Drones and the global warfare system

by Peter Burt
from Dronewars UK

The Military Data Machine

Vast quantities of data are collected and used to select and destroy targets.

Drones and satellites play a crucial role in collecting this data as well as destroying some of the targets.

The process is becoming increasingly automated.

The US Military's Vision of the Future

A global nervous system armed with the world's most sophisticated weaponry.

Operations co-ordinated through a single web, allowing faster, and more lethal operations in air, land, sea, space, and cyberspace.

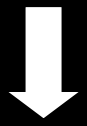
Only autonomous systems will be able to deal with this global information grid as military systems will be too fast, too numerous and will create an environment too complex for humans to direct.

'Perfect warfare' – rapidly overcome the enemy with no casualties / minimal risks to own forces.

Data/Information Flow

Sensors

Computer network



Commander

Weapon

Situational awareness

Analysis and targeting

Decisions

Destructive action

Data Sources - Space

Satellites

High Altitude Platform Station

Data sources - air

Drones

Aircraft

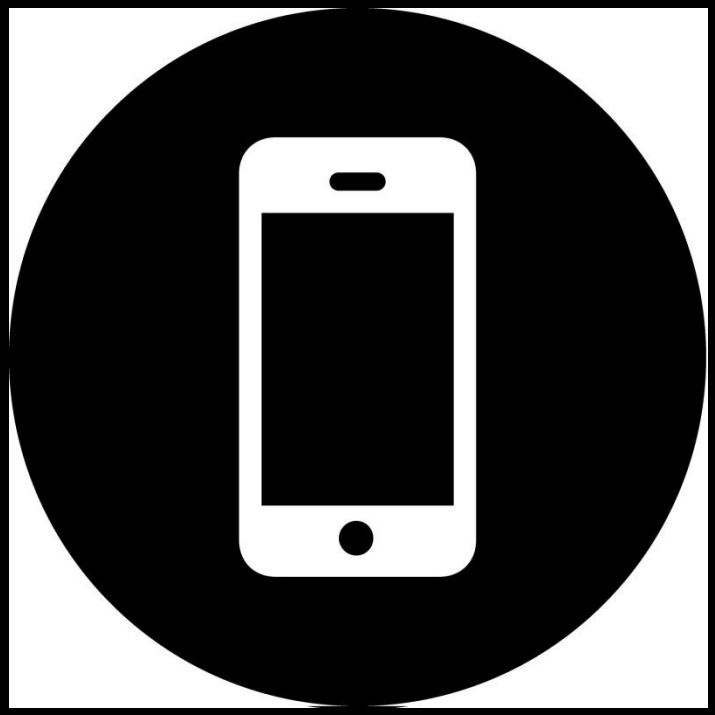
Data sources - surface

Ships

Land vehicles

Data sources - virtual

Social media analysis



Mobile phone signals

Sensors – beyond eyes and ears

Full motion video.

Infrared heat sensors - night time.

Synthetic aperture radar – smoke and cloud.

Electromagnetic spectrum – signal structure and emission characteristics of military electronic equipment (radar, navigational beacons etc), LIDAR.

Spectral signature – emission, absorption, and reflection of EM radiation.

Acoustic.

- Increasingly high definition.

ARGUS-IS

Autonomous Real-time Ground Ubiquitous Surveillance Imaging System.

Developed by DARPA and BAE Systems.

Installed on the USAF's MQ-9 Reaper drone.

