



A COHORT PLC COMPANY

# Virtual Training using Real Applications

Ian Cox & Angus Laurie-  
Pile



# Agenda

## Background:

- Current Approaches to Maritime Operator and Maintainer Training
- Challenges when using Hardware Focussed Training Solutions

## Enhanced Training Solution:

- Combination of emulation and software running on Virtual Machines
- Emulator to 'real world' signal Interface

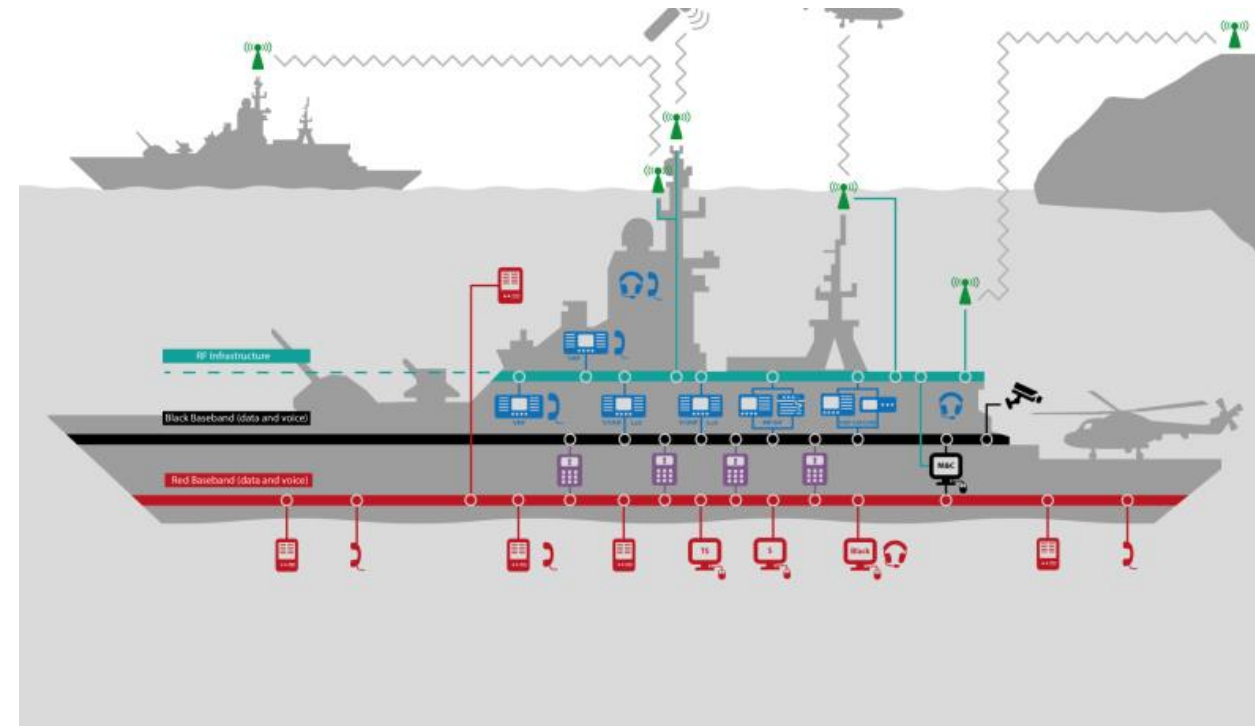
Use Case: Maritime Communications Systems Trainer

