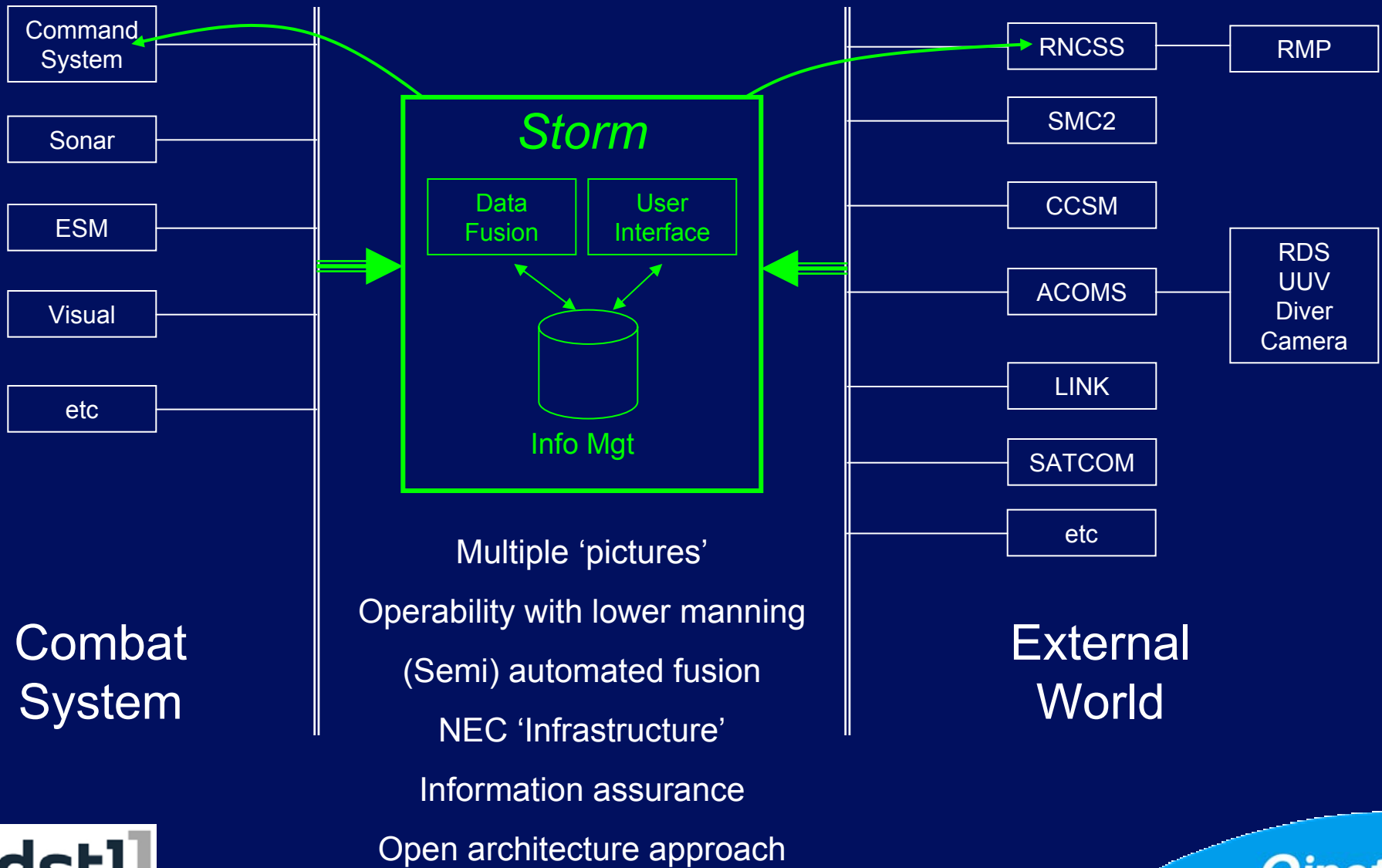
introduction

Our current research programme

“Underwater Network Enabled Capability Picture Compilation”

- Submarine centric but not submarine specific
- Concentrating on improved picture compilation leading to heightened situation awareness
- Largely concerned with track / tactical information
- We're building a system called *Storm* to do NEC experimentation

Storm situation



Our open architecture track record

- DeRSCI research programme for UK Royal Navy
- Defined a 'Generic Open Architecture' for sonars
- Built common towed and bow sonars for a number of different arrays
- Active and intercept sonars in development
- (Almost) all COTS - hardware *and* software infrastructure
- Many successful sea trials
- Very highly regarded by MoD and RN
- Competition for upgrading a major UK sonar about to begin



A very practical approach!

