Unstructured Training with Serious Games

EW Training with Computer Games

Ed Oates

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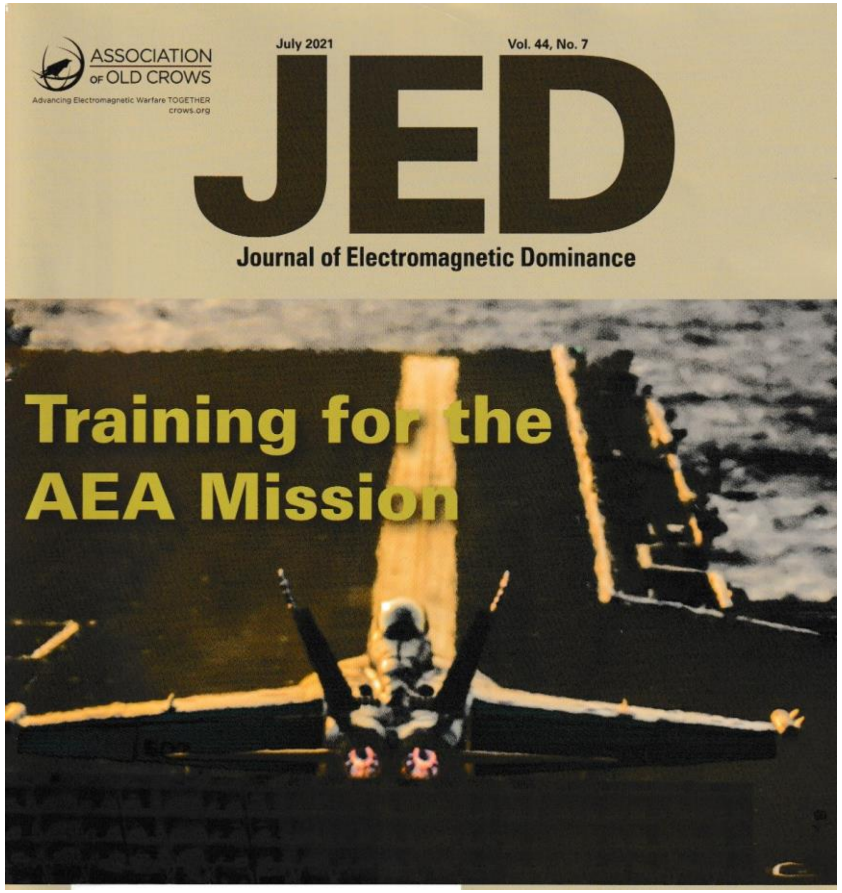
www.cranfield.ac.uk

Structured Training Design for EW Operations

Systems Approach to Training Needs Analysis



ASSOCIATION OF OLD CROWS
Advancing Electromagnetic Warfare TOGETHER
crows.org

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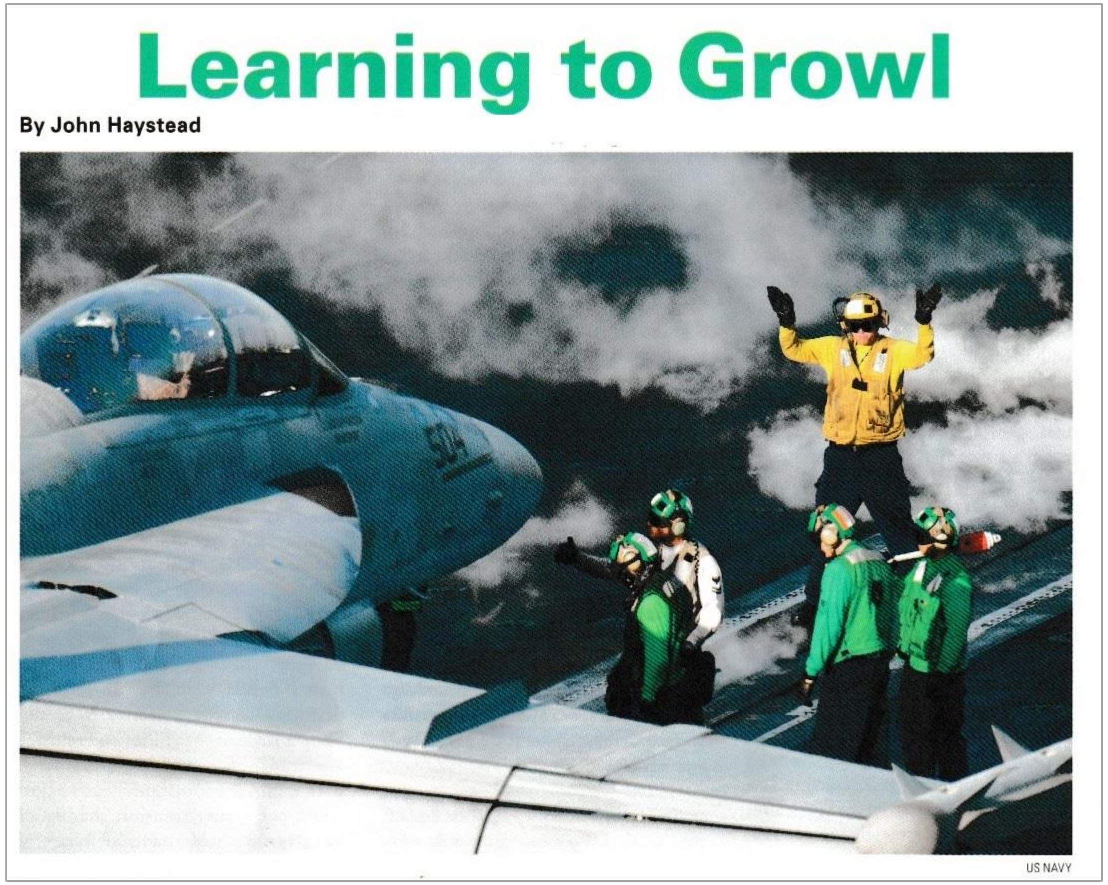
JED
Journal of Electromagnetic Dominance

