Transmuted EW for New Scenarios

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Synopsis

There is Nothing Permanent, Except Change!

Heraclitus

1. Introduction;
2. Once Upon a Time… Then Today!
3. The Touch of the Liquid Reality Muse;
4. What is to come… and what about our business? and
5. Conclusions

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1. Introduction

Surprise! Your war has changed!

Introduction

Transmutation

Definition: The Convertion of an element into something else.

We Live Liquid Times, Nothing is made to last!

Zygmunt Bauman (1925 -2017)

Introduction

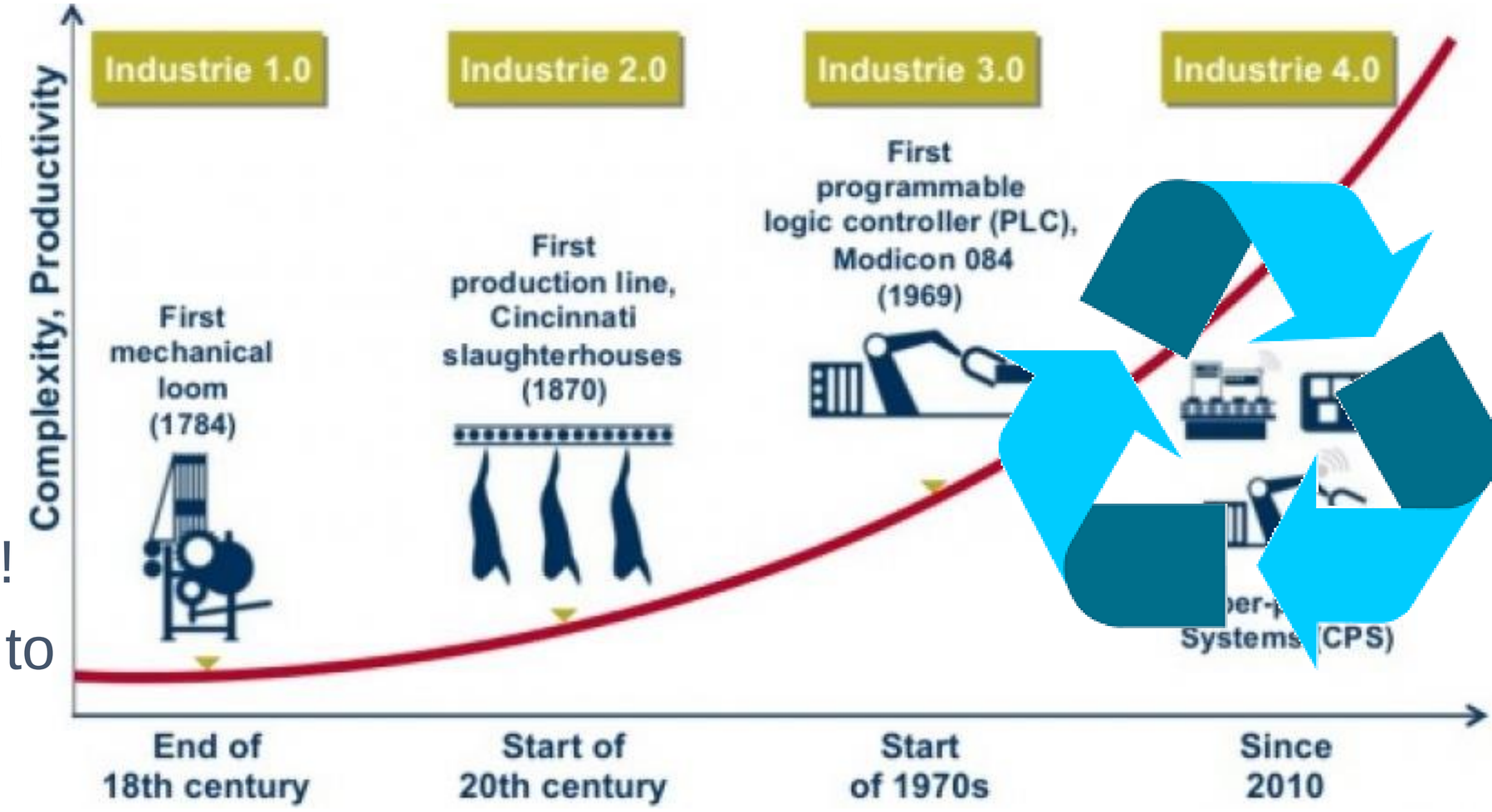
Innovation is the process of transformation of new ideas or inventions into products, services or processes to adress a specific challange and generate value for those who apply them
(IET)

Introduction

https://www.potatopro.com/news/2015/trends-industry-40-how-it-applied-today

Industry 4.0 We Live in an Increasingly Complex World

- Obsolescence is almost immediate!
- Thus, things tend to be disposable!



Introduction

EW and IW will have to follow the changes

Technology affects not only the way a war is conducted and victory is sought, but the very framework that we use for thinking about it. …
A framework used useful at one moment is likely to be out-of-date, even positively harmful, in the next.

Martin Van Creveld (in *Technology and War*)

Introduction

Adm Braga's Equation

Effectiveness $= \text{⌘}(P, M, T, W, A)$

⌘ is **a *T-norm***

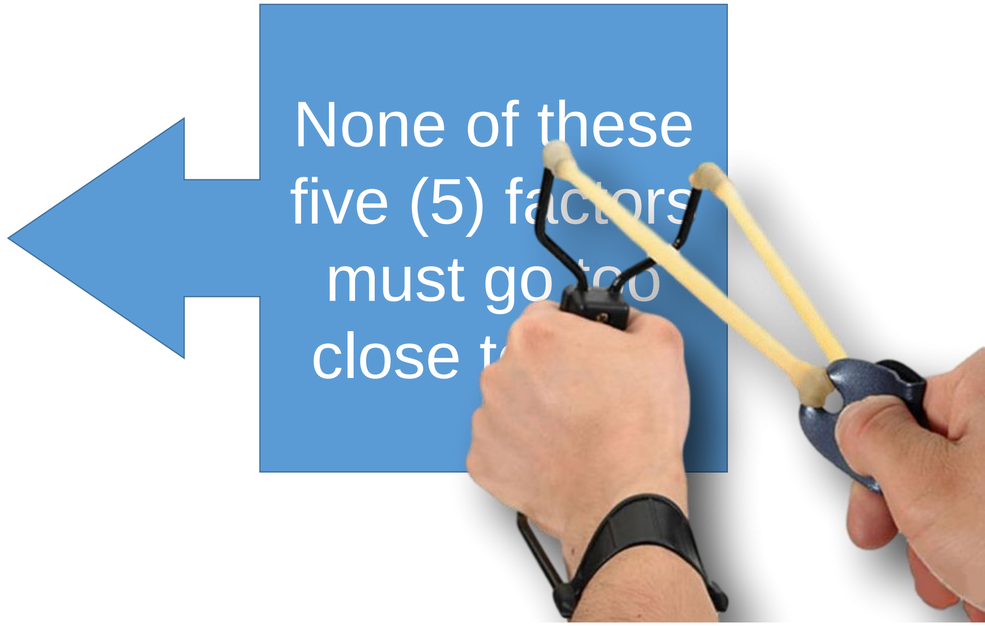
Where: *P* = performance;

M = maintainability;

T = training;

W = technological mastery; and

A = appropriateness to the mission.



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2. Once Upon a Time… Then Today

The future is what happens to us at a constant speed of 60 min/hour!

Woody Allen

Will the **Future** be a **Today** with modern gadgets?

No!

The **Future will be disruptive**!

New Values!

New Lifestyle!

New Behaviors!

New Businesses!

New Wars…

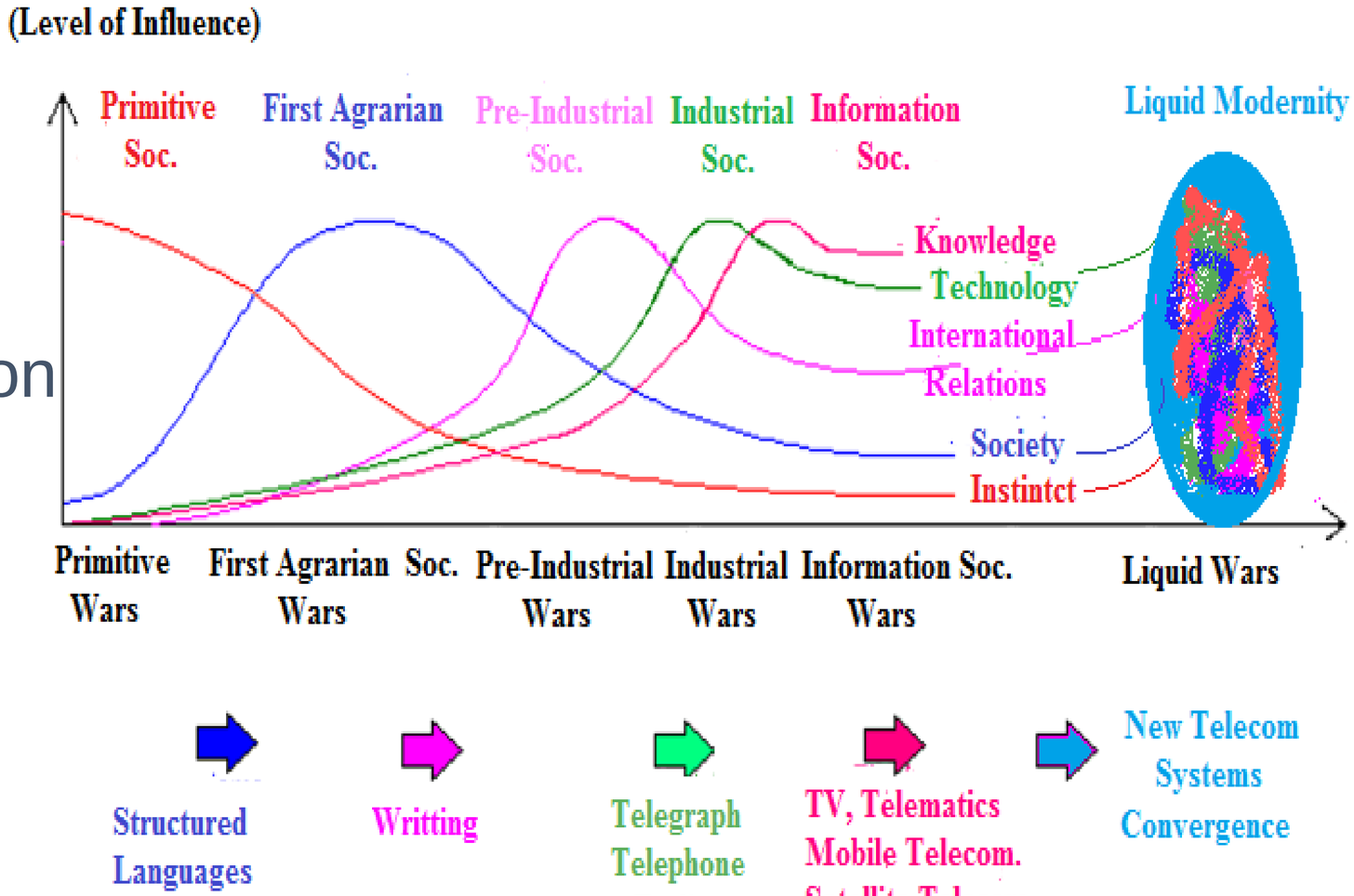
Today, the Future is not as it was in the Past…

The Maginot Line Syndrome!

Once Upon a Time… Then Today

Science, Engineering and Technology shape the Societies lifestyle!