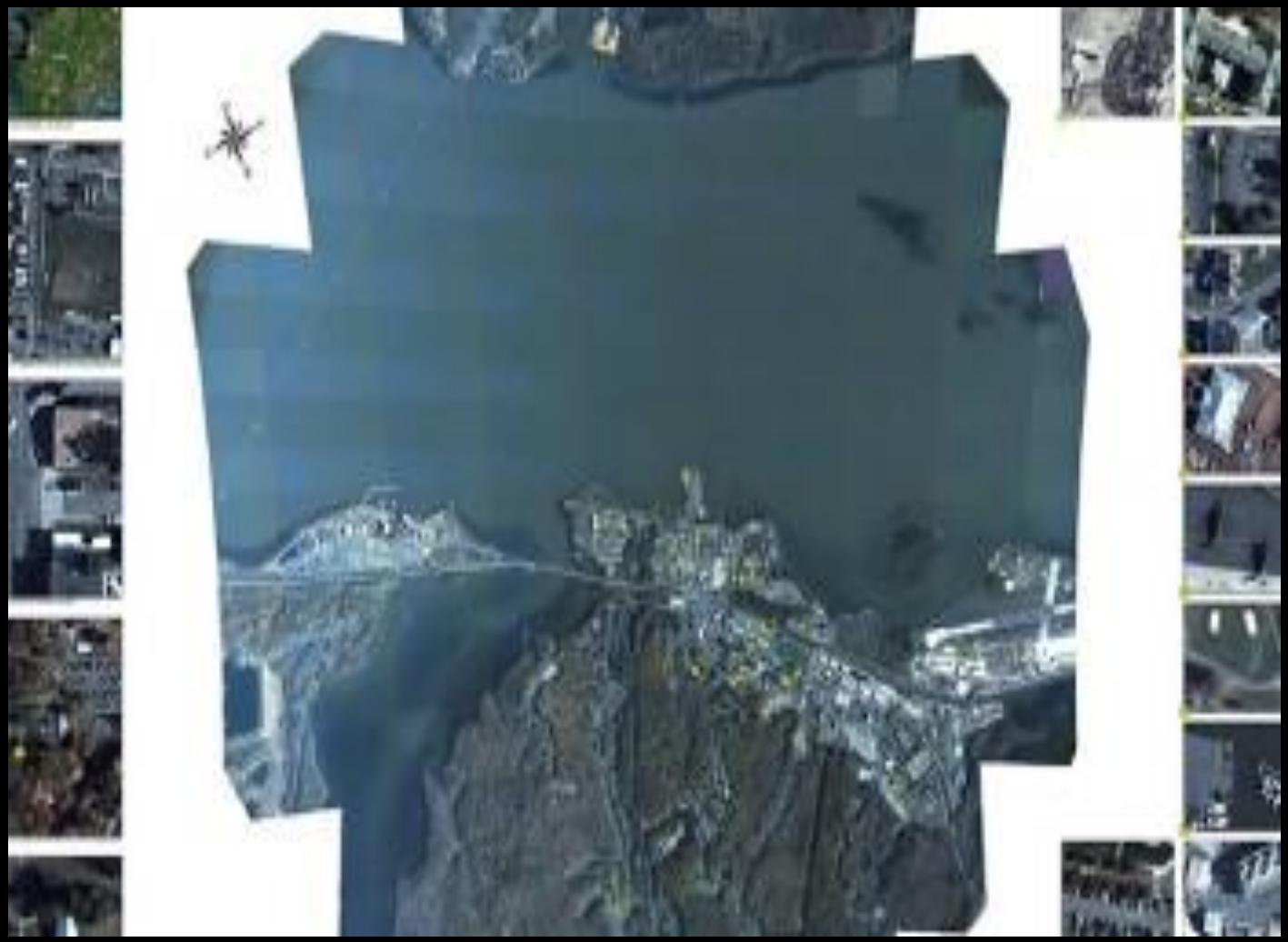
Can monitor in high-res everything that moves in 100km^2 area.

Able to track up to 12 different targets simultaneously for several hours.

Data collected by 368 cameras, each can capture 5 million pixels, to create a composite image of about 1.8 billion pixels

Operators can open more than 100 windows for a detailed look while still maintaining a broad view.

Allows 1 Reaper to view an entire town.



Computer processing

As a result of such technology the quantity of intelligence information and data, is growing exponentially.

Some of the information is obtained by novel intelligence-gathering techniques – for example, spectral imagery and radio-frequency emanations – cannot be interpreted by the human cognitive system, and must be processed automatically.

The use of computer algorithms and artificial intelligence methods to process data is essential to handle the quantity of information involved.

Information systems

US: Distributed Common Ground System.

UK: Single Information Environment / Morpheus.

NATO: MAJIIC 2 (Multi-intelligence All-source Joint ISR - Intelligence, Surveillance, Reconnaissance - Interoperability Coalition).

Coming soon:

US: Joint Enterprise Defense Infrastructure (JEDI) - cloud provider computer system to push mission-critical information to front-line.

Data Analysis

Every day US military collects more raw data than the Department of Defence could analyse even if its entire workforce spent their whole lives at the task.

To analyse this data, artificial intelligence computing software is needed.

Machine learning processes train a computer to recognise patterns and identify features in an image.

The vast quantities of data that have been archived can be used to train AI systems.

UK military data machine

UK is following in the footsteps of the US Ministry of Defence 'Single Information Environment' programme will have a 'tactical edge', known as Morpheus, to allow information to be accessed by all military units, including individual infantry soldiers, through hand held computers.

UK also keen to develop sensor technology: DSTL has a large research programme on sensors.