QinetiQ

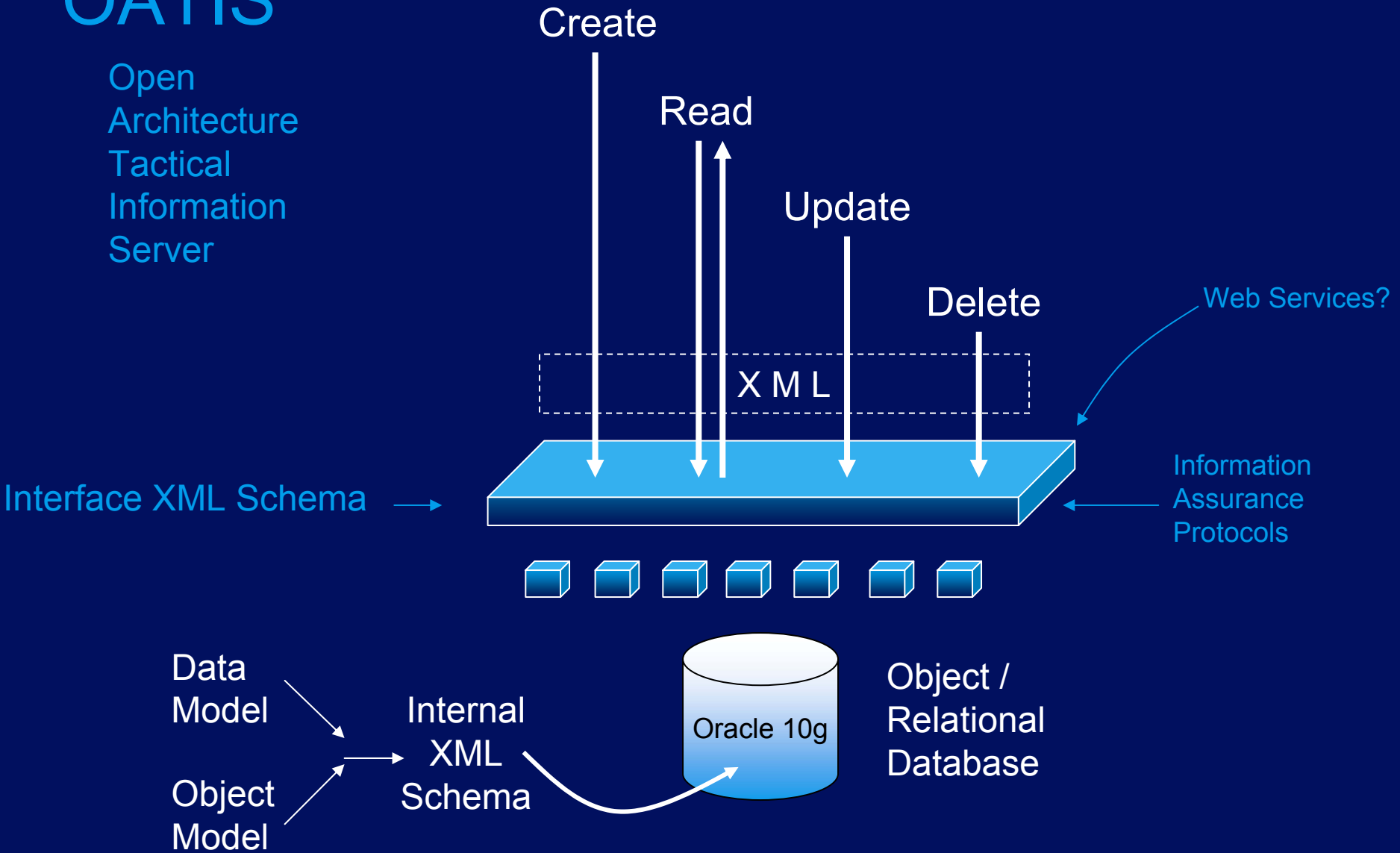
Why open architectures?

