Project Ploughshare

A Practical Approach to Rapid Reforestation

Aerial Reforestation

- **Could military strategy win the war on global warming?**
- Article by Jennifer Horton

Innovation is our Business

Ideas, Insights, Design and Craftsmanship

based on Proven Technology and Engineering

The problem

"Almost 50,000 acres of trees are lost worldwide each day. When they're cut or burned down, not only do they cease absorbing carbon dioxide, but they release all of what they've stored up during their lifetimes " [source: FAO].

Aggressive reforestation efforts could potentially prevent the release of more than 300 billion tons of carbon dioxide over the next 40 years"
[source: Conservation International].

The proposed solution

- So what can we do about it? Our idea is to use known technology to green the desert.
- The tools required to do this in a practical and speedy way are as follows:
- Helicopter /UAV's
- Computer/ GPS control
- Satellite Survey and Positioning
- A Chain Gun

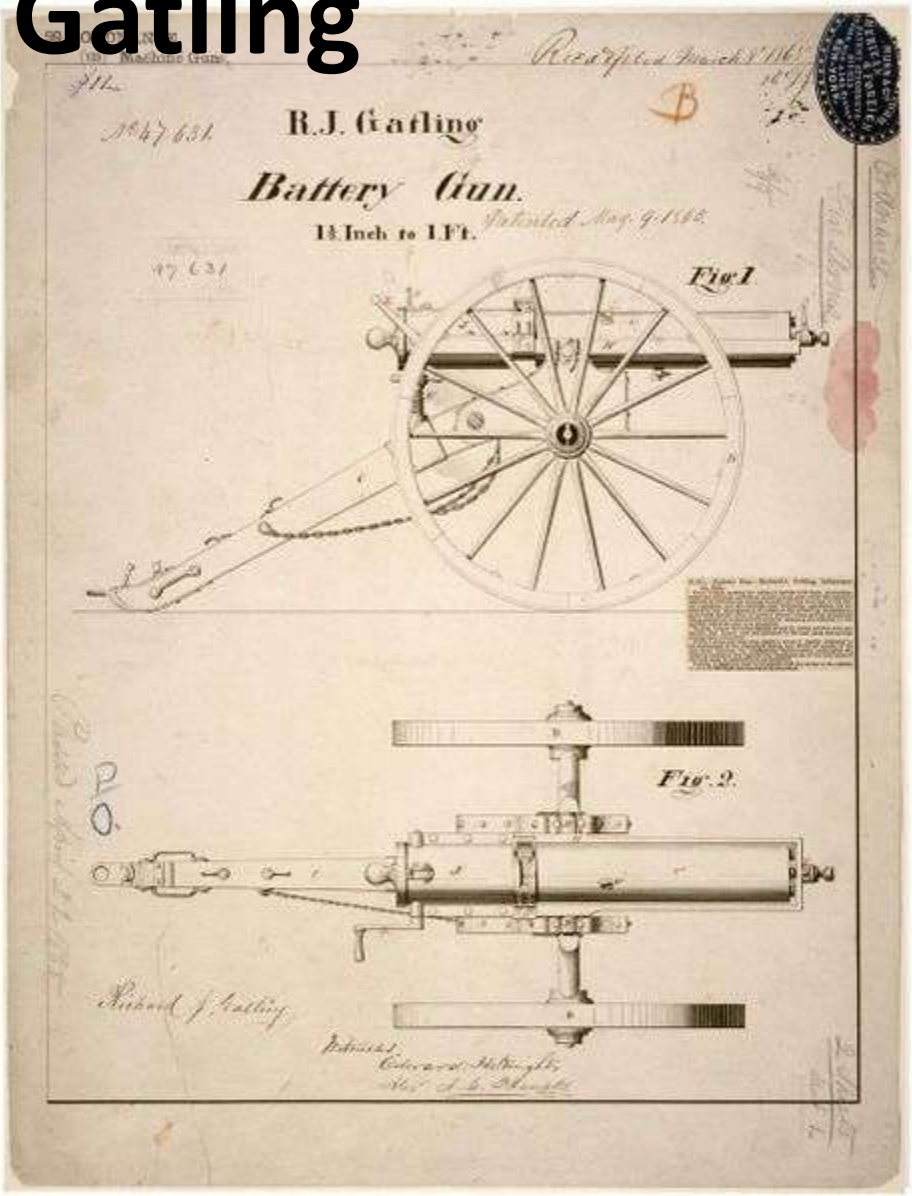
Sowing Machine

- The last on the list, **the Chain Gun** is the central tool to carry out the task. Don't think of it as a gun, but regard it as a