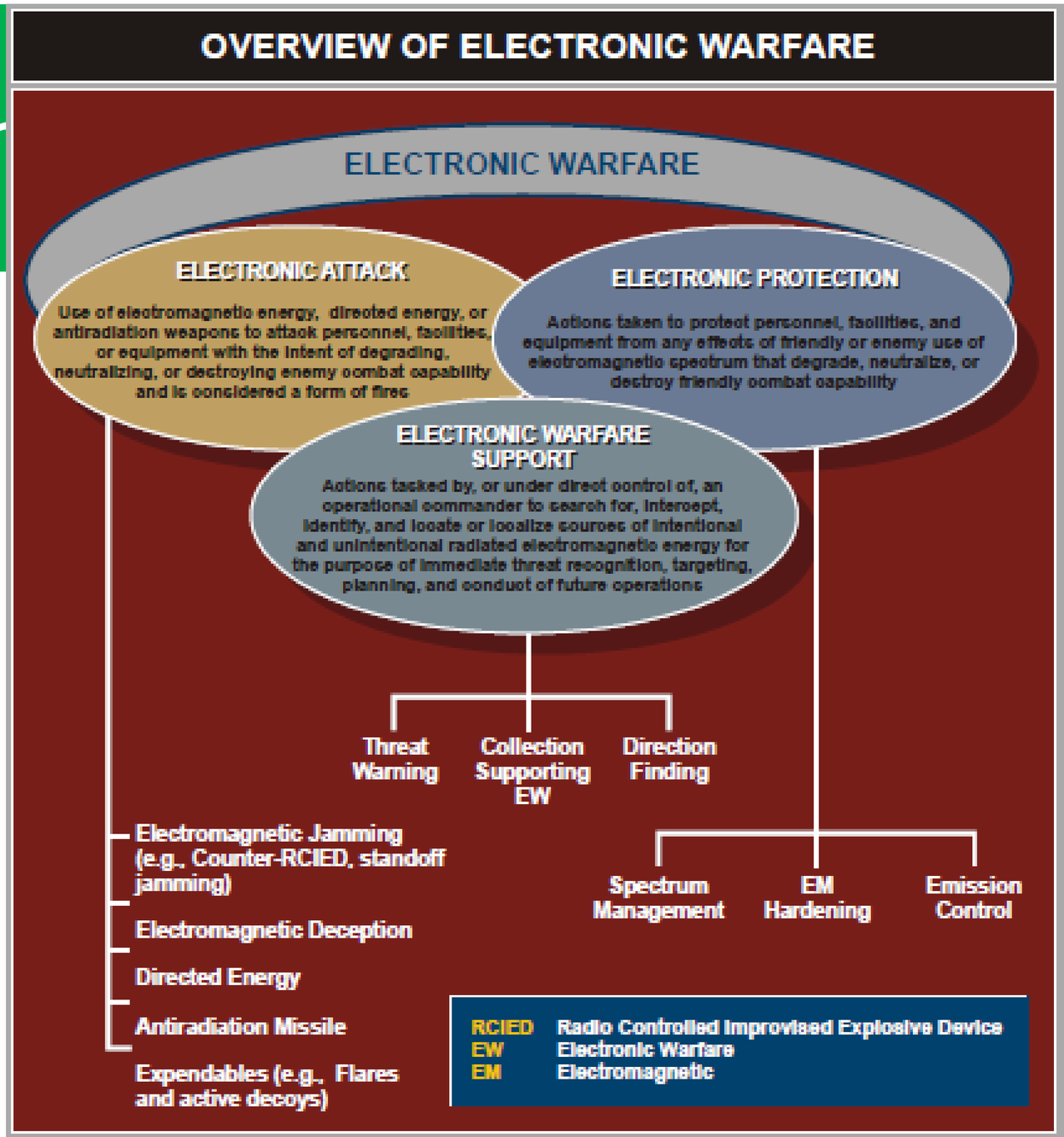
Thus, the way wars are won are also transmuted in the same way…



Once Upon a Tim

Today EW is basically platform oriented:

1) **Crisp EW subdivisions;**
2) **Com and non-Com;**
3) **Concentrated systems; and**
4) **Only targets are military systems.**



Once Upon a Time… Then Today

NCW **will not make much difference if we think in isolated platforms working together!**

EW IW tinuum

CYBERTRONIC WARFARE

Once Upon a Time… Then Today

It is all a matter of perception !

The future is to be made not to be waited for!

Once Upon a Time… Then Today

The Future belongs for those who are FAST!

The Future is Disruptive, Unexpected and Non Linear!

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3. The Touch of the Liquid Reality Muse

We Shape our Buildings; thereafter, they shape us.

Sir Winston Churchil

The 9 Mythological Muses

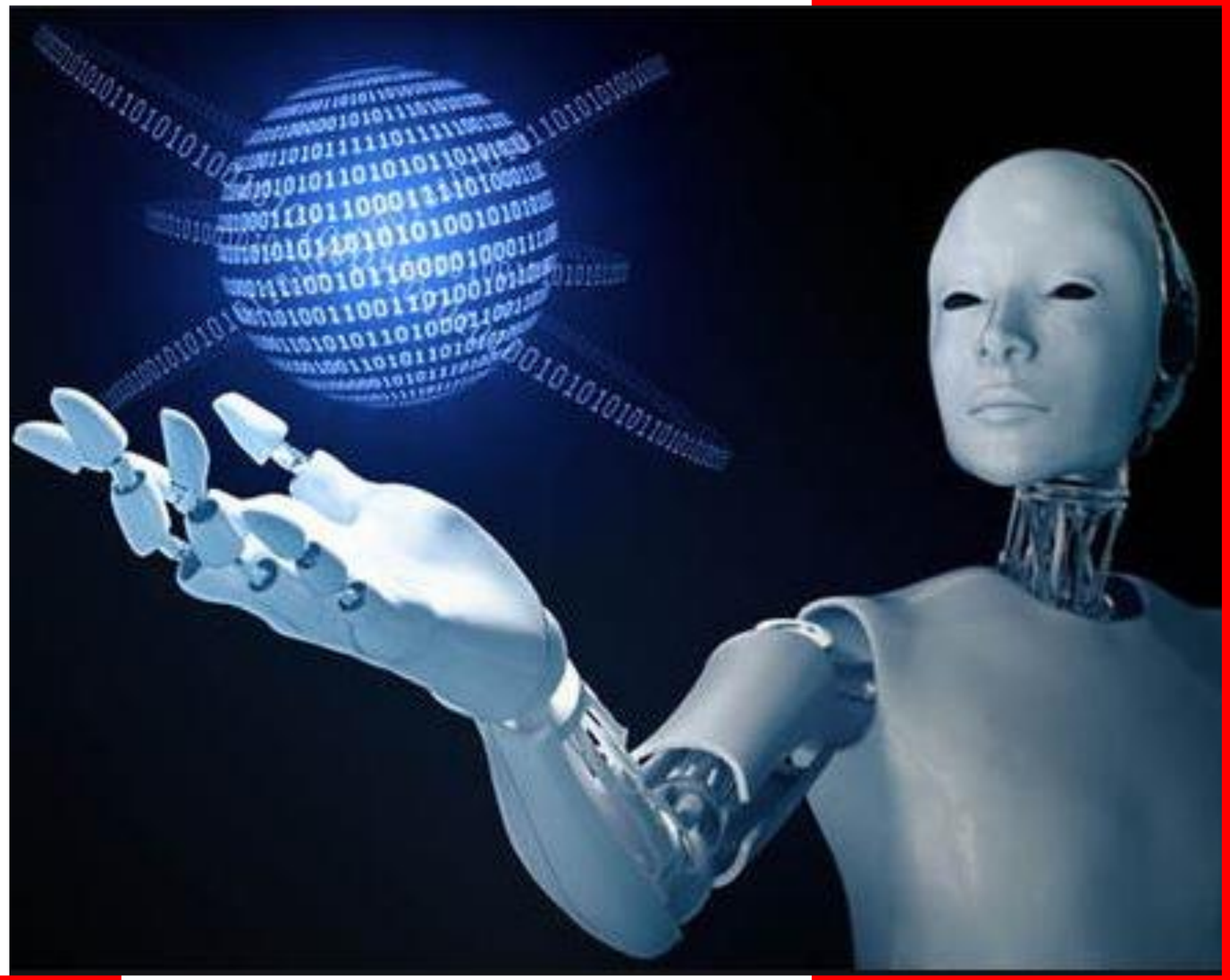
Calliope, Clio, Euterpe, Erato, Melpomene, Polyhymnia, Terpsicore, Thalia & Urania

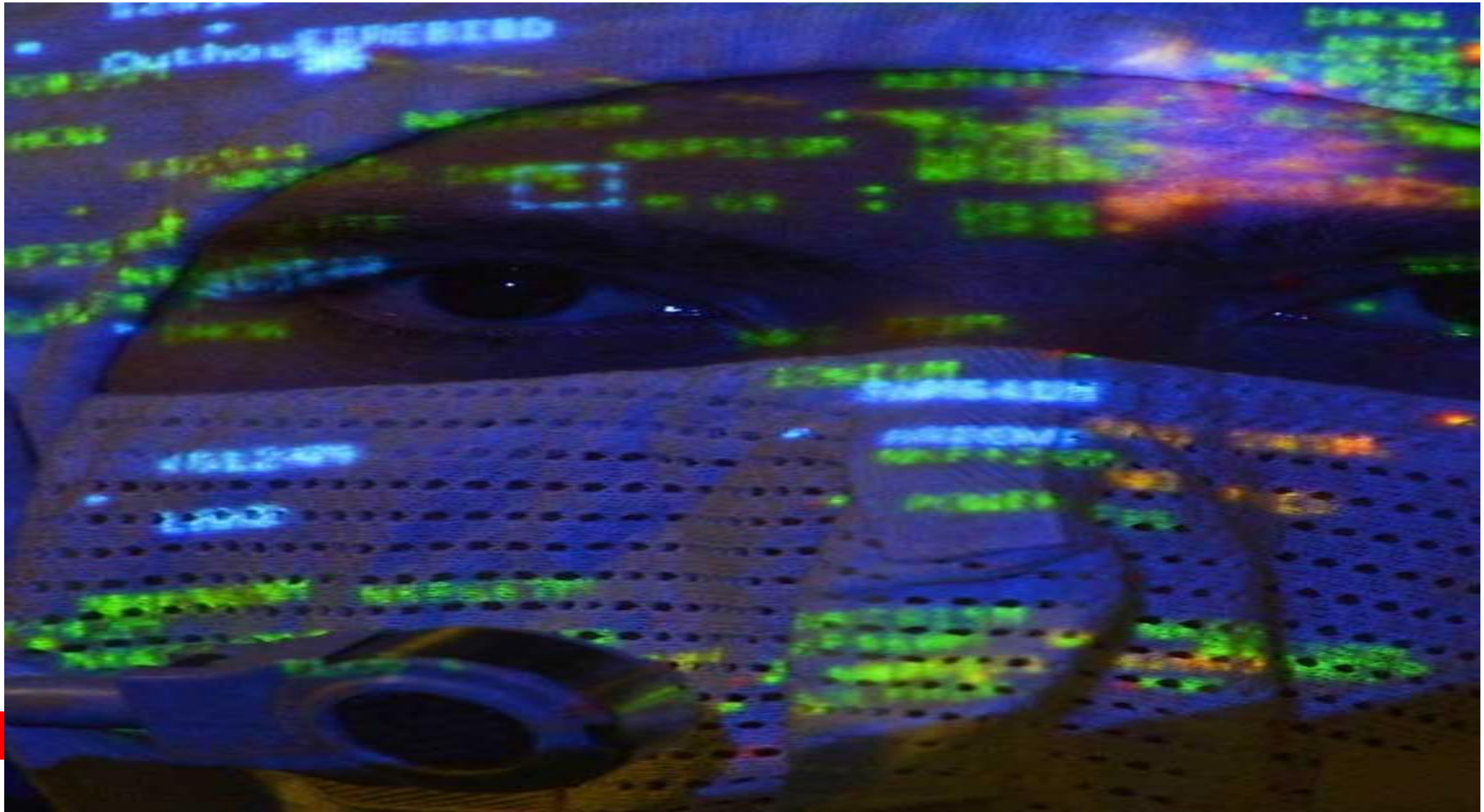
Parnassus by Rafaello

Today there is one more Muse: Techna!

YouWall.com

As new Technologies will enter into scene





Fixed EW Subdivisions?

In Practice, no more EW subdivisons!!!!

One system with AI will provide intercept and detect signals, reason their danger levels and, if required, act immediately. Operators will only need to feed extra information and to redirect the operation when necessary.

The Systems will be SW defined, and will change with time. Cyber Warfare and EW will merge! Sensors and Telecomm may also join them through IoT!

Com and non-Com?

- **There will be much more to care about!**

  EW and IW against biomedical devices, bionic extensions, domestic devices, and will act to persuade those who decide that the chessboard is not how it is in fact! By the way…

  no one can know for sure how it will be…

EW and Cyber Warfare as Weapons of Persuasion, to reach a desired Nash Equilibrium. For those who adopt a wrong model of the environment: GAME OVER!

Concentrated Systems?