Benefits of a Virtual Training System

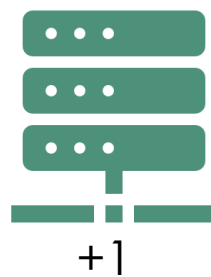
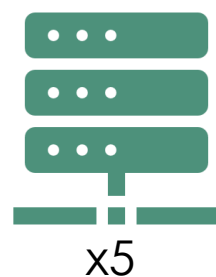
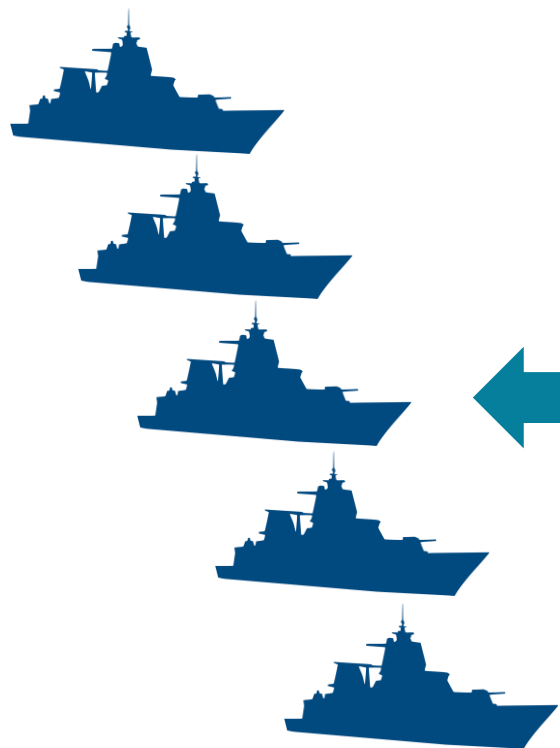


# A typical ship mission/combat system

- Includes multiple interconnected equipment from different suppliers
  - Platform management
  - External and internal communications
  - Sensors (e.g. radar, sonar)
  - Effectors (e.g. weapons, decoy launchers)
  - Mission planning and situational awareness
  - Navigation
- Increasingly software driven applications hosted within an open architecture
- Applications potentially accessible via a common operating console



## A 'traditional' approach to equipment operator and maintainer training...



Procure an additional set of hardware (and software) to use for training...

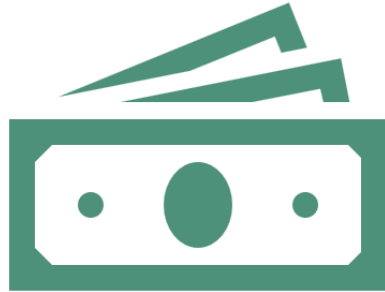
Locate new system within a fixed training school and embed within new dedicated training course for that system

New equipment type to be fitted to fleet.  
Requirement for operator and maintainer training...

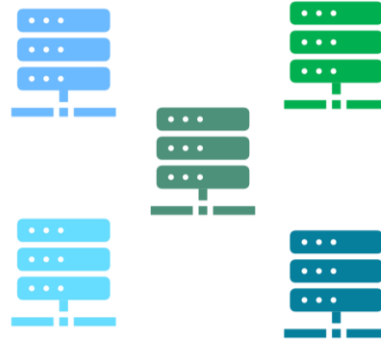
# Challenges using Hardware-focussed Training Solutions



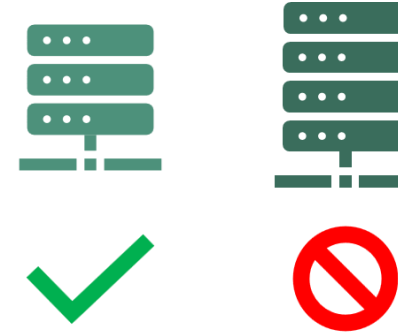
**Accessibility:**  
Trainees have to travel to 1 site – doesn't support 'on demand' training



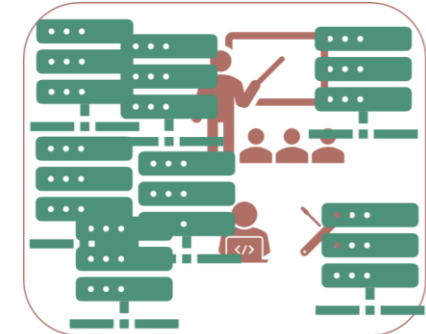
**Affordability:**  
Potential significant purchase and support costs of operational equipment.  
Training need could be met at lower fidelity