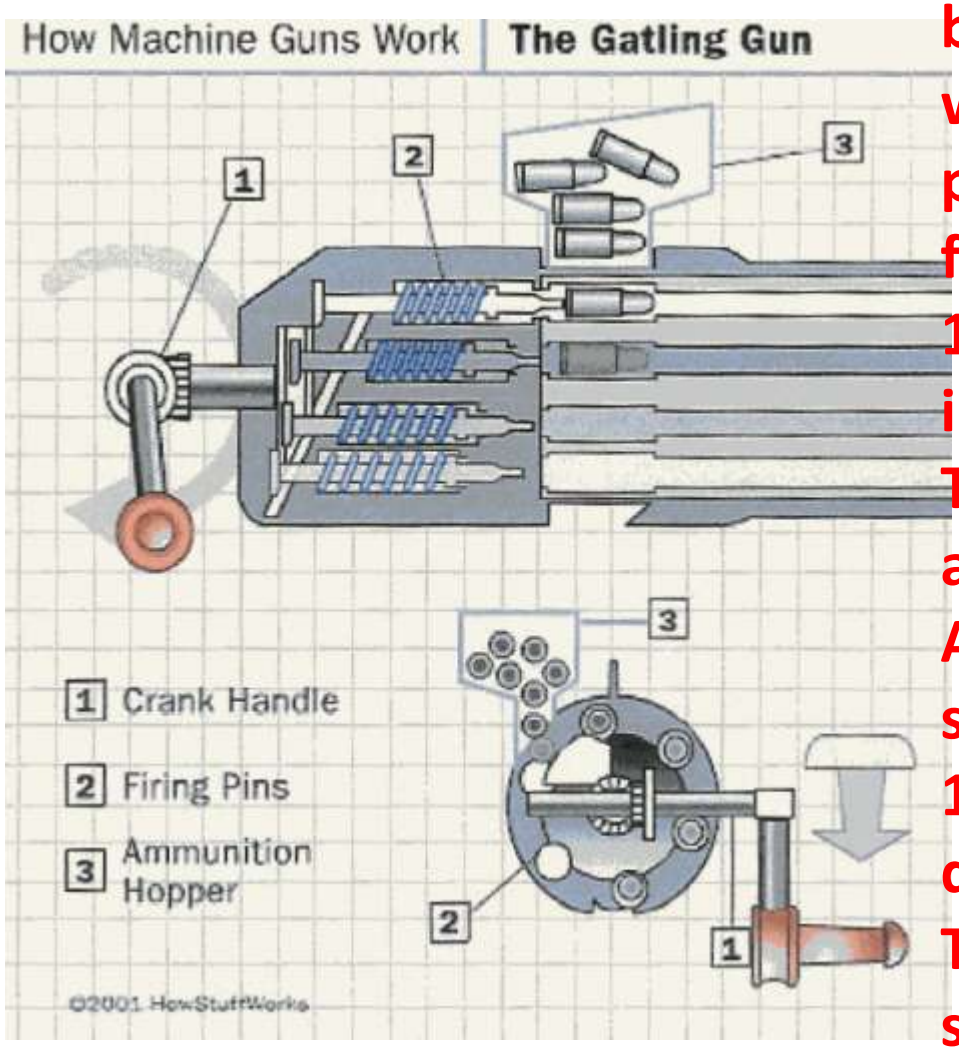
- **“sowing” machine.**

- The principle of the Chain Gun goes back a long way and was known loosely as a Gatling gun.

The Gatling


R.J. Gatling
Battery Gun.
1½ Inch to 1 Ft.
Fig 1
Fig 2.


DISINTEGRATOR



The Gatling had ten barrels, each with its own lock. Only when a barrel is in the 6 o' clock position will it fire. Its journey to this position and onwards, is in the following sequence:

12 o'clock, the cartridge drops into the carrier.

Then as it rotates it is chambered and fired at 6 o'clock.

As it continues it extracts the spent case and ejects it before at 12 o'clock another cartridge drops..

This occurs with all ten barrels in sequence, each, in turn, loading at 12 firing at 6.

Variable, Controllable Rates

- This process can be as fast or slow as you can turn the barrel, unlike other machine guns that can only fire at a set rate, and stop if a cartridge fails to fire. The reason being they require some of the energy produced by the expanding gases to operate the system, and subsequently require manual assistance to clear and start the process.