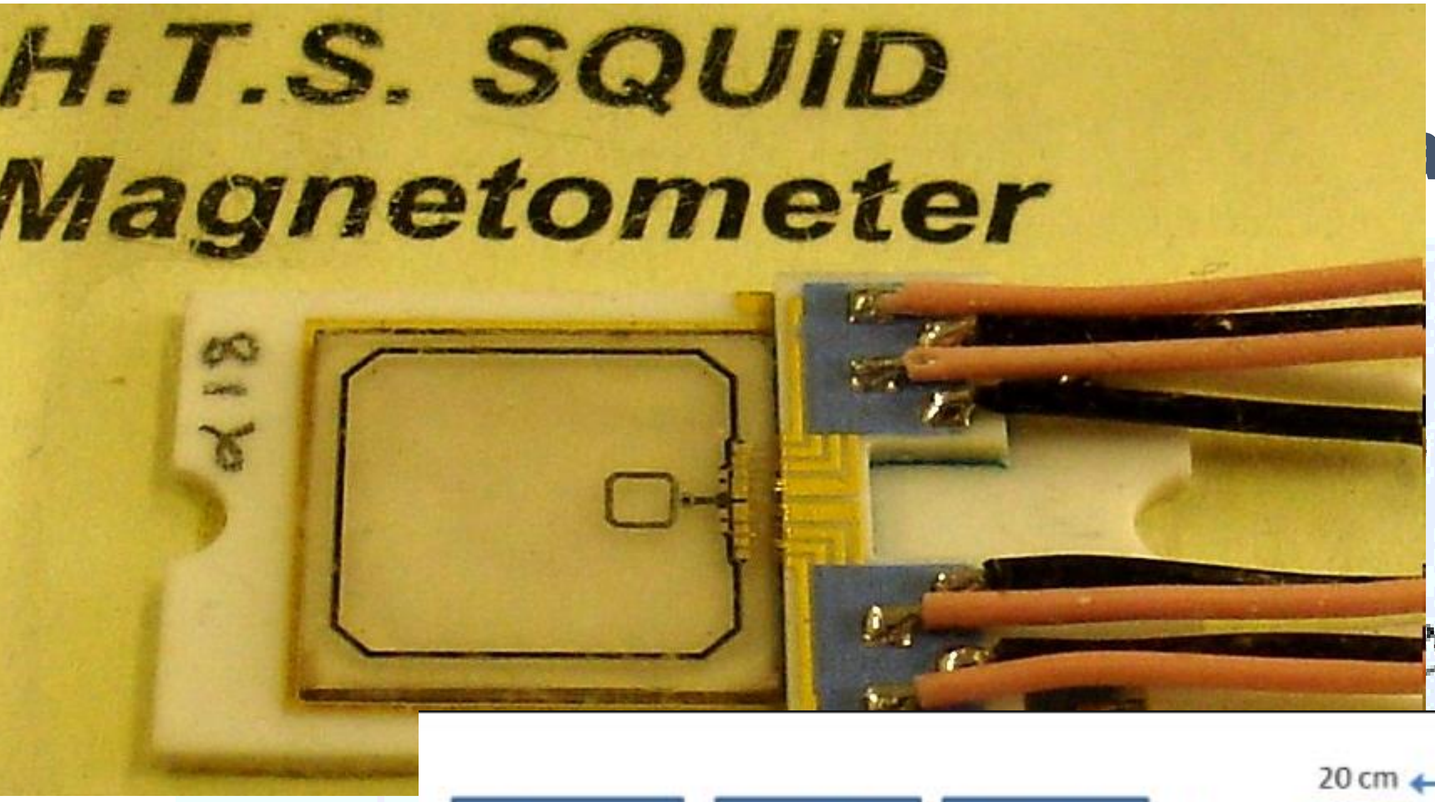
Systems will be Distributed and Act as a Network

The end of giant monolithic systems! Small and well coordinated systems will gather information for a main, but also distributed, intelligence processor. Such systems will be well fitted to work in swarms and with Big Data!

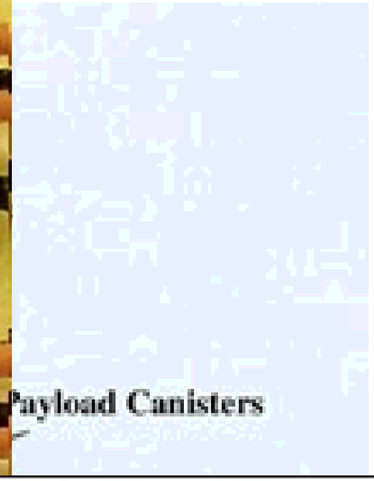
EW and Cyber Warfare systems as networks of several elementary systems. Novel Technologies will enable them to manage and store voluminous amounts of information and to achieve faster problem solving and improve performance

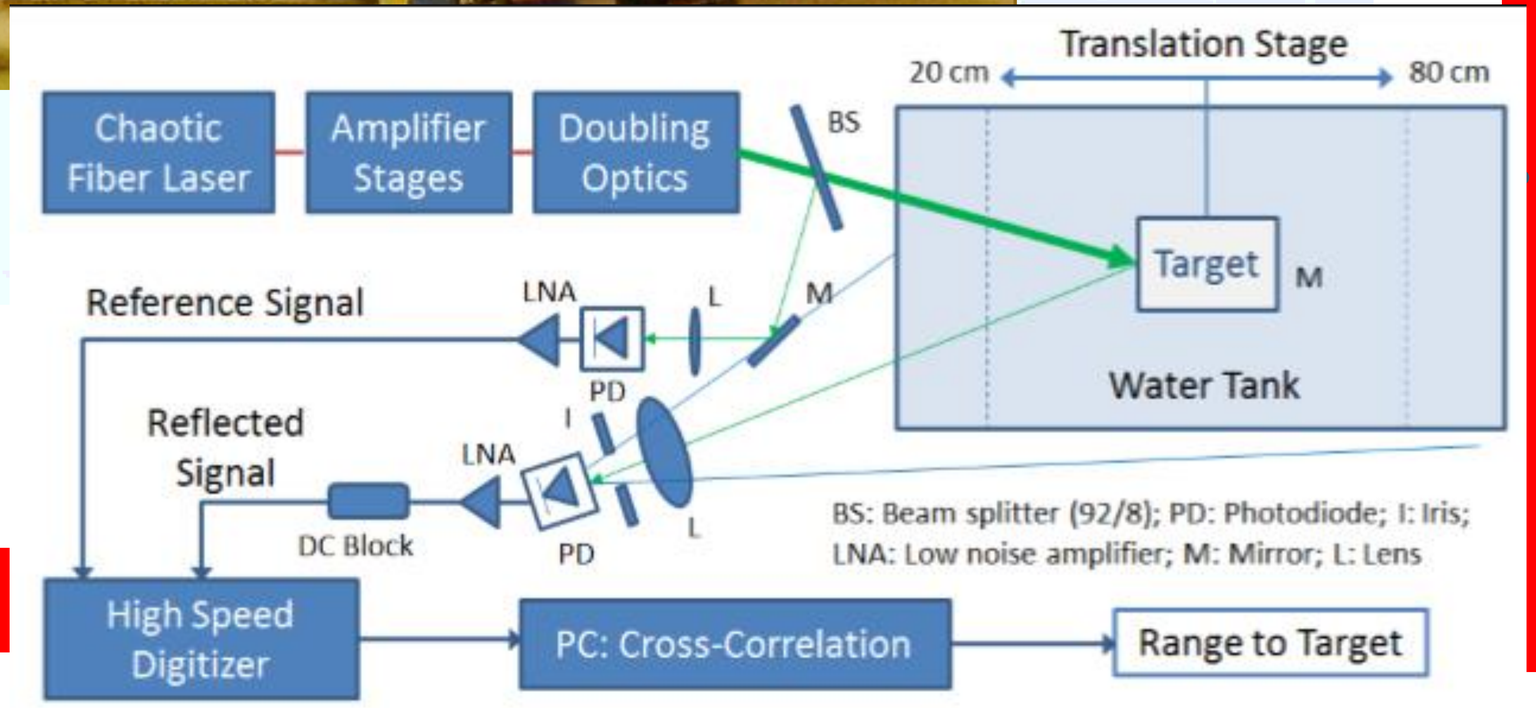
Techniques to Achieve Low Observability!

a) Reduced RCS;
b) Quiet acoustic signatures;
c) Very high speed;
d) Visual Camouflage;
e) Low IR signature;
f) Low UV signature;
g) Silent communications;
h) Suitable use of decoys and active EA;
i) Blackchaff techniques;
j) Anti low frequency radar techniques;
k) Anti bistatic radar techniques;
l) Underwater detection techniques;
m) Metamaterials and Smart Materials;
n) etc

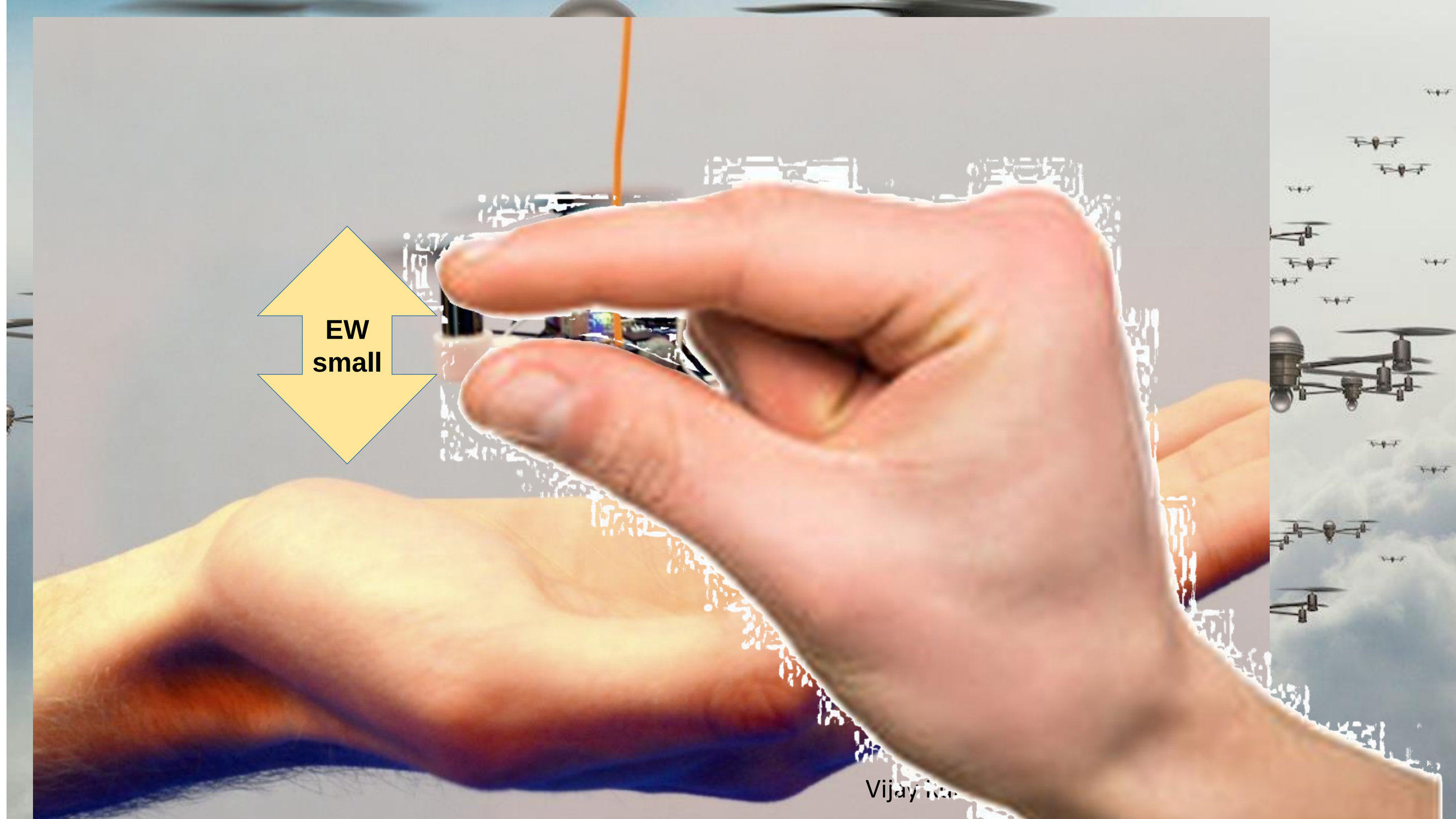


alth?





- Stealthier submarine architectures
- However…
- The rise of Squid Arrays (Superconductor magnetometers at High Temp) Green/Blue scanning LIDARs + ISAR processing+ AI!


EW
small

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4. What Is To Come… And What About Our Business?

The Best Way to predict your future is to create it.

Peter Drucker

New Technologies will bring in new possibilities

Challenges to Innovation

a) Over-engineering;
b) No real added value;
c) Too much time to develop;
d) Misunderstanding the real needs;

The Institution of Engineering and Technology

IW against Everything !