**Configuration Control:** Need to replicate any differences of equipment across ships of same type or fleet



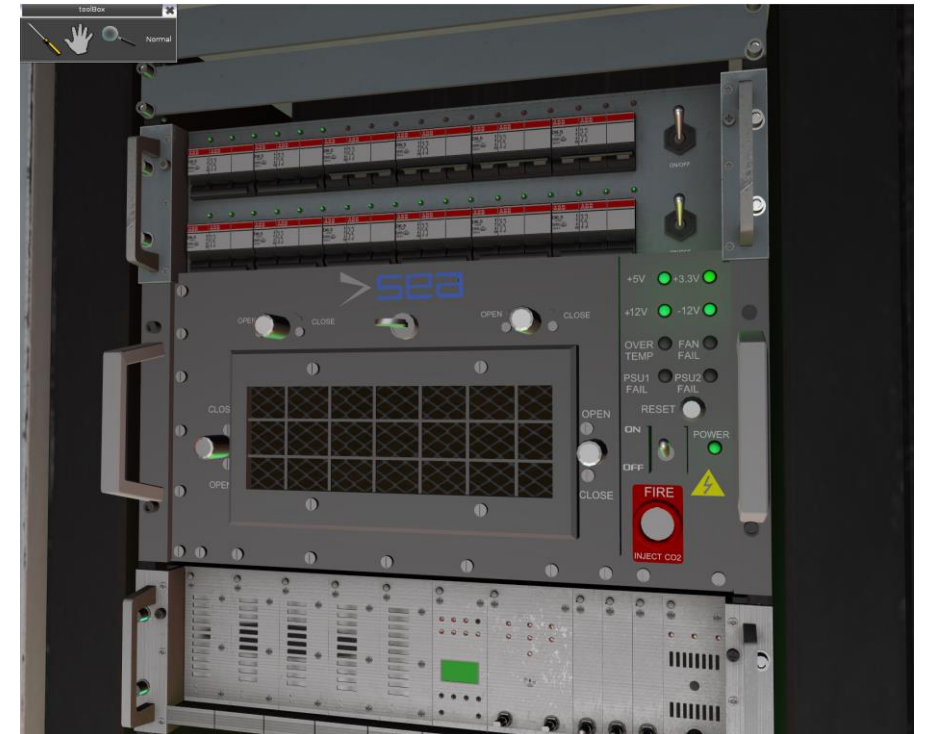
**Adaptability and Flexibility:** May only represent 1 equipment type and not cover some training aspects due to risk of damage



**Space Constraints:**  
Training Centres are running out of room for more hardware

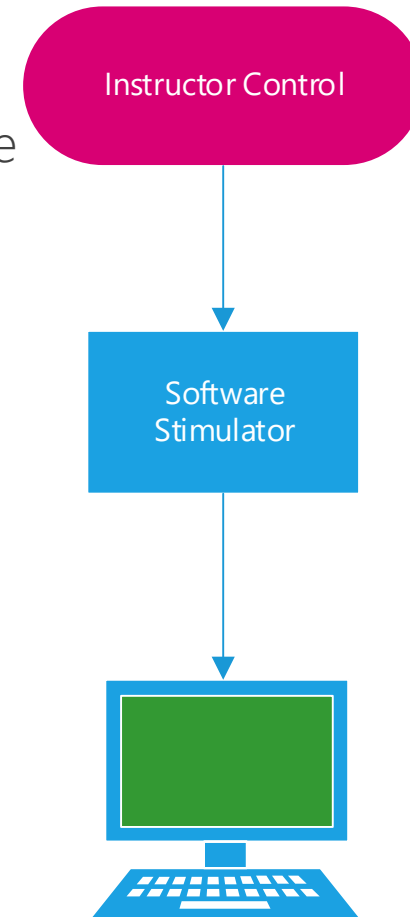
# Emulation

- Relatively cheap when compared to real hardware
- Compact
- Rapid familiarisation
- Easily repeatable training procedures
- Time consuming/costly to emulate complex interfaces
- Emulation will always give the same deterministic result



# Stimulating Real Software

- Students can get a feel of the real software
- Multiple software systems can be virtualised and accessed from one place
- Software is stimulated and controlled by the instructor
- Software is used in isolation to the rest of the system.