- An open architecture approach *makes things easier*
- When applied to NEC, an OA approach makes it...
 - Easier to access and manage information
 - In an open but controlled manner
 - Easier to connect into the platform
 - To existing combat systems and legacy equipments
 - Easier to connect to other NEC assets
 - Using a variety of connection mechanisms
 - Easier to incorporate 3rd party components
 - Applications, sub-systems...
 - Easier to use
 - By ordinary naval users

easier to access and
manage information

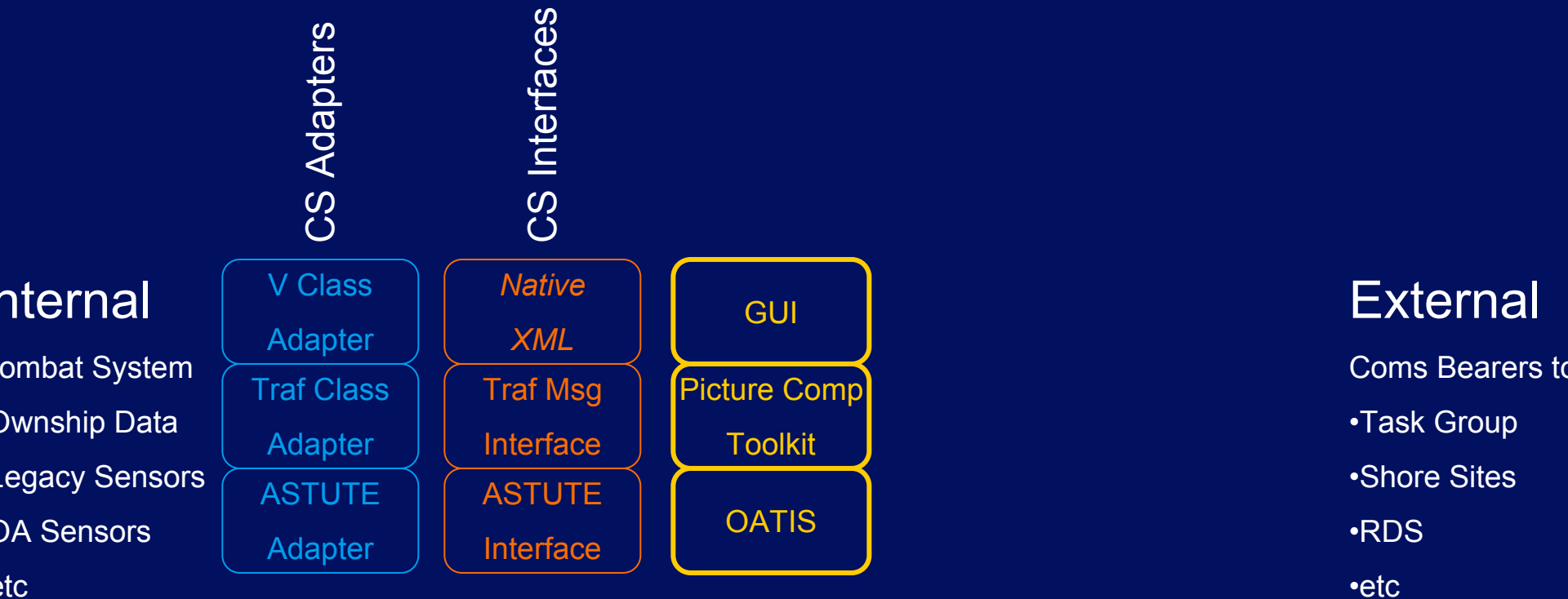
OATIS

Open
Architecture
Tactical
Information
Server



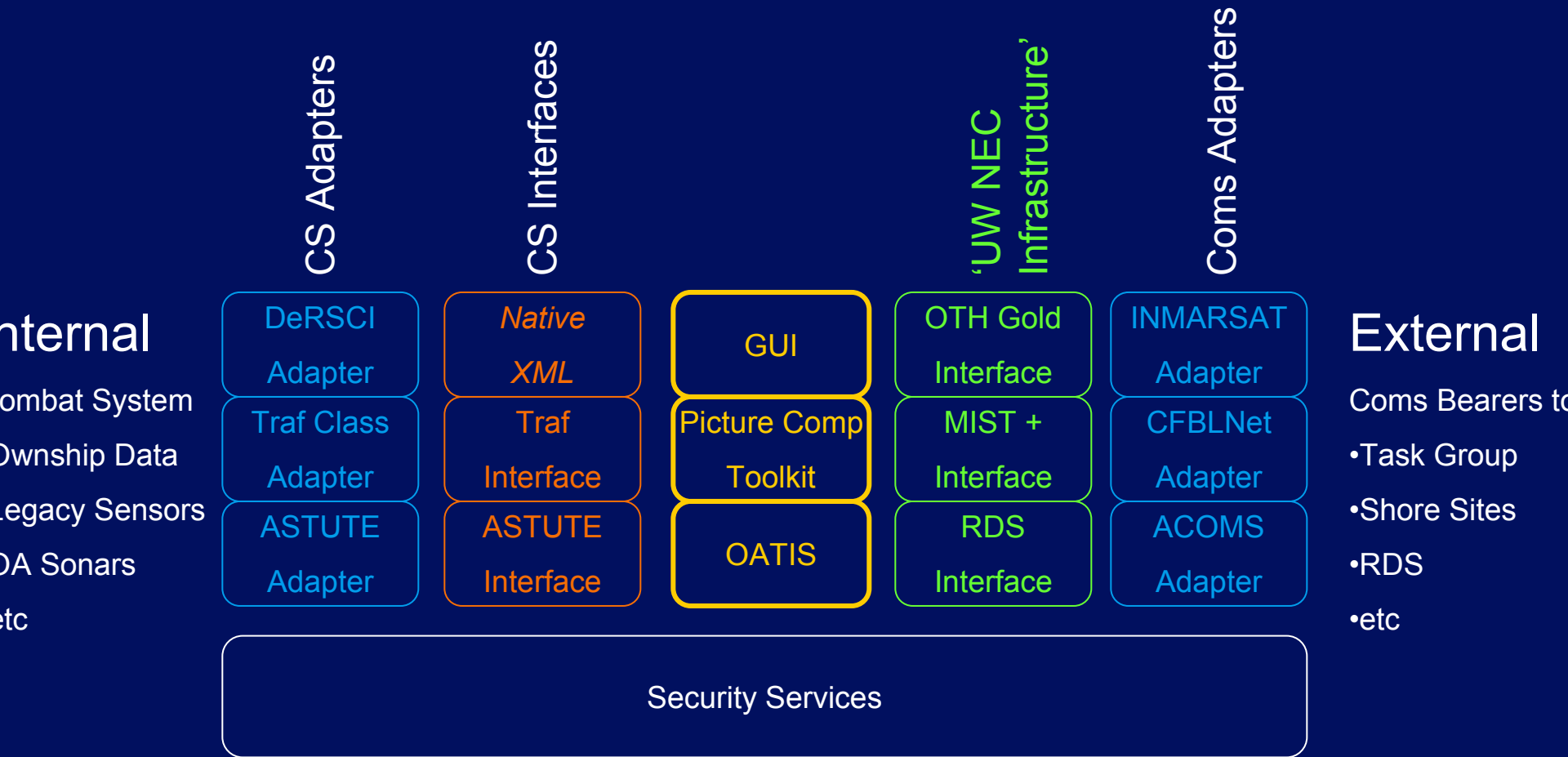
easier to connect into the
platform

Storm internal connectivity



easier to connect to other
NEC assets

Storm external connectivity



Problems with connecting the submarine

- Intermittent... interrupted...
- Low bandwidth now, a bit better later
- Slow adoption of IP Coms
 - But even with IP, TCP/IP may be difficult
- Often only a short time at periscope depth
 - Implies prioritisation of transfers and perhaps pull mode
 - May miss regular cyclic updates
- Sometimes covert operational role so no transmit allowed
- Short range with UHF
- Standard surface ship mechanisms not directly suitable

Reqs for an UW NEC infrastructure

- Session management
- Quality of service
- Bandwidth optimisation
 - Push / pull
 - Information prioritisation, transfer of most important first
 - Publish / subscribe
- Information assurance / security
- Database equalisation techniques
- Covert working