Training for the AEA Mission



Learning to Growl

By John Haystead

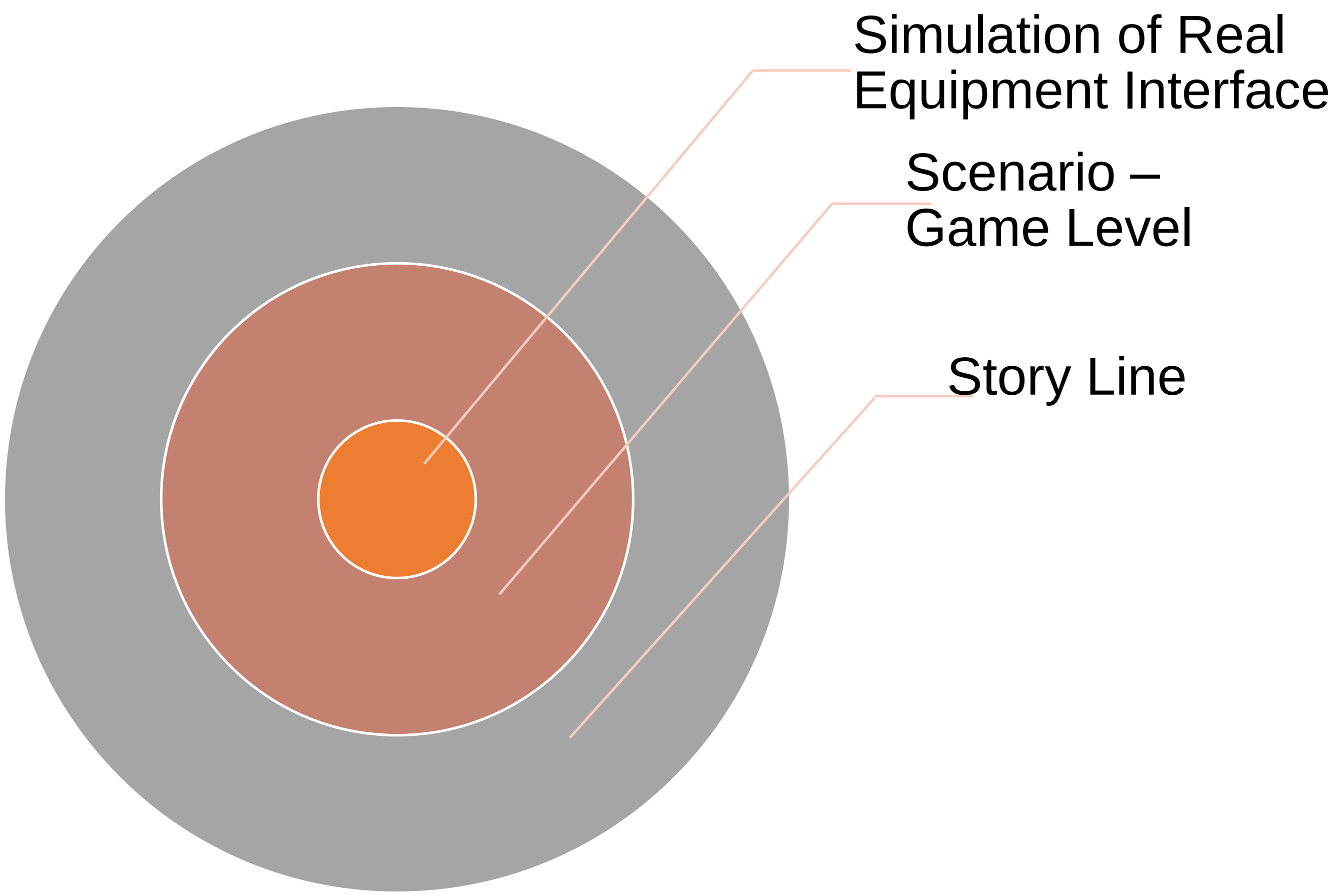
US NAVY

The Case for Unstructured Training Delivery

Complex computer games don’t have training manuals

Serious Games

Computer Games for a Business Purpose



Simulation of Real Equipment Interface

Scenario – Game Level

Story Line