# An Enhanced Training Solution...

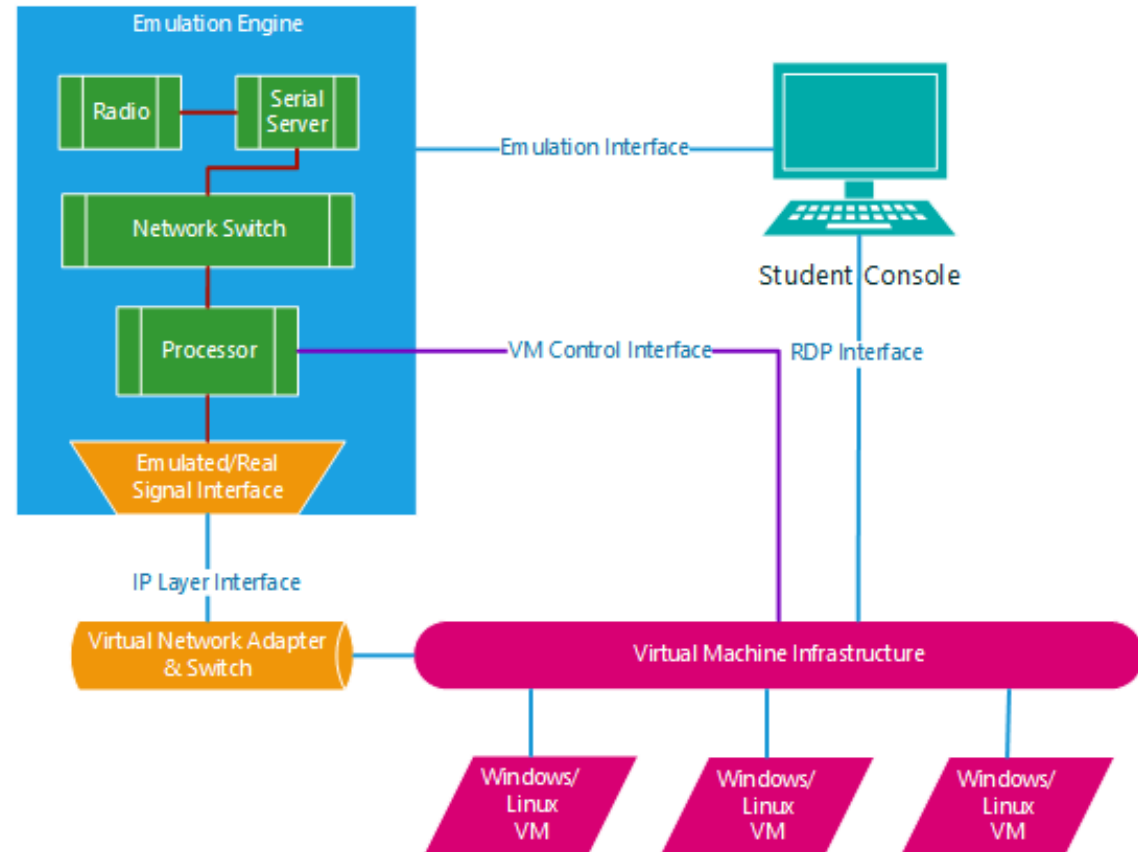
- Why can't we have the best of both worlds?
- Have real software stimulated by emulated equipment controlled by student
- 2 Way stimulation – Real software can interface with emulated equipment
- Embed the real software into the 3D interface





# An Enhanced Training Solution...

- Emulation engine emulates logic of equipment.
- Emulation engine emulates signals between emulated equipment
- Emulation engine converts between real and emulated signals
- 3D simulation uses RDP open interface to embed real software into simulation