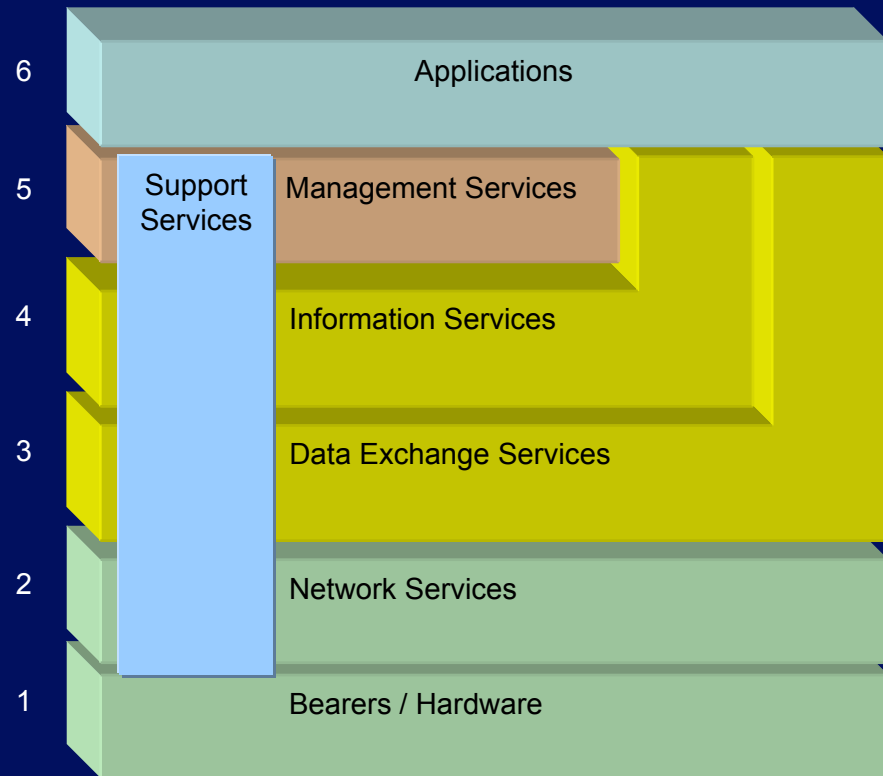
Reqs for an UW NEC infrastructure

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Different mechanisms for different exchanges

A model for an UW NEC infrastructure

Use the model to assess candidate products and approaches

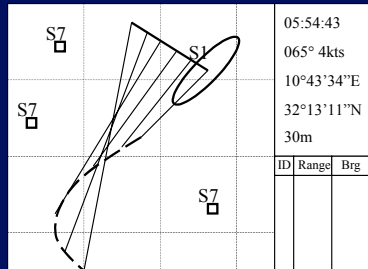


easier to incorporate 3rd
party components

Generic granularity + dataflow model

Manual Toolkit

Automatics



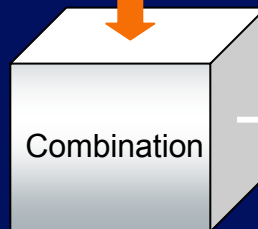
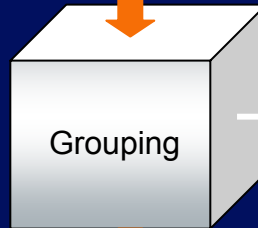
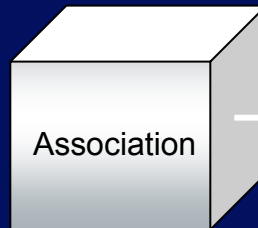
Associate tracks