Planting Programs

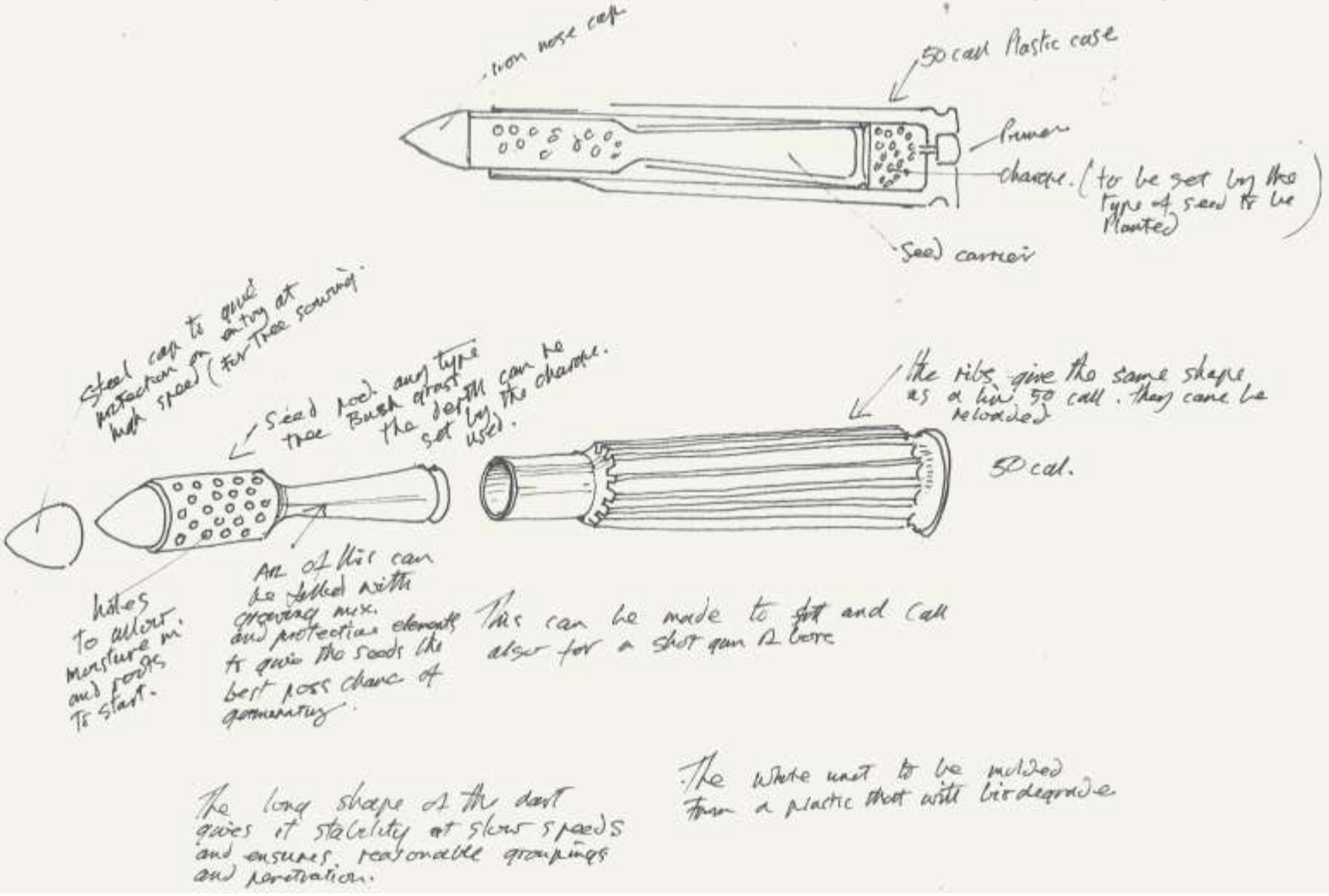
- The Chain Gun requires no energy from the cartridge. If a cartridge fails to fire it is simply ejected at the appropriate time. This system, which requires no recoil or gas to actuate the firing system, is ideal for programming a seed planting-firing order. It is also ideal for programming rates from spaced single shots to high speed bursts.