# An Enhanced Training Solution...

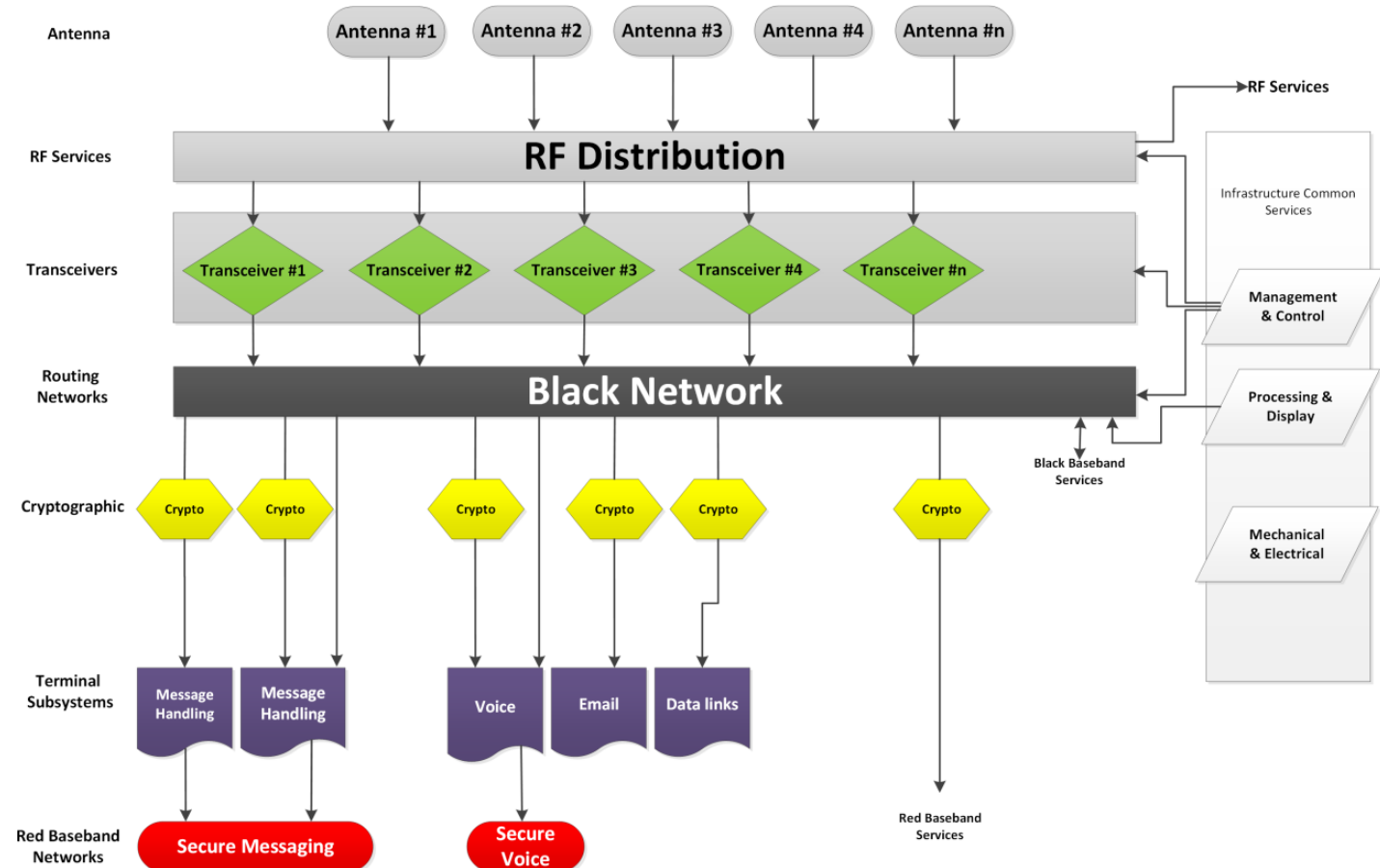


# Benefits offered by New Technologies

- Can emulate a large system without the high hardware costs
- Allows student to get high fidelity familiarisation on entire system
- Single seat, and PC, required for training entire system
- True free play using the real system software in a safe environment
- Fault diagnosis training can be more dynamic
- Easy 'reset' for both emulated equipment and virtualised software if mistakes are made.

# Use Case – Maritime Communications System

- Communications system are extremely complex
- 100s of different instances of equipment
- Control software interfaces to over 150 individual pieces of equipment
- Attempting to emulate the control software would have been prohibitively expensive.



# Specific Benefits to Communications Systems Training

- Realistic software behaviour that matches that of the real system
- Faults can be injected that would otherwise be expensive or impossible on real equipment
- Students steps/actions can be compared to that of the instructor during free play sessions, improving training metrics.
- Integrated virtual machines, allows cheap training for KVM switches and even software image restores.
- Any student mistakes on the operating software or emulated equipment can be easily rectified by resetting the scenario
- System can be easily and cheaply expanded to allow multiple teams to work together. For example teams on different platforms can establish communications with each other.
- Real hardware can be added into the system and act the same as emulated hardware.

# In Summary...

Modern training systems need to replicate more open, modular and flexible system architectures based upon software driven applications and decreasing reliance upon bespoke hardware

The combination of equipment emulation, real systems software and an interactive 3D virtual environment provides many benefits for operator and maintainer training:

- Improved training accessibility
- Increased flexibility, scalability and re-use
- Enhanced trainee progress monitoring
- Lower through-life costs



**THANK YOU**