Everything will have Digital processing! Everything will be linked in an IoT! Thus, everything is a target for Cyber Warfare.

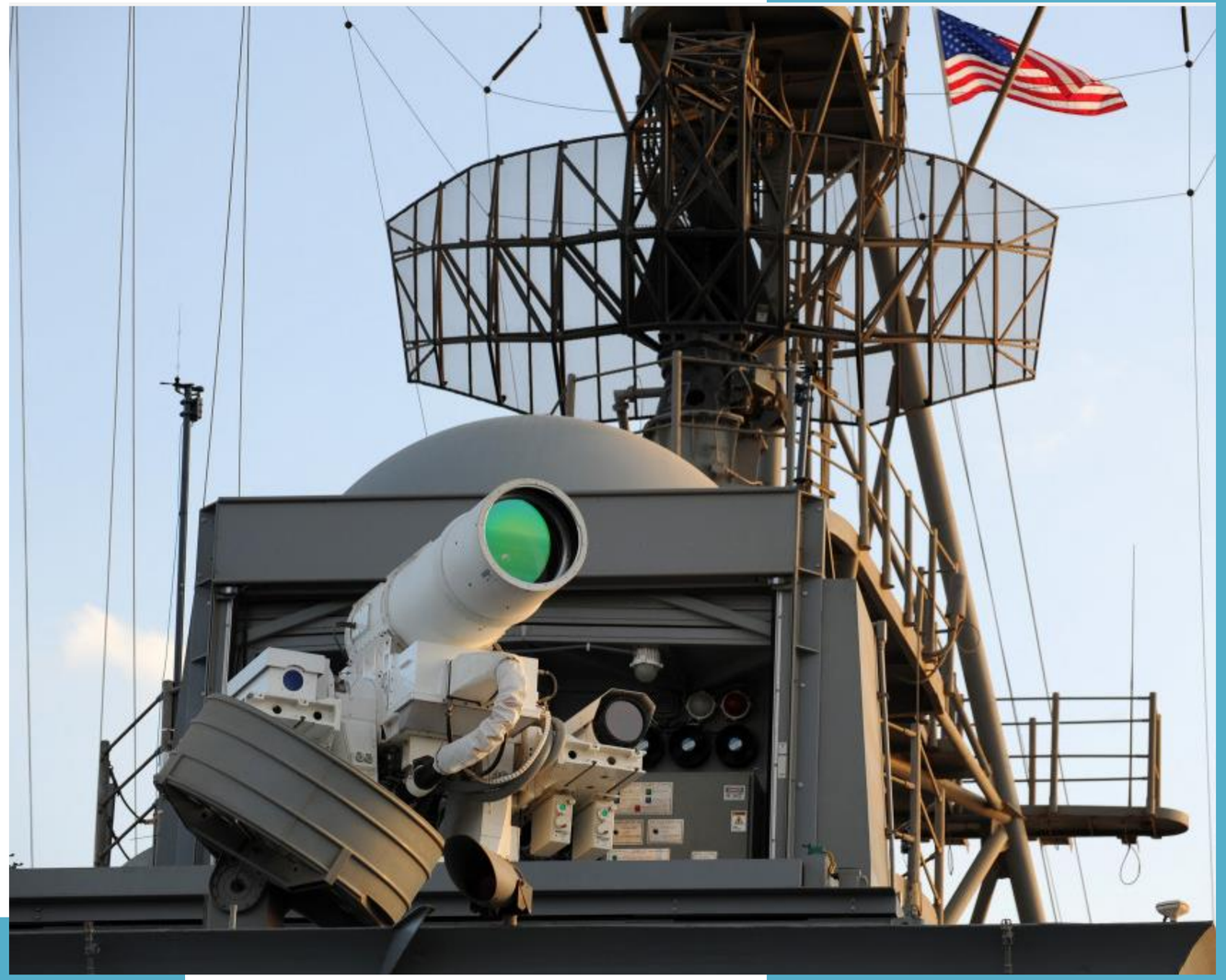
If you are not good in Cyber Warare: Game Over!

Anti-SWARM EA

Swarms provide increased range, persistence, daring, mass, coordination, intelligence, and speed

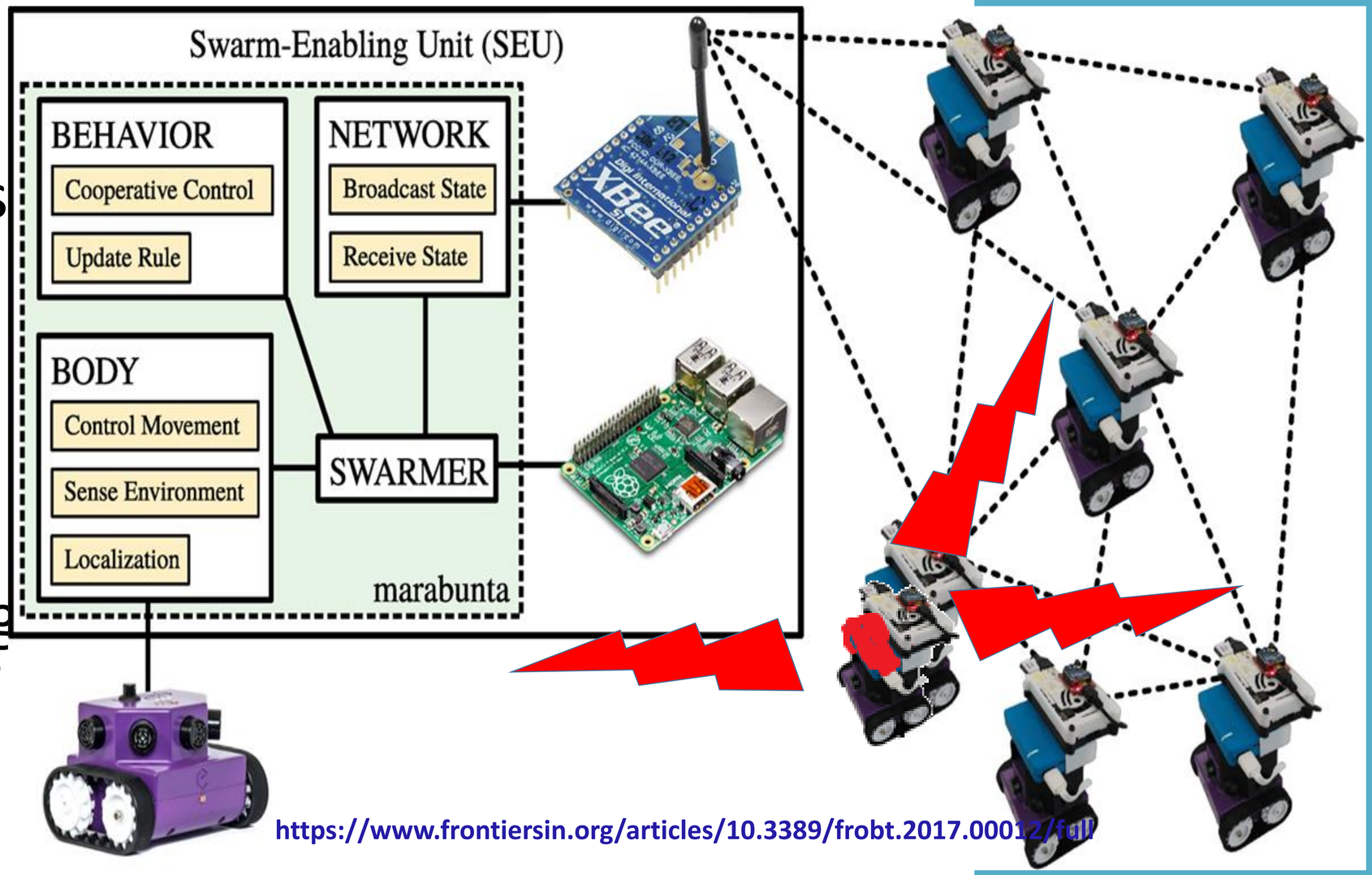
Thus, modern EA such as ***Laser Weapons*** are entering into service to conter robot swarms.

Moreover IEMI with HPMW is another possibility!



EW will help swarm-on-swarm tactics:

- **Collapsing** the swarm into uncoordinated units
- EA against the close comm between units;
- **Trap** ou **hijack** the swarm by infiltrating fake “swarm leders” into the enemy flock.



https://www.frontiersin.org/articles/10.3389/frobt.2017.00012/full

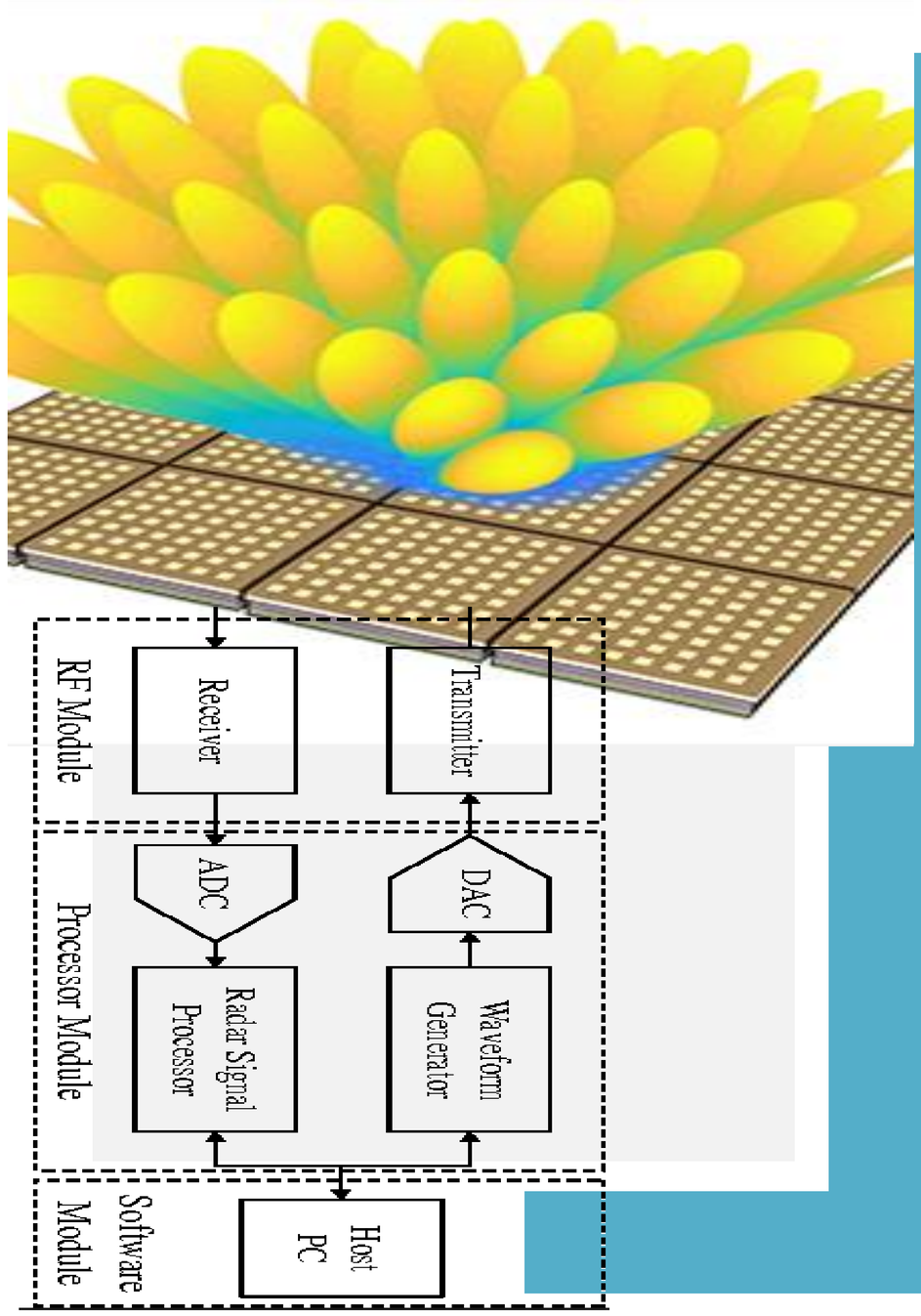
Hypersonic Weapons

The defense from Hypersonic (> MACH 5 maybe up to MACH 20) vehicles and missiles will require longer- range radars (1000’s of km), space based sensors and highly sensible thermal sensors. However, solutions comprising innovative designs and materials for sharp, shape-stable, cooled leading edges are coming..

http://mil-embedded.com/10084-hypersonic-weapons-demand-longer-range-radars-and-space-based-sensors-for-detection/

AI + SW Defined Systems

Most EM based Systems may trend to apply wideband phased arrays plus an adaptive SW Defined Architecture, if this goes along with AI, then reshapable EW will enter into scene!