Cartridges

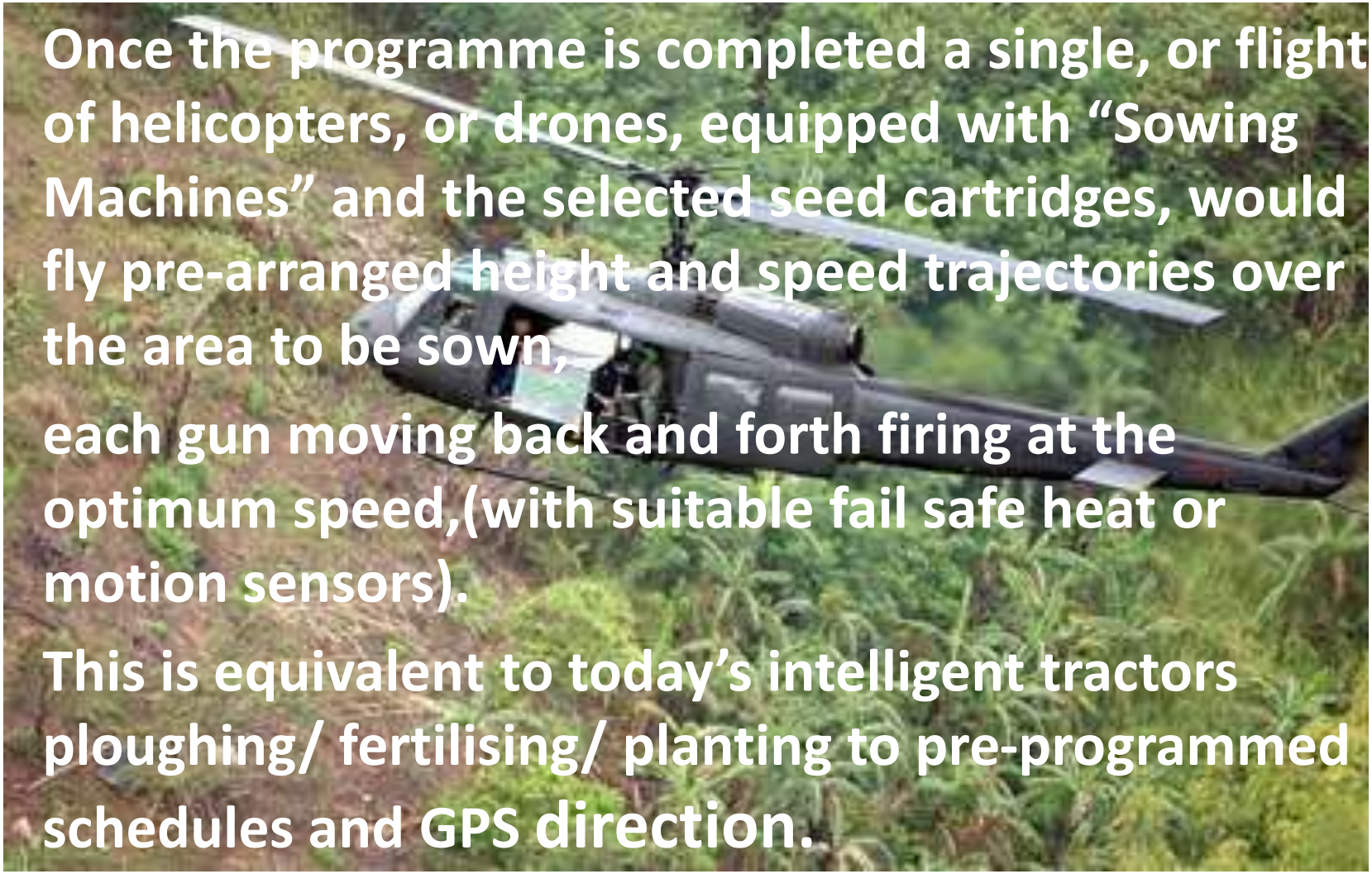
- So the idea is that appropriate seeds are selected and loaded in shell cases with the correct amount of propellant to drive them into the soil/sand/scree with sufficient force to position them at the depth best suited for their germination; e.g., light ground light ground cover and scree will require less penetration than longer germinating larger plants and trees.

Seed Heads

The following diagram illustrates the loads and cartridge design..