‘Transmedia Learning’
– Sandia National Laboratories

TRADOC.ARMY.MIL

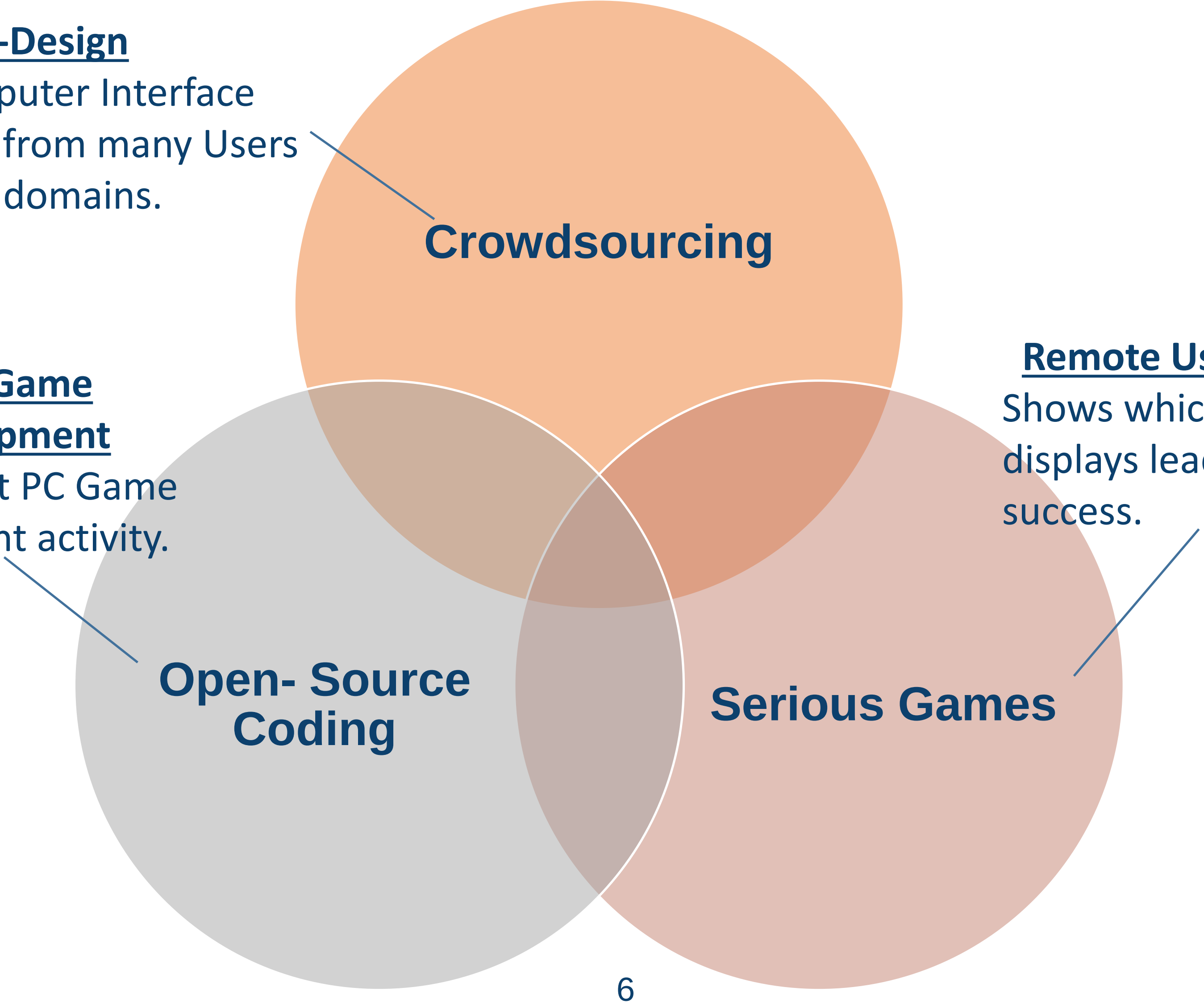
On-Line /
On-Demand
Courses

Social Media

Serious
Games

Cranfield
Defence and
Security

‘Crowdsourcing with Serious Games’ – Cranfield University



Co-Design
Human Computer Interface design ideas from many Users across many domains.