Thus, Tech is a Must…

But it will be not in the grasp of everyone due to the Nightmare of the Periphery: The Logistic Cost Iceberg!

Therefore Logistics is a business!!!!! A BIG one!

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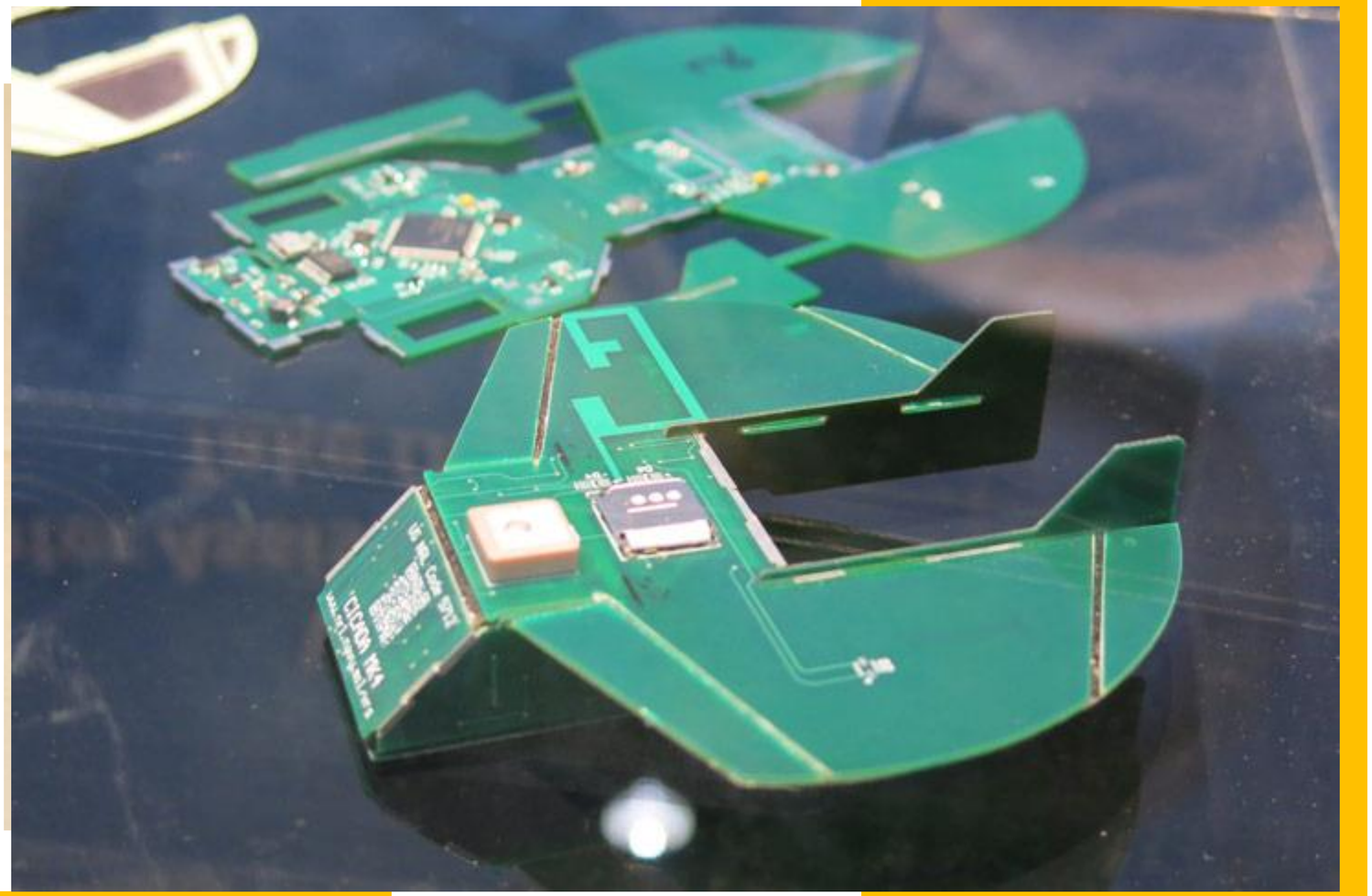
I am the Lizard King… I can do anything!

James Douglas Morrison

Use and then Trash!

Industry 4.0 products are very high tech, but most of them will be disposable, that is very low cost!. Flexibility to use in several sort of missions!



News Desk at https://defense-update.com/20160419_cicada.html

Distributed Systems

Many small elements that can have specific tasks that are designed as mission goes on

Lets say:

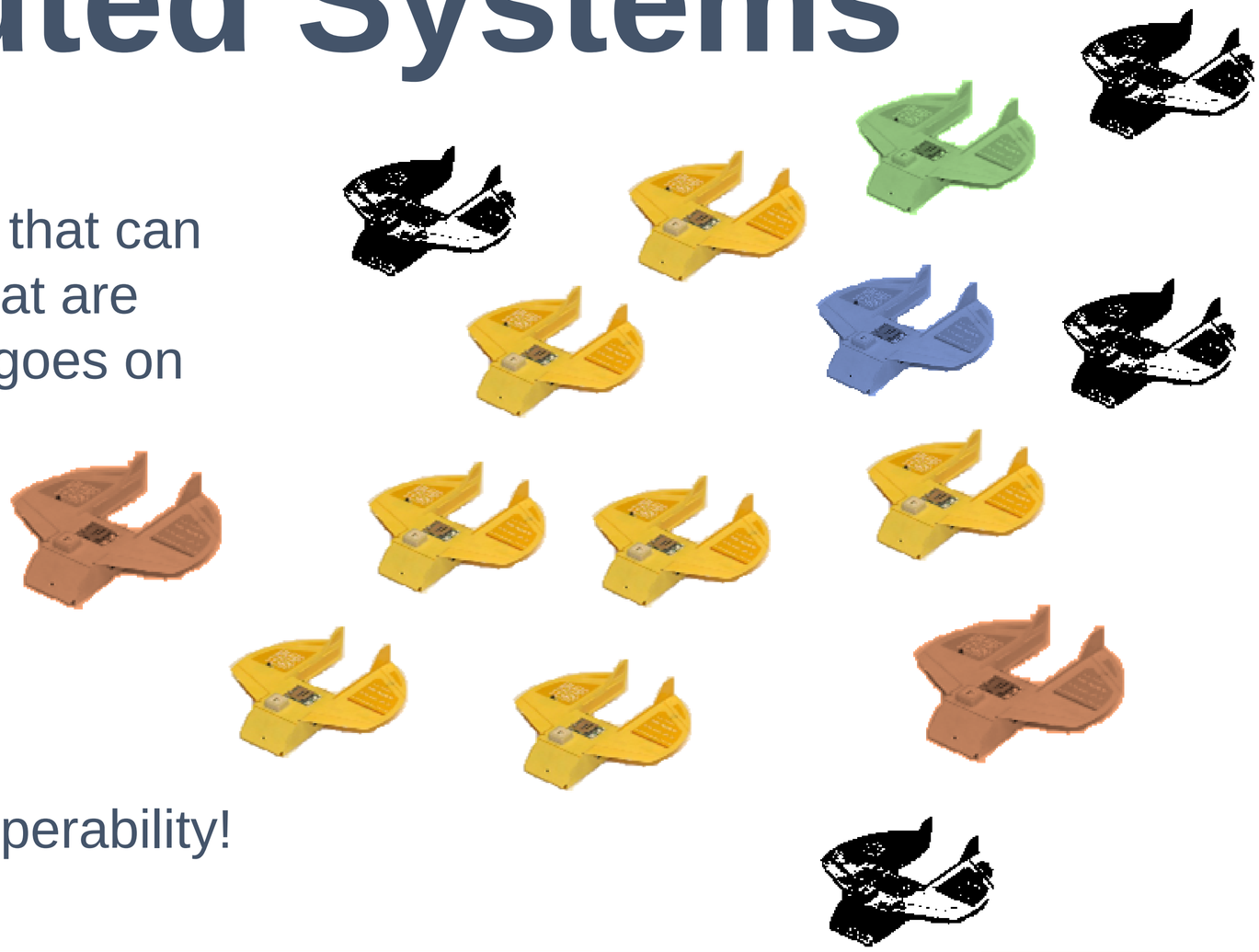
Yellow: RX

Red: TX

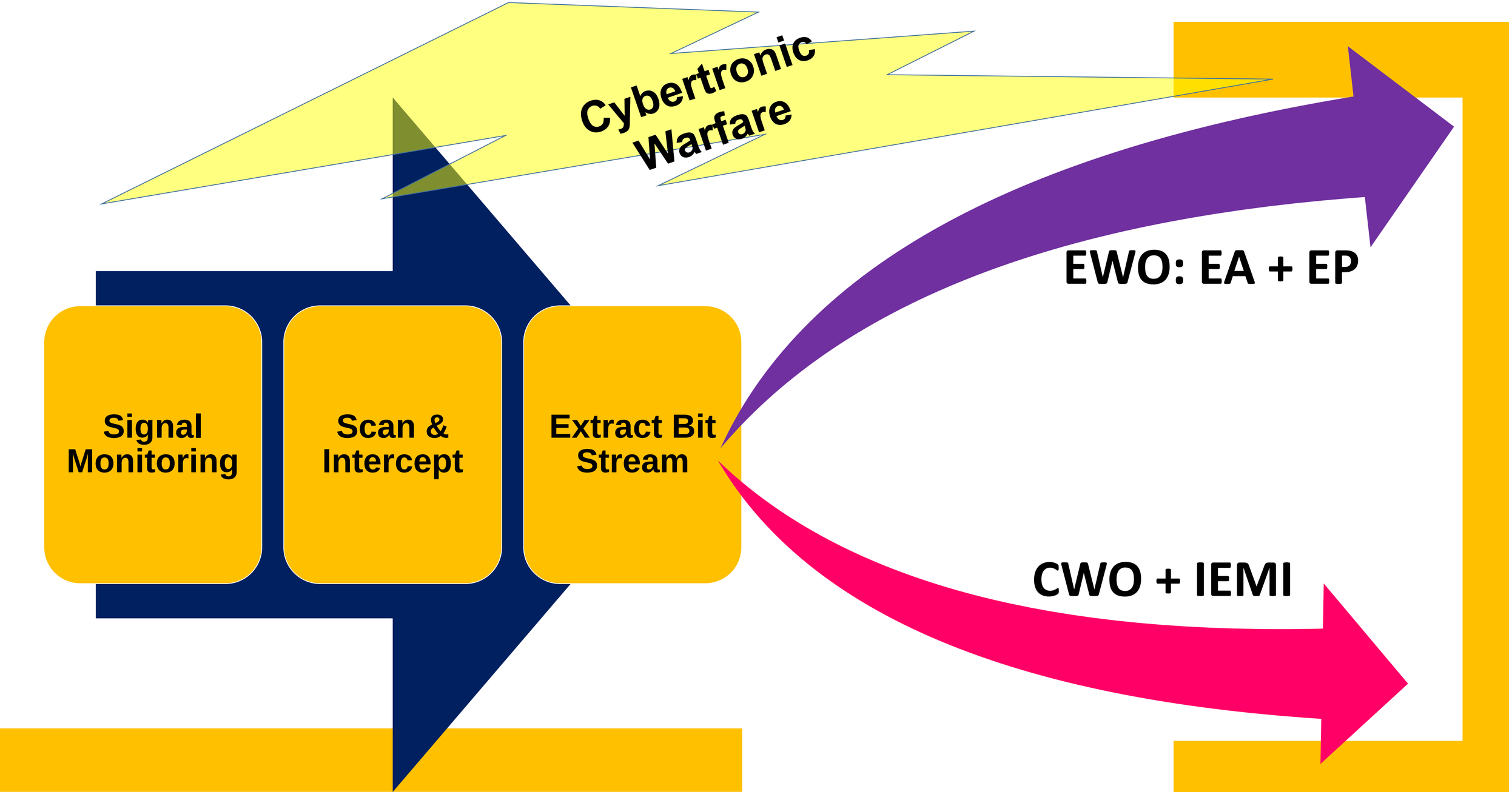
Blue: Processor

Green: Telecmm

More than that, interoperability!