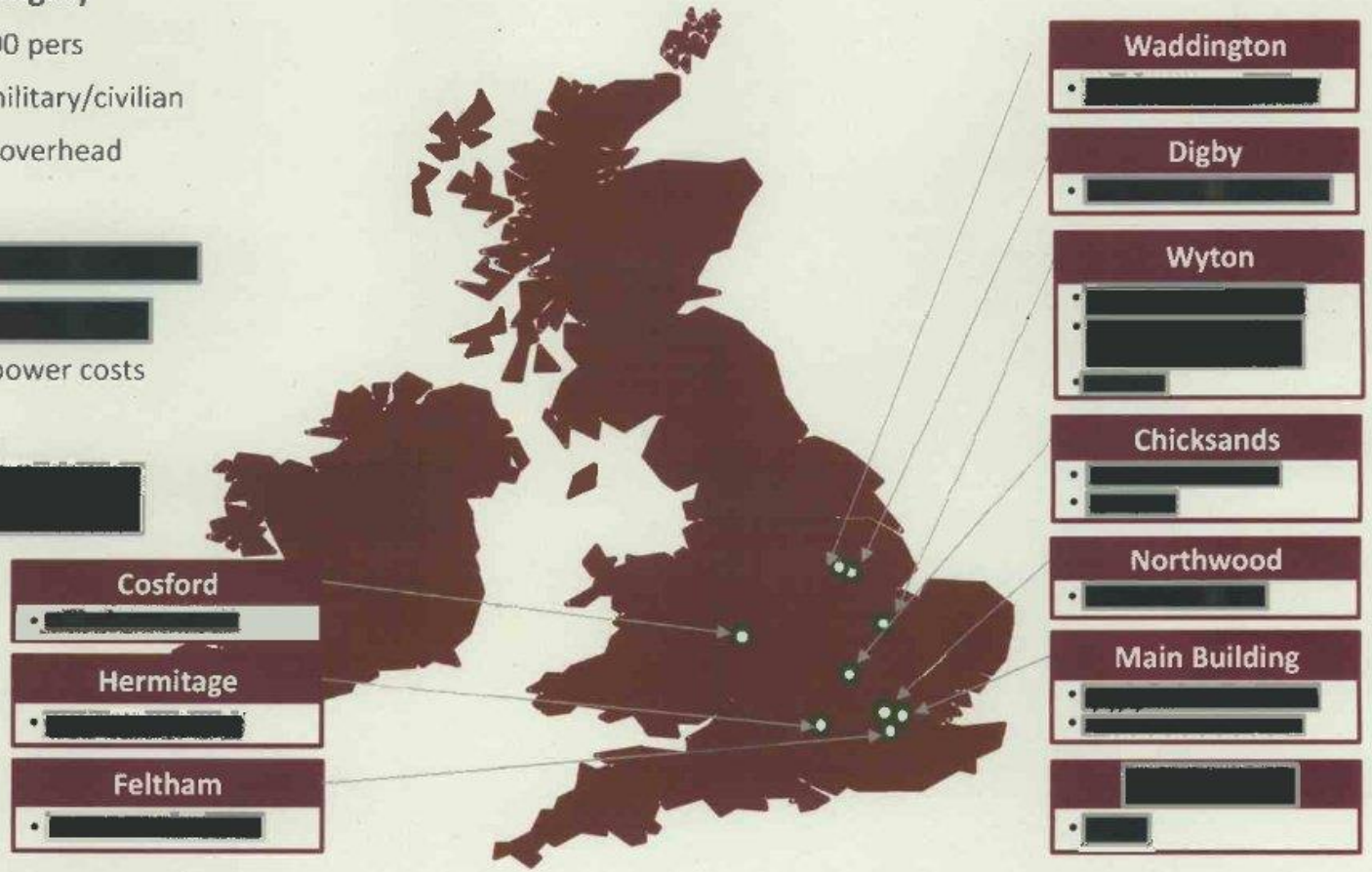
UK military information programmes run by Joint Forces Command, which includes Defence Intelligence.

DEFENCE INTELLIGENCE

CDI

Organisational Overview

- **Headcount (strength)**
  - Around 4200 pers
  - 65%/35% military/civilian
  - Low senior overhead
- **Budget**
  - [redacted]
  - [redacted]
  - C70% manpower costs
- **Footprint**
  - [redacted]



Project Maven

April 2017:Algorithmic Warfare Cross-Functional Team (AWCFT) – Project Maven

Aim: turn the enormous volume of data available into actionable intelligence and insights at speed.

First task: develop technology to automate the processing of data from drones in support of US military operations in Iraq and Syria.

Algorithms ‘trained’ using thousands of hours of archived battlefield video captured by drones in the Middle East.

The Maven object identification algorithms are based on commercial technology including open source image recognition software developed by Google.

Project Maven

December 2017:
Algorithms developed by Project Maven help intelligence analysts exploit drone video over the battlefield. These algorithms help analysts to identify objects in video feed from ScanEagle drones used by US special operations forces.

Summer 2018:
Project Maven's algorithms to begin automated analyses of video feeds from Reaper drones and will then be applied to the ARGUS-IS camera system .

Project Maven

Future goal:
Programme onboard computers on the drones themselves to process data.
This would give the drone the ability to identify potential targets itself.

And then?
You've developed an autonomous weapon system: a flying 'killer robot' that is able to kill without orders from a human.

Conclusions

Modern military forces are increasingly functioning as 'data machines'.

Drones are the visible part of this, but it is information systems that enable this mode of warfare and raise bigger ethical questions.

Autonomous weapon systems are not part of a science fiction movie future – they will be with us in the next few years.

www.dronewars.net

Thank you for your attention.