Crowdsourcing

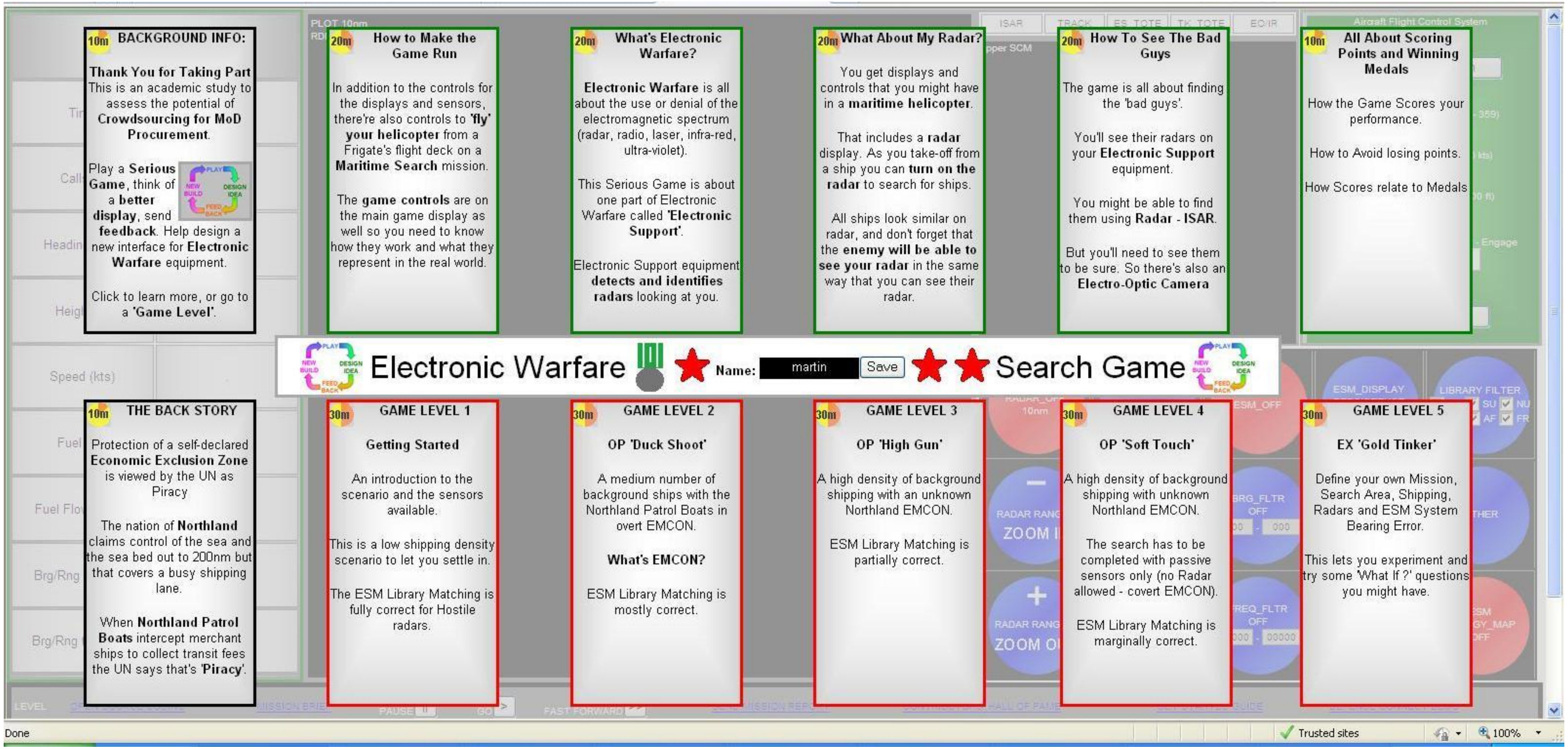
Indie Game Development
Pre-contract PC Game development activity.

Open- Source Coding

Remote Usability Testing
Shows which functions and displays lead to mission success.

Serious Games

Home Page



10m **BACKGROUND INFO:**

Thank You for Taking Part
This is an academic study to assess the potential of **Crowdsourcing for MoD Procurement**.

Play a **Serious Game**, think of a **better display**, send **feedback**. Help design a new interface for **Electronic Warfare** equipment.

Click to learn more, or go to a **'Game Level'**.

20m **How to Make the Game Run**

In addition to the controls for the displays and sensors, there're also controls to **'fly' your helicopter** from a Frigate's flight deck on a **Maritime Search** mission.

The **game controls** are on the main game display as well so you need to know how they work and what they represent in the real world.

20m **What's Electronic Warfare?**

Electronic Warfare is all about the use or denial of the electromagnetic spectrum (radar, radio, laser, infra-red, ultra-violet).

This Serious Game is about one part of Electronic Warfare called **'Electronic Support'**.

Electronic Support equipment **detects and identifies radars** looking at you.

20m **What About My Radar?**

You get displays and controls that you might have in a **maritime helicopter**.

That includes a **radar** display. As you take-off from a ship you can **turn on the radar** to search for ships.

All ships look similar on radar, and don't forget that the **enemy will be able to see your radar** in the same way that you can see their radar.

20m **How To See The Bad Guys**

The game is all about finding the 'bad guys'.