CYBERTRONIC WARFARE



Adapted from Rajeev Sabherwal at https://srilankasignals75.lk/materials/01-LtGenSabherwal-India.pdf

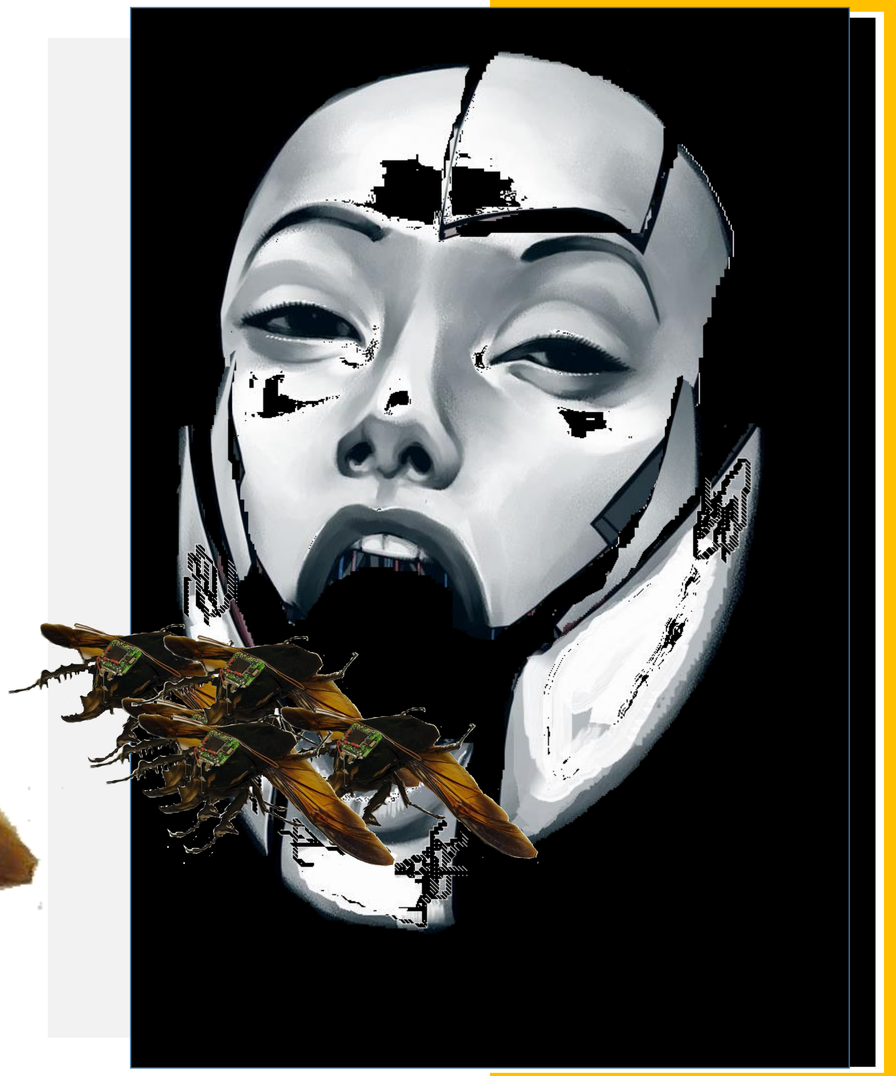
Microwave Gun

- Made with components of a microwave oven.
- Technology easily obtained by technically unsophisticated actors.

Video fetched by 25 April 2019 at https://www.youtube.com/watch?v=CWF-2Z508j8

Innovation! New Technology +Strategy!

Miniaturization



Distribution, Disguise What Else??

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Many Thanks!

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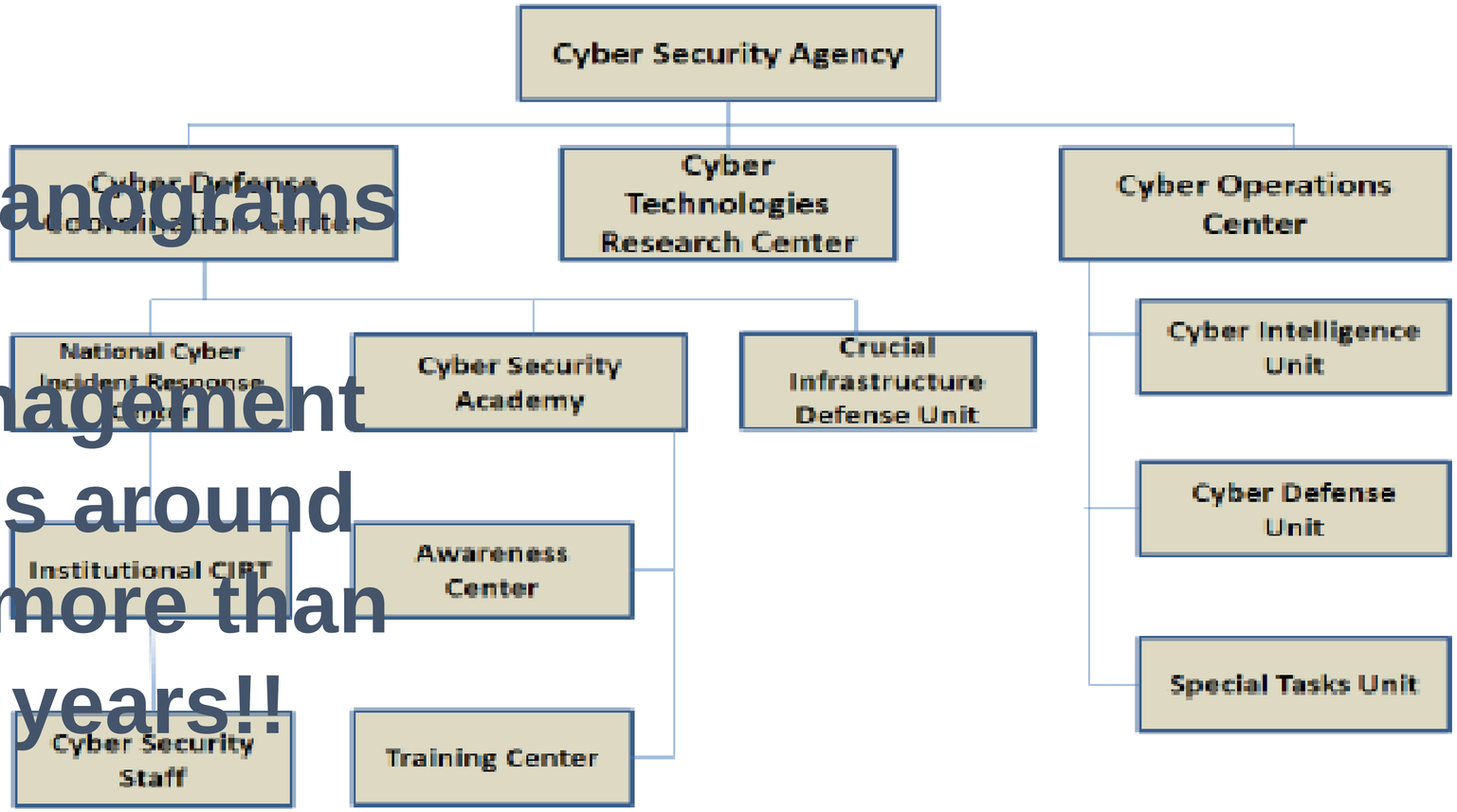
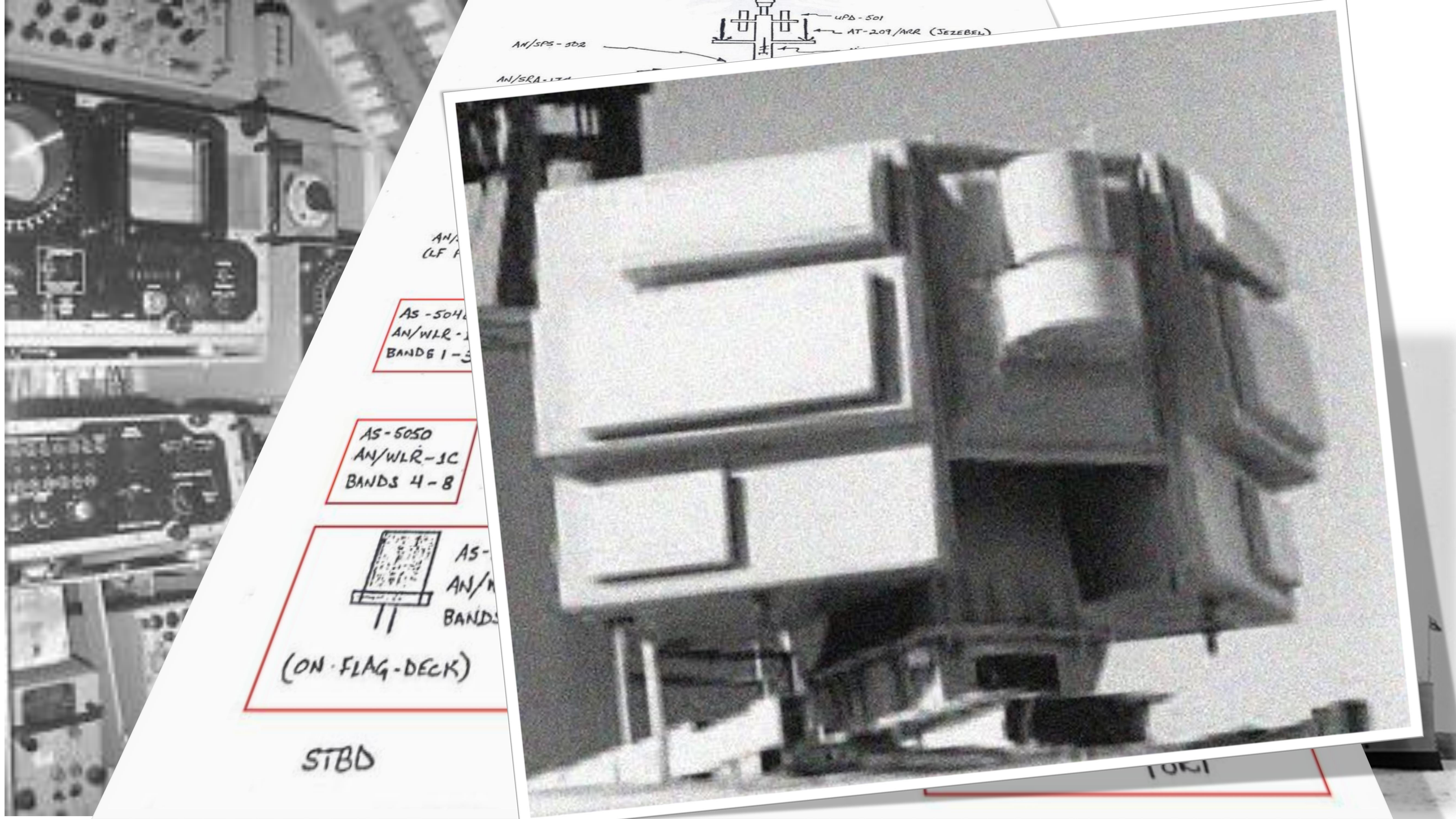
Once Upon a Time… Then Today

Organograms are management tools around for more than 150 years!!