Disassociate tracks

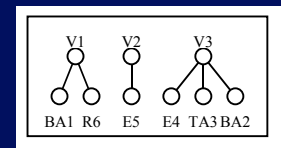
Make recommendation

Accept recommendation

Choose combination



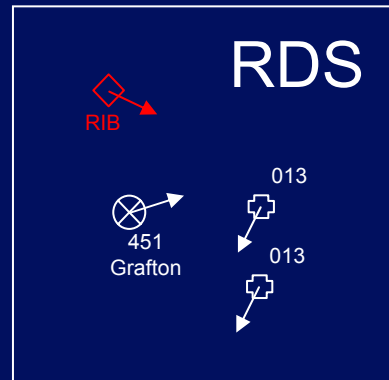
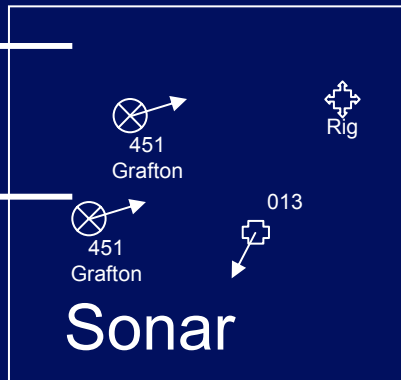
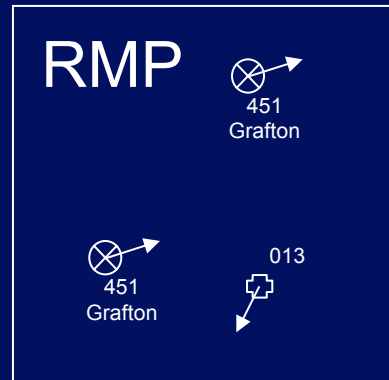
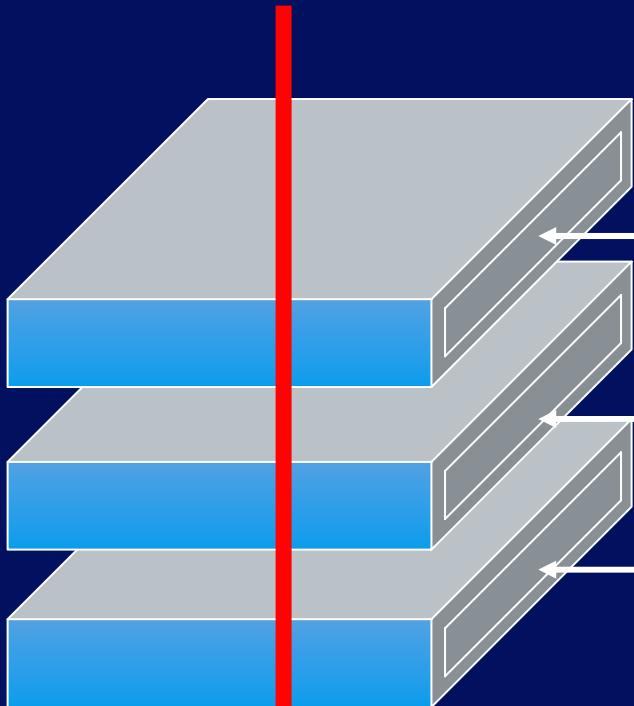
	BA1	BA2	TA3	E4	E5	R6
BA1						
BA2						
TA3						
E4						
E5						
R6						



Vessel	Last update	Bearing	Range
V1	10:28:32	045	10.5
V2	10:28:32	183	#
V3	10:28:04	346	5.7

easier to use

GUI layers and tactical pictures



Early Storm GUI

Own Ship Data

Time: NONE Heading: NONE Depth: NONE Pitch: NONE
 Date: NONE Speed: NONE V.O.S.: NONE Roll: NONE

Display Buttons

Display Filter

Configure Enabled

LPD Window

File Navigation View Options

Available Pictures test.39

Map Layers Options

Picture Content

- VMAP0
 - Administrative Areas
 - Built-Up Areas
 - Inland Water Areas
 - Airport Facilities Points
 - Coastlines
 - Depth Contours
 - Elevation Contours
 - Political Boundaries
 - Railroads
 - Water Courses
 - Roads
 - placenam
 - poland
 - Background
 - Grids
 - Ilgrid10
 - Ilgrid5
- AML CLB
- AML SBO
- AML LBO

Primitive TOTE (0)

New Configure

Name	Absol...	Algori...	Name	Depth	Absol...	Absol...	Relat...	Relat...	Relat...	Relat...	Speed	Cour...	Dive...	Ellips...	Ellips...	Ellips...
UKA... 09:5...	12	0.00	Unset	Unset	2,08...	-13.34	49.56	-6.76	6.18	100.00	0.00	Unset	Unset	Unset		
UKA... 09:5...	37	0.00	Unset	Unset	77,7...	46.30	49.56	-6.76	9.99	310.00	0.00	Unset	Unset	Unset		
UKT... 09:5...	19	0.00	Unset	Unset	57,3...	7.97	49.35	-6.86	9.78	270.00	0.00	Unset	Unset	Unset		
UKA... 09:5...	9	0.00	Unset	Unset	44,9...	-57.06	49.56	-6.76	1.29	220.00	0.00	Unset	Unset	Unset		
UKT... 09:5...	3	0.00	Unset	Unset	60,9...	-18.88	49.35	-6.86	1.29	220.00	0.00	Unset	Unset	Unset		
UKA... 09:5...	23	0.00	Unset	Unset	70,9...	84.59	49.56	-6.76	9.99	344.00	0.00	Unset	Unset	Unset		