You'll see their radars on your **Electronic Support** equipment.

You might be able to find them using **Radar - ISAR**.

But you'll need to see them to be sure. So there's also an **Electro-Optic Camera**

10m **All About Scoring Points and Winning Medals**

How the Game Scores your performance.

How to Avoid losing points.

How Scores relate to Medals

Electronic Warfare **Name:** martin Save Search Game

10m **THE BACK STORY**

Protection of a self-declared **Economic Exclusion Zone** is viewed by the UN as Piracy

The nation of **Northland** claims control of the sea and the sea bed out to 200nm but that covers a busy shipping lane.

When **Northland Patrol Boats** intercept merchant ships to collect transit fees the UN says that's **'Piracy'**.

30m **GAME LEVEL 1**

Getting Started

An introduction to the scenario and the sensors available.

This is a low shipping density scenario to let you settle in.

The ESM Library Matching is fully correct for Hostile radars.

30m **GAME LEVEL 2**

OP 'Duck Shoot'

A medium number of background ships with the Northland Patrol Boats in overt EMCON.

What's EMCON?

ESM Library Matching is mostly correct.

30m **GAME LEVEL 3**

OP 'High Gun'

A high density of background shipping with an unknown Northland EMCON.

ESM Library Matching is partially correct.

30m **GAME LEVEL 4**

OP 'Soft Touch'

A high density of background shipping with unknown Northland EMCON.

The search has to be completed with passive sensors only (no Radar allowed - covert EMCON).

ESM Library Matching is marginally correct.

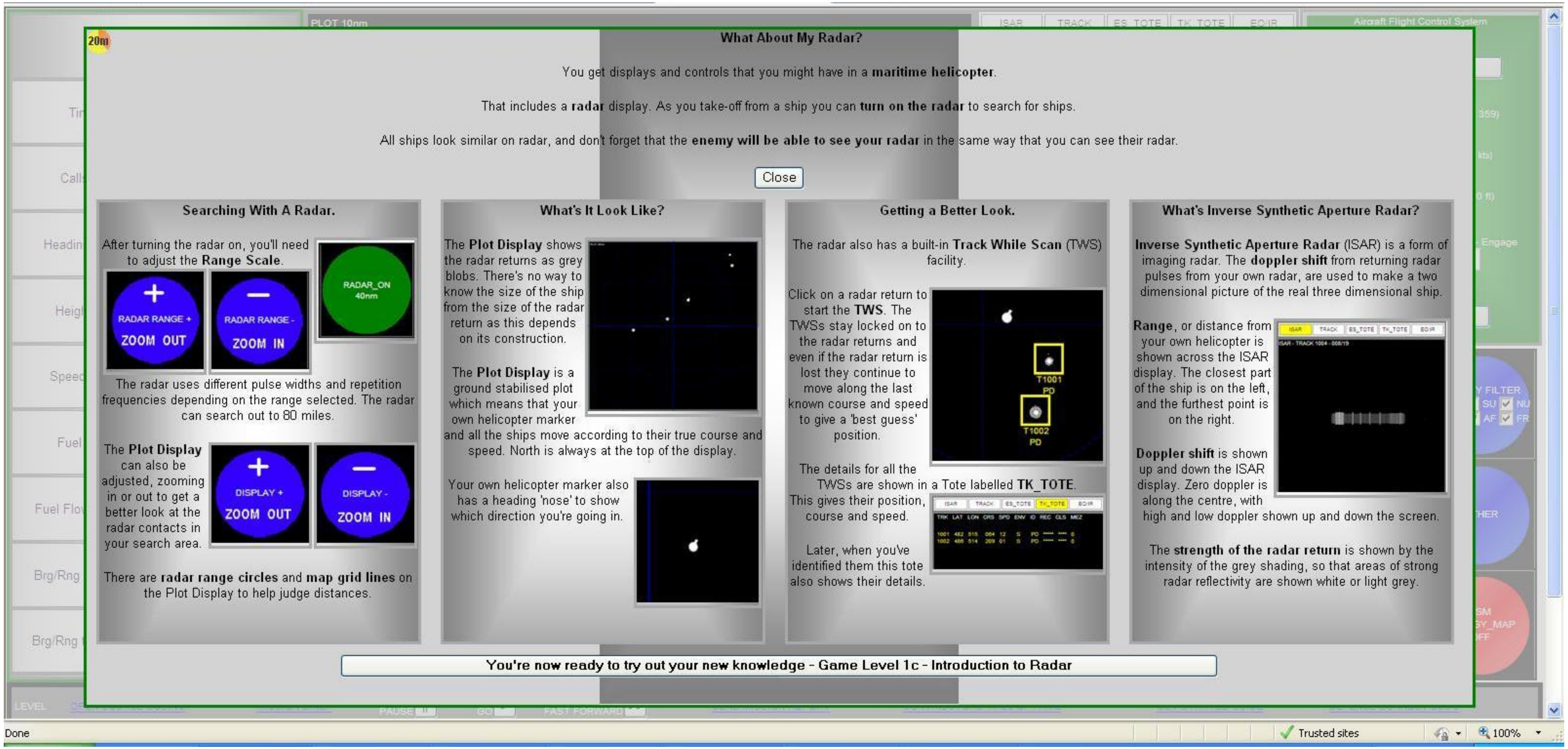
30m **GAME LEVEL 5**

EX 'Gold Tinker'

Define your own Mission, Search Area, Shipping, Radars and ESM System Bearing Error.