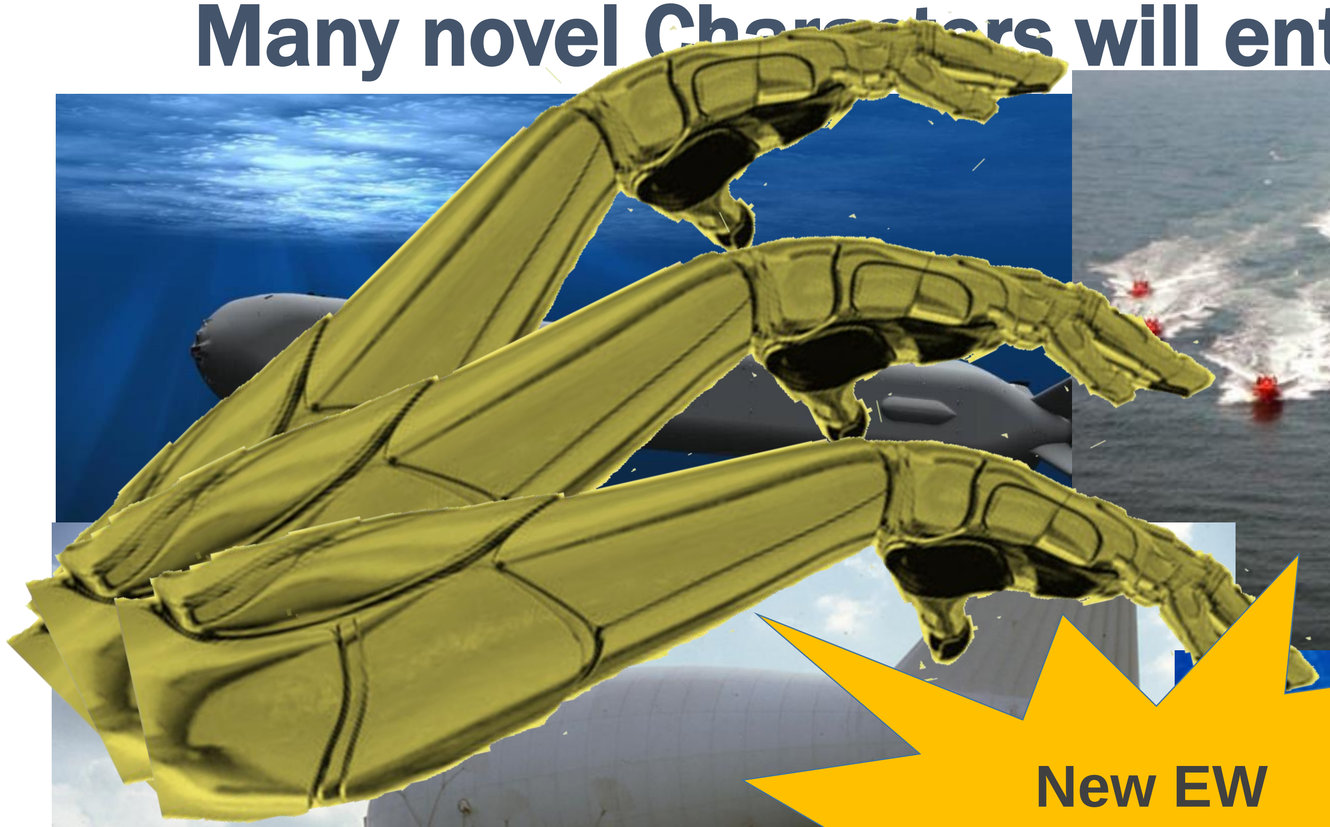


Once Upon a Time… Then Today

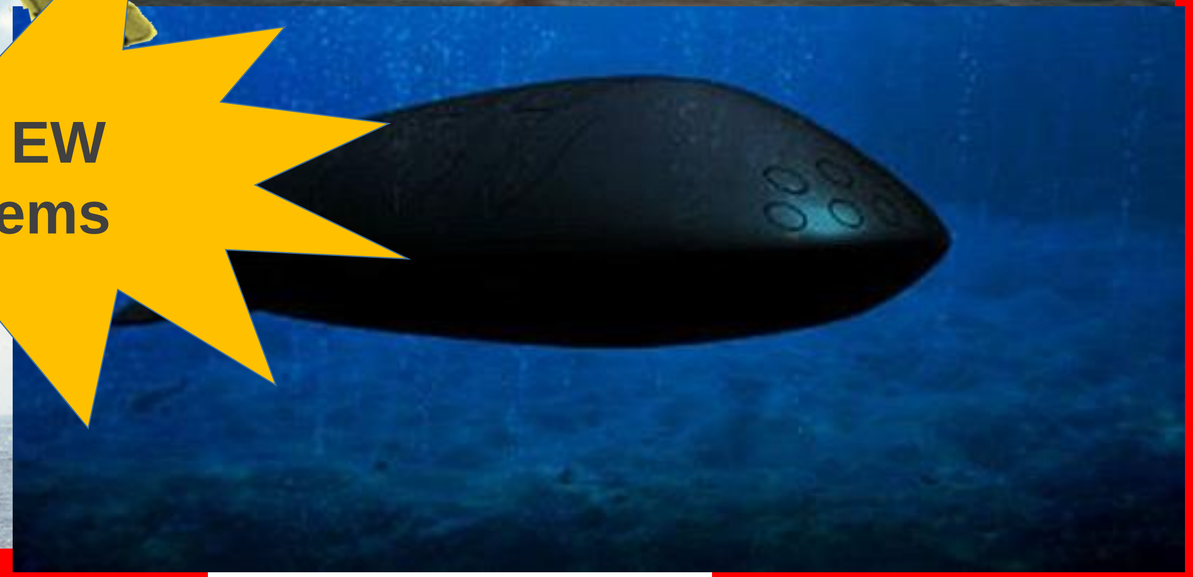
Classrooms + Instructor teaching is also too solid to survive in Liquid Modernity times!


uPD - 501
AT-209/ARR (JEZEBEL)
AN/SPS - 502
AN/SRA-171
AS-5050
AN/WLR-1C
BANDS 4-8
(ON FLAG-DECK)
STBD

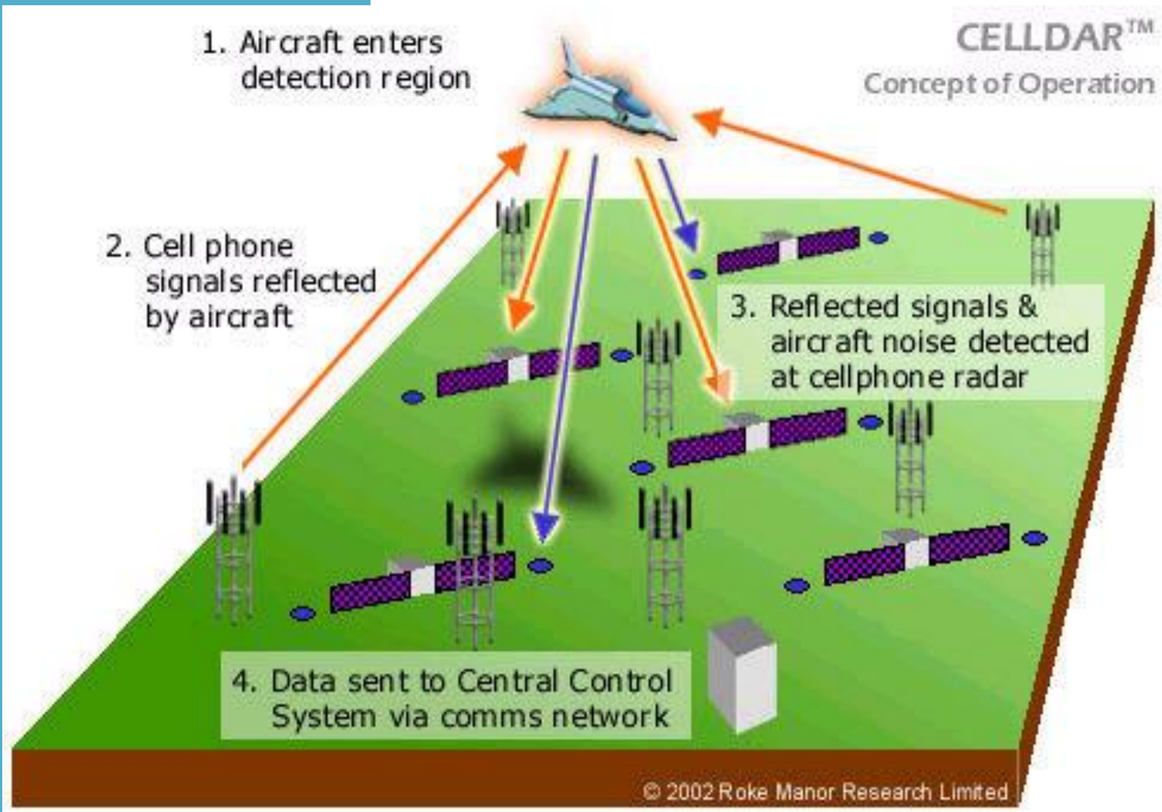
Many novel Characters will enter into scene!

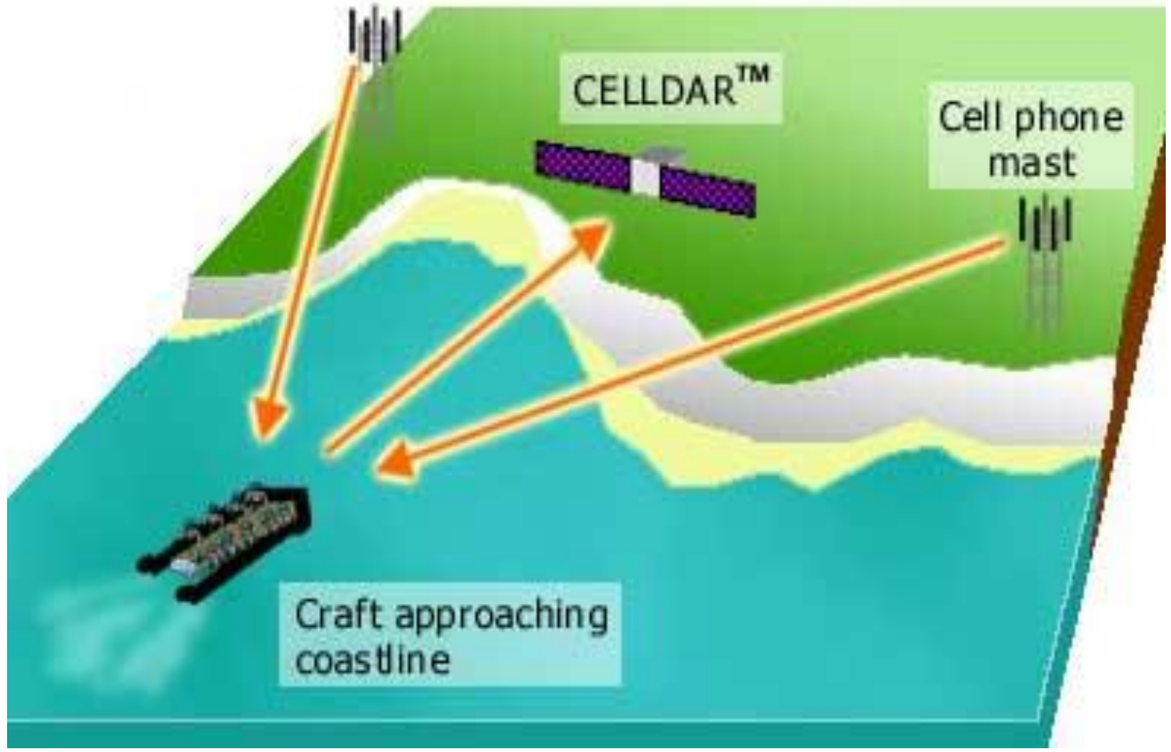


New EW Systems



In the other way around, everything that can be applied as a form of IW and EW will be used! For example, Anti-stealth radars using commercial cell-phone infrastructure, as the ***Celldar©***.

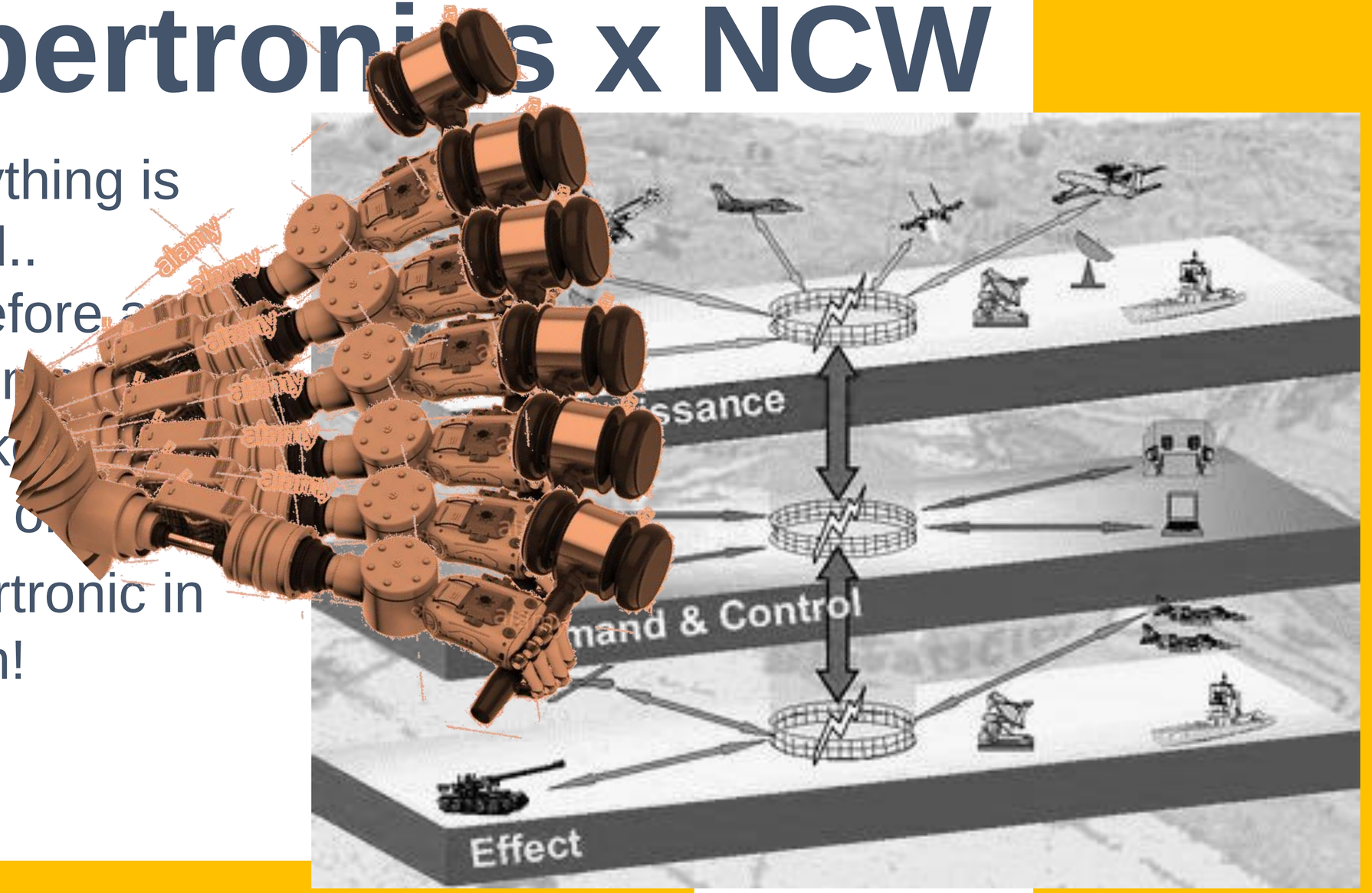




http://www.zzz.com.ru/index.php?area=articles&action=show_article&article_id=110&session_id=0