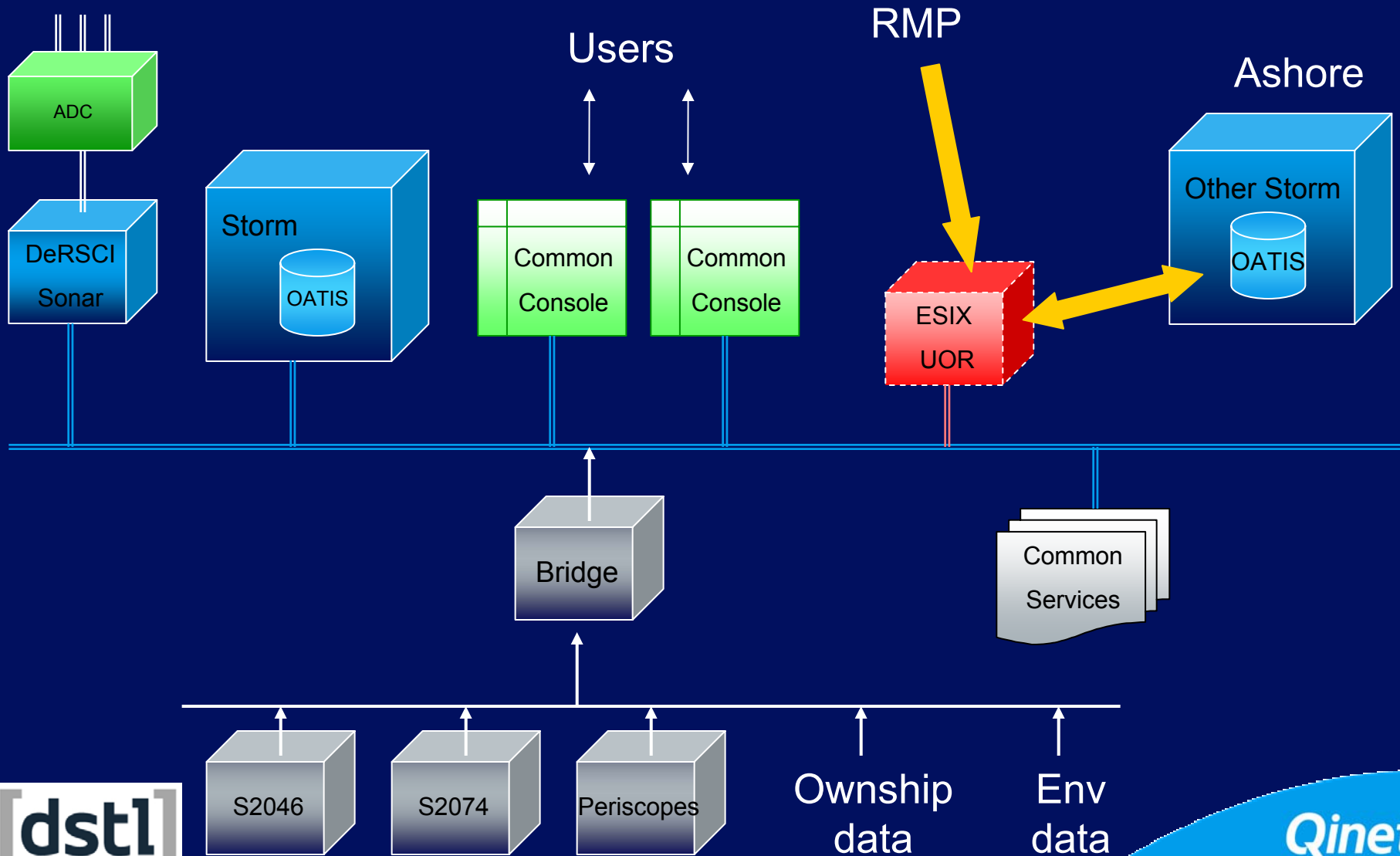
Current Latitude: 49.128° Current Longitude: -5.309°
 Range (Kyds): 125.791Kyds Bearing (deg): 101.773°

Windows: Start | NECTO - Micr... | 11 Window... | CMB-BEST | GRP-MGR | 2 CMBAllData | CMB MANAGER | 5 java | 09:55

Virtual battle experiments



Storm trial JMC 043 Oct / Nov 04





The End

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