This lets you experiment and try some 'What If ?' questions you might have.

Training Levels



What About My Radar?

You get displays and controls that you might have in a **maritime helicopter**.

That includes a **radar** display. As you take-off from a ship you can **turn on the radar** to search for ships.

All ships look similar on radar, and don't forget that the **enemy will be able to see your radar** in the same way that you can see their radar.

Searching With A Radar.

After turning the radar on, you'll need to adjust the **Range Scale**.

The radar uses different pulse widths and repetition frequencies depending on the range selected. The radar can search out to 80 miles.

The **Plot Display** can also be adjusted, zooming in or out to get a better look at the radar contacts in your search area.

There are **radar range circles** and **map grid lines** on the Plot Display to help judge distances.

What's It Look Like?

The **Plot Display** shows the radar returns as grey blobs. There's no way to know the size of the ship from the size of the radar return as this depends on its construction.

The **Plot Display** is a ground stabilised plot which means that your own helicopter marker and all the ships move according to their true course and speed. North is always at the top of the display.

Your own helicopter marker also has a heading 'nose' to show which direction you're going in.

Getting a Better Look.

The radar also has a built-in **Track While Scan** (TWS) facility.

Click on a radar return to start the **TWS**. The TWSs stay locked on to the radar returns and even if the radar return is lost they continue to move along the last known course and speed to give a 'best guess' position.

The details for all the TWSs are shown in a Tote labelled **TK_TOTE**. This gives their position, course and speed.

Later, when you've identified them this tote also shows their details.

What's Inverse Synthetic Aperture Radar?

Inverse Synthetic Aperture Radar (ISAR) is a form of imaging radar. The **doppler shift** from returning radar pulses from your own radar, are used to make a two dimensional picture of the real three dimensional ship.

Range, or distance from your own helicopter is shown across the ISAR display. The closest part of the ship is on the left, and the furthest point is on the right.

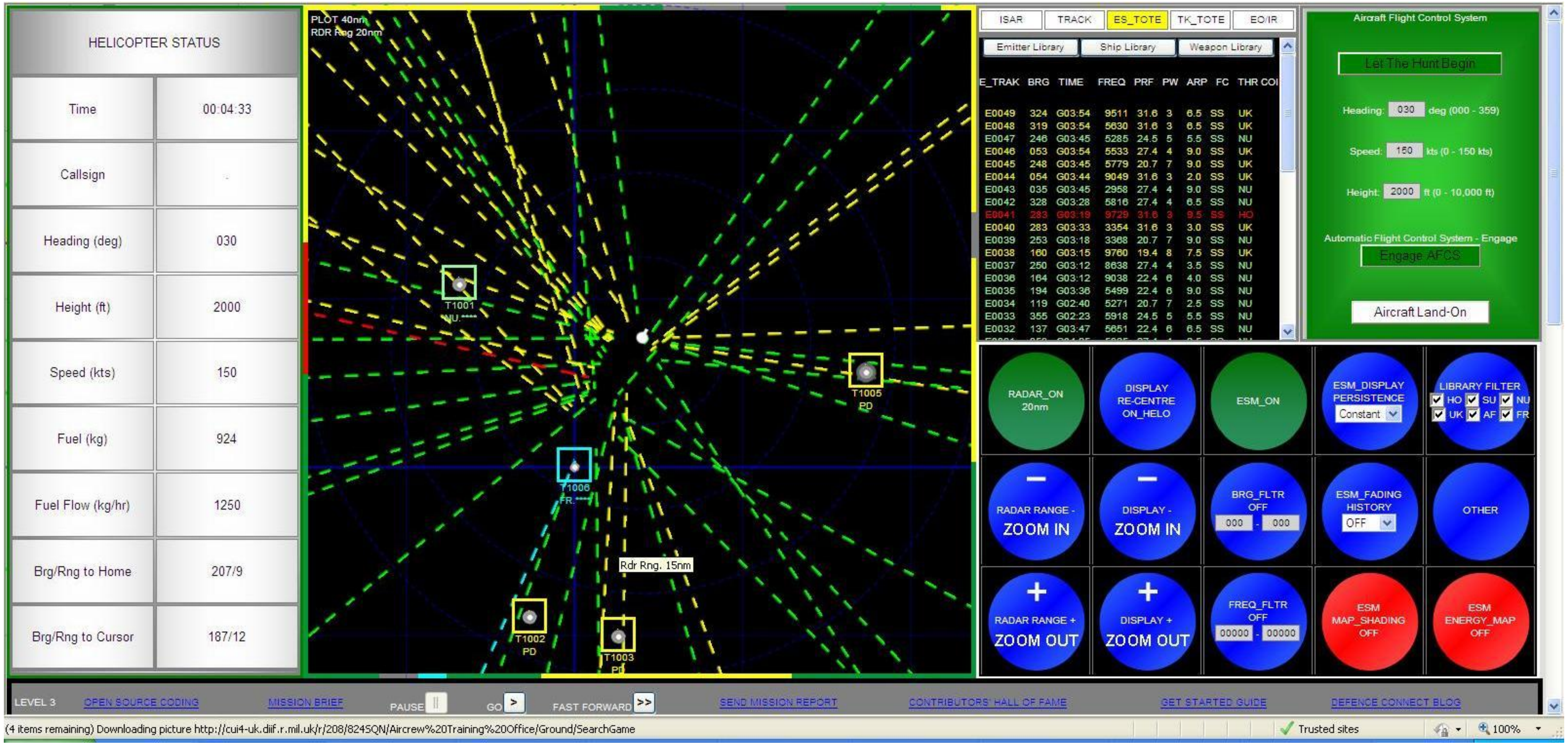
Doppler shift is shown up and down the ISAR display. Zero doppler is along the centre, with high and low doppler shown up and down the screen.