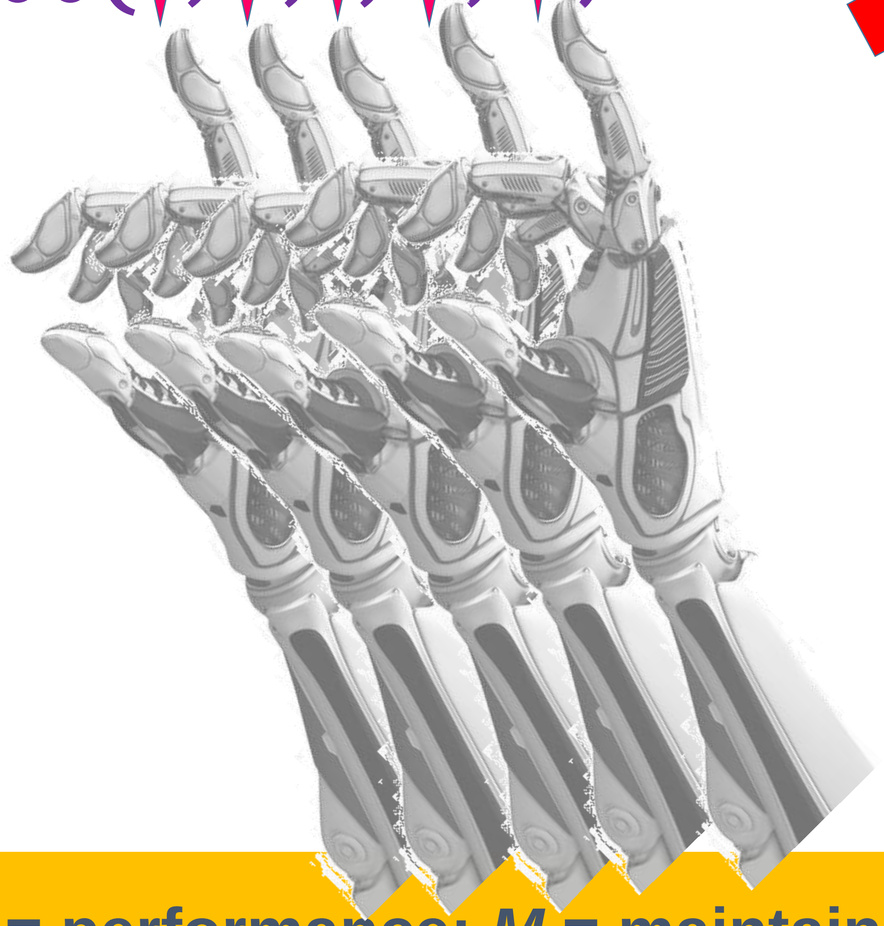
Cybertronics x NCW

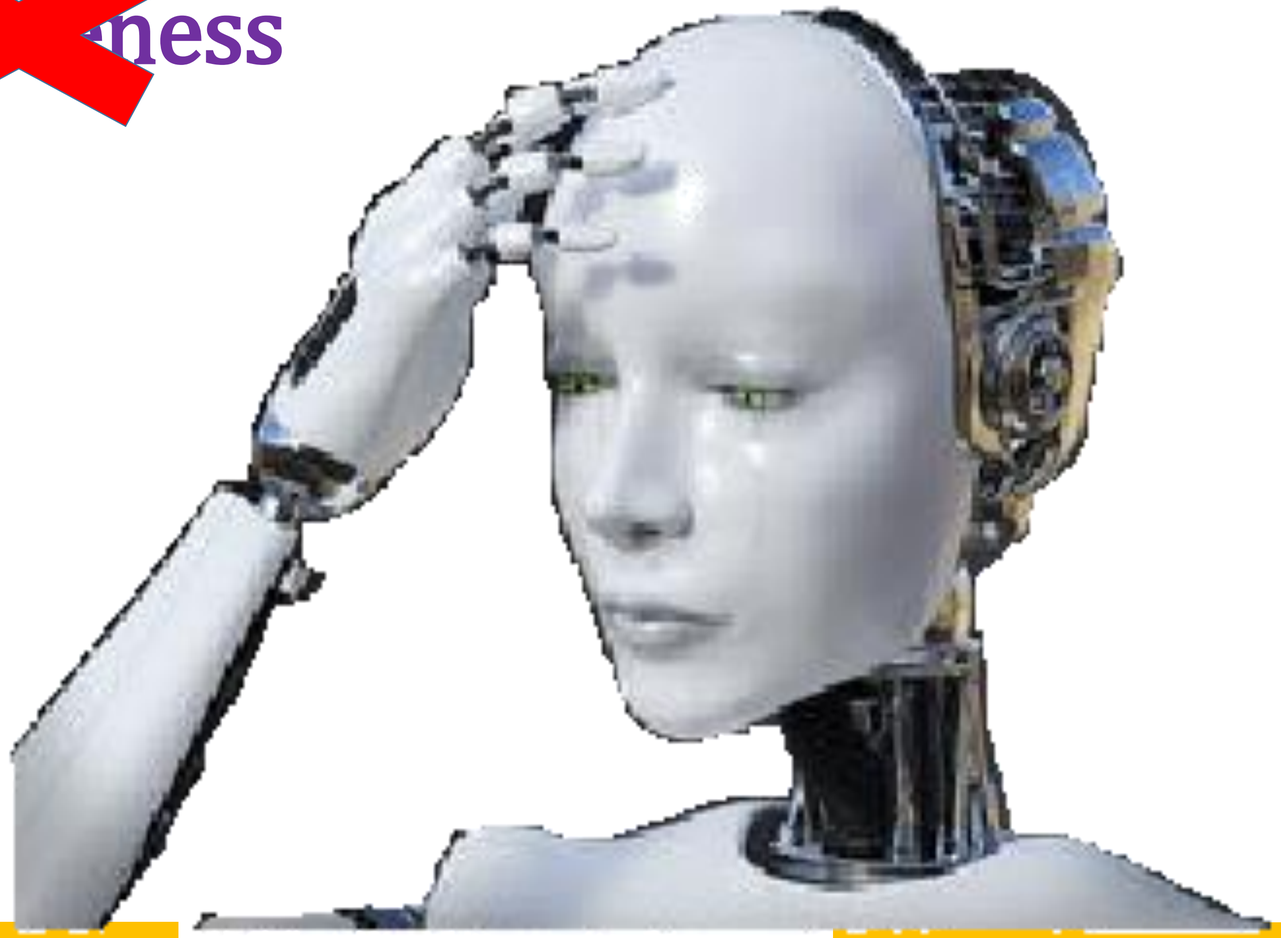
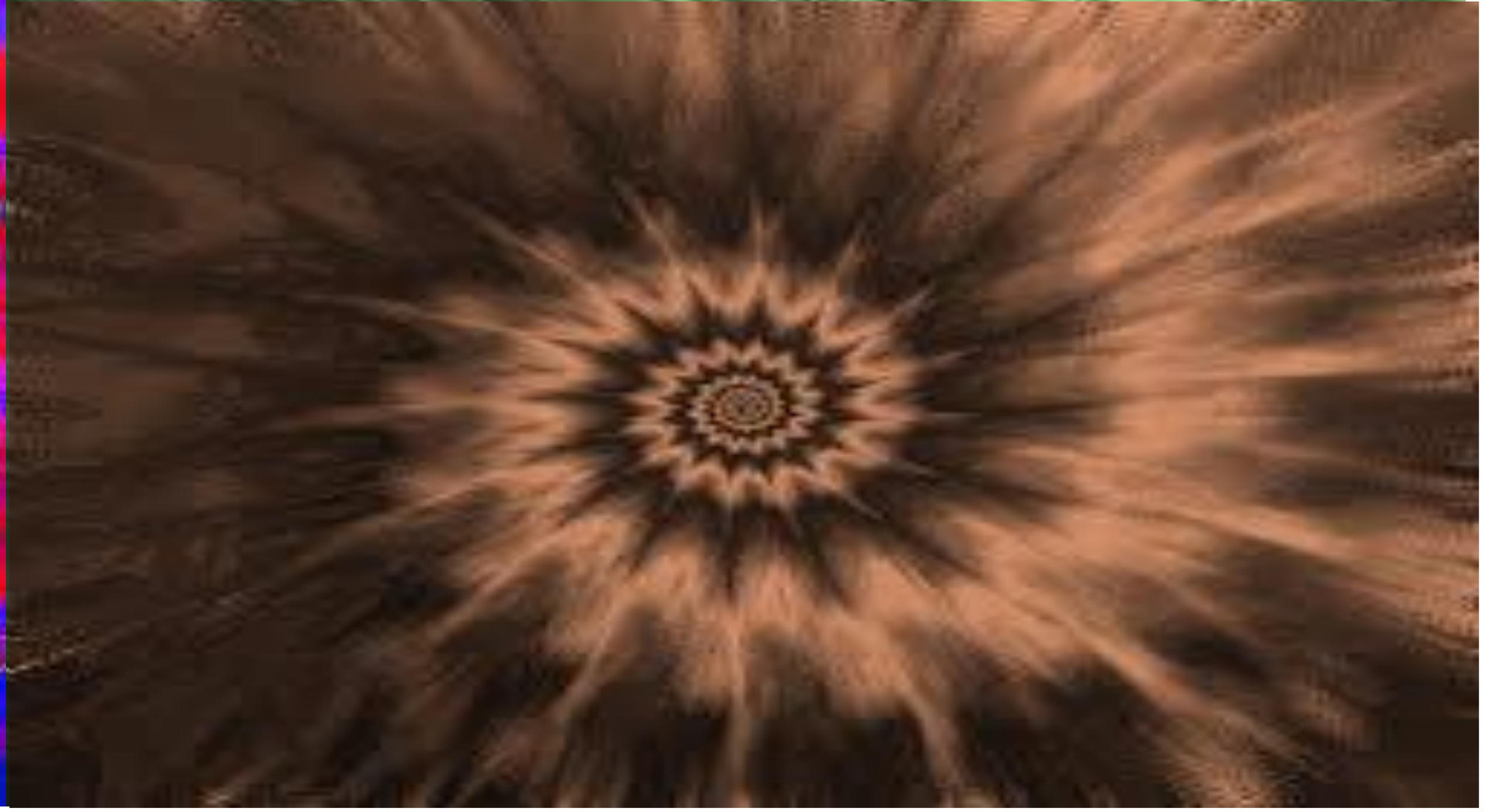
- Everything is linked.. Therefore a node m… attack… cyber o…
- Cybertronic in action!



Adm Braga's Equation

$$\cancel{\mathcal{H}(P, M, T, W, A)} = \cancel{\text{Effectiveness}}$$





P **= performance;** ***M*** **= maintainability;** ***T*** **= training;** ***W*** **= technological mastery; and** ***A*** **= appropriateness to the mission.**