Delivery

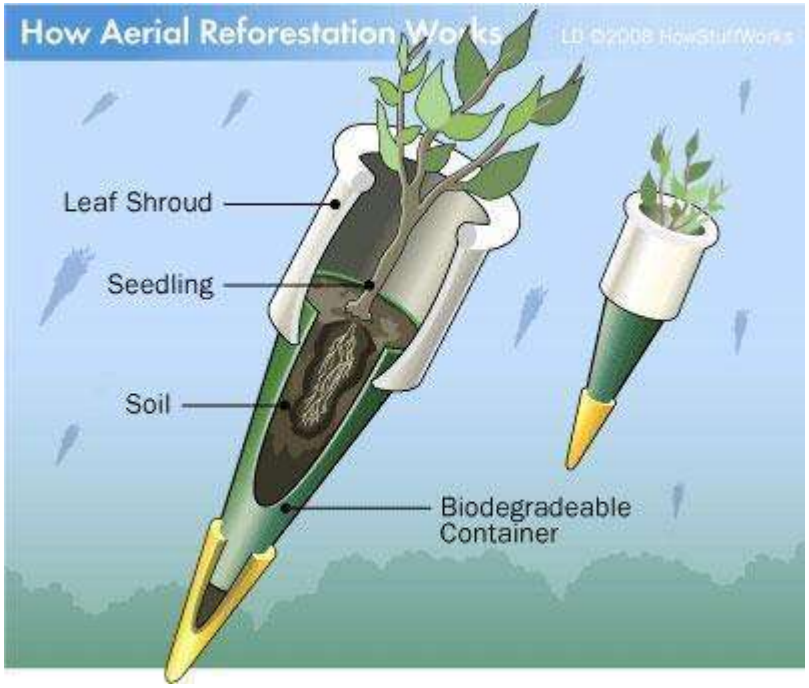


Once the programme is completed a single, or flight of helicopters, or drones, equipped with “Sowing Machines” and the selected seed cartridges, would fly pre-arranged height and speed trajectories over the area to be sown,

each gun moving back and forth firing at the optimum speed,(with suitable fail safe heat or motion sensors).

This is equivalent to today’s intelligent tractors ploughing/ fertilising/ planting to pre-programmed schedules and GPS direction.

Strategic Seed Bombs

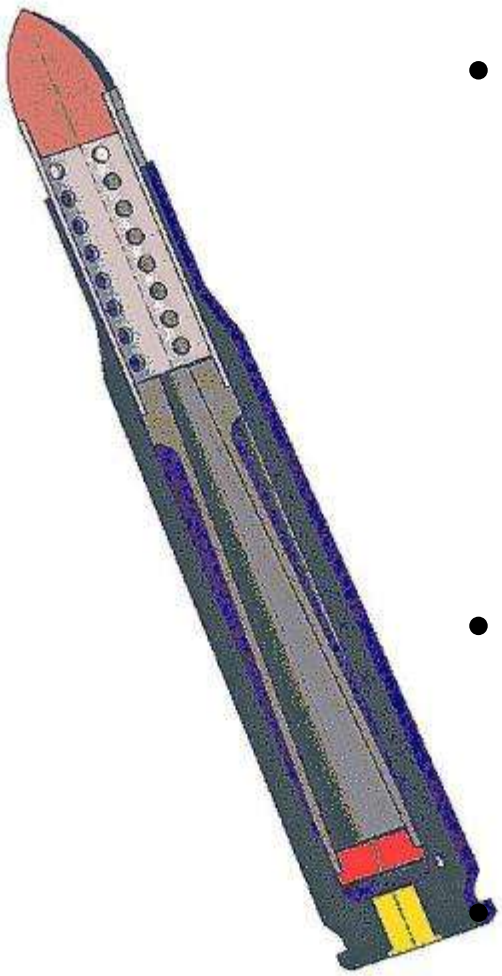


- There has been a great deal of interest in this kind of approach, but most either rely on vulnerable, nursery raised seedlings in containers which cannot penetrate any but the loosest of soils, or scatter seeds which end up feeding the birds.

Summary

- It is the powder charged seed projectile in this concept which solves these current problems
- (cartridge filling, storage and delivery are bread and butter “givens” for the logistics expertise of the military!)
- and which will allow the exploitation of this attractive option for rapid and low cost reforestation of vast inaccessible and uninhabited areas.

Progress I



- We have now developed the design , produced and aerodynamically improved the accuracy of the prototype seed rounds (opposite), using a gas operated large animal tranquiliser dart gun.
- We have also acquired and mounted a 50 calibre Gatling barrel on a standard shot gun stock.

We have then successfully demonstrated the viability of the concept in a series of test firings of live cartridges.

Progress II

But do they work in the wild?

Next Steps

- Continue the Tests with live rounds and real seed mixtures.
- Two objectives –

  To calibrate charge penetration relationships

  To show successful germination and subsequent healthy growth

Progress III

Plant some trees!

Way Forward

- We are looking for funding and partners to pioneer this revolutionary approach to reforestation.
- We have the interest and support of the Royal Armouries and looking for MOD involvement.
- Interest has also been expressed in an Australian demonstration.