The **strength of the radar return** is shown by the intensity of the grey shading, so that areas of strong radar reflectivity are shown white or light grey.

You're now ready to try out your new knowledge - Game Level 1c - Introduction to Radar

20m
PLOT 10nm
ISAR
TRACK
ES_TOTE
TK_TOTE
EO/IR
Aircraft Flight Control System
Close
RADAR RANGE +
ZOOM OUT
RADAR RANGE -
ZOOM IN
RADAR_ON
40nm
DISPLAY +
ZOOM OUT
DISPLAY -
ZOOM IN
T1001
PD
T1002
PD
TRK LAT LON CRS SPD ENV ID REC CLS MEZ
Tim
Calls
Headin
Heigh
Speed
Fuel
Fuel Flo
Brg/Rng
Brg/Rng
LEVEL
PAUSE
GO
FAST FORWARD
Done
Trusted sites
100%

The Game Interface – Emulation of RN Merlin Mk 2 – ASW Helicopter


PLOT 40nm
RDR Rng 20nm
T1001
NU.****
T1005
PD
T1006
FR.****
Rdr Rng. 15nm
T1002
PD
T1003
PD
ISAR
TRACK
ES_TOTE
TK_TOTE
EO/IR
Emitter Library
Ship Library
Weapon Library
Let The Hunt Begin
Engage AFCS
Aircraft Land-On
RADAR_ON 20nm
DISPLAY RE-CENTRE ON_HELO
ESM_ON
ESM_DISPLAY PERSISTENCE
Constant
LIBRARY FILTER
☑ HO ☑ SU ☑ NU
☑ UK ☑ AF ☑ FR
− RADAR RANGE - ZOOM IN
− DISPLAY - ZOOM IN
BRG_FLTR OFF
000 - 000
ESM_FADING HISTORY
OFF
OTHER
+ RADAR RANGE + ZOOM OUT
+ DISPLAY + ZOOM OUT
FREQ_FLTR OFF
00000 - 00000
ESM MAP_SHADING OFF
ESM ENERGY_MAP OFF
LEVEL 3
OPEN SOURCE CODING
MISSION BRIEF
PAUSE
GO >
FAST FORWARD >>
SEND MISSION REPORT
CONTRIBUTORS' HALL OF FAME
GET STARTED GUIDE
DEFENCE CONNECT BLOG
Trusted sites
100%

HELICOPTER STATUS	
Time	00:04:33
Callsign	
Heading (deg)	030
Height (ft)	2000
Speed (kts)	150
Fuel (kg)	924
Fuel Flow (kg/hr)	1250
Brg/Rng to Home	207/9
Brg/Rng to Cursor	187/12

E_TRAK	BRG	TIME	FREQ	PRF	PW	ARP	FC	THR COI
E0049	324	G03:54	9511	31.6	3	6.5	SS	UK
E0048	319	G03:54	5630	31.6	3	6.5	SS	UK
E0047	246	G03:45	5285	24.5	5	5.5	SS	NU
E0046	053	G03:54	5533	27.4	4	9.0	SS	UK
E0045	248	G03:45	5779	20.7	7	9.0	SS	UK
E0044	054	G03:44	9049	31.6	3	2.0	SS	UK
E0043	035	G03:45	2958	27.4	4	9.0	SS	NU
E0042	328	G03:28	5816	27.4	4	6.5	SS	NU
E0041	283	G03:19	9729	31.6	3	9.5	SS	HO
E0040	283	G03:33	3354	31.6	3	3.0	SS	UK
E0039	253	G03:18	3368	20.7	7	9.0	SS	NU
E0038	160	G03:15	9760	19.4	8	7.5	SS	UK
E0037	250	G03:12	8638	27.4	4	3.5	SS	NU
E0036	164	G03:12	9038	22.4	6	4.0	SS	NU
E0035	194	G03:36	5499	22.4	6	9.0	SS	NU
E0034	119	G02:40	5271	20.7	7	2.5	SS	NU
E0033	355	G02:23	5918	24.5	5	5.5	SS	NU
E0032	137	G03:47	5651	22.4	6	6.5	SS	NU

Aircraft Flight Control System

Heading: 030 deg (000 - 359)

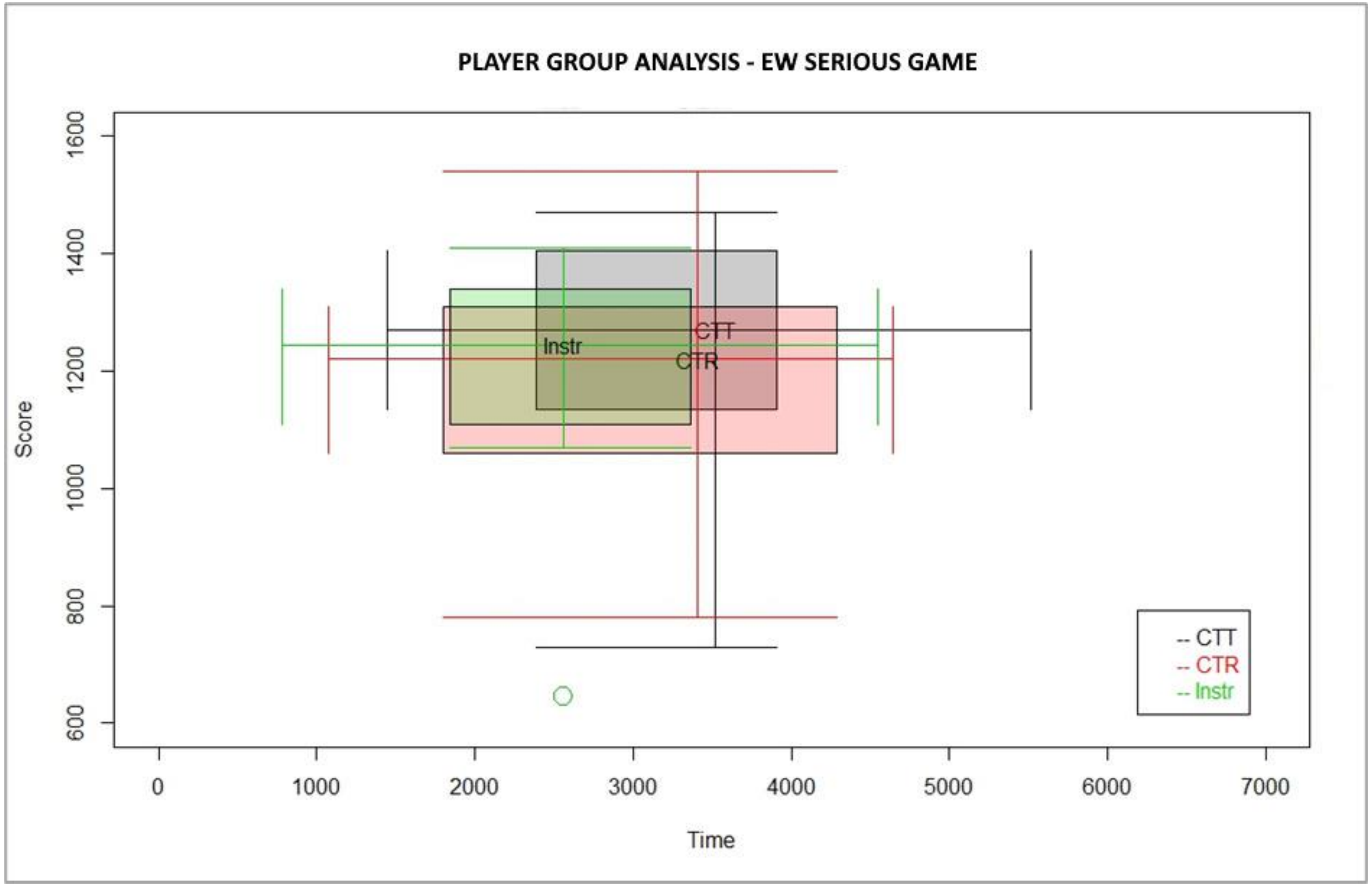
Speed: 150 kts (0 - 150 kts)

Height: 2000 ft (0 - 10,000 ft)

Automatic Flight Control System - Engage

(4 items remaining) Downloading picture http://cui4-uk.diif.r.mil.uk/r/208/824SQN/Aircrew%20Training%20Office/Ground/SearchGame

Serious Game – Assessment for Training



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