



Liquid EW For Liquid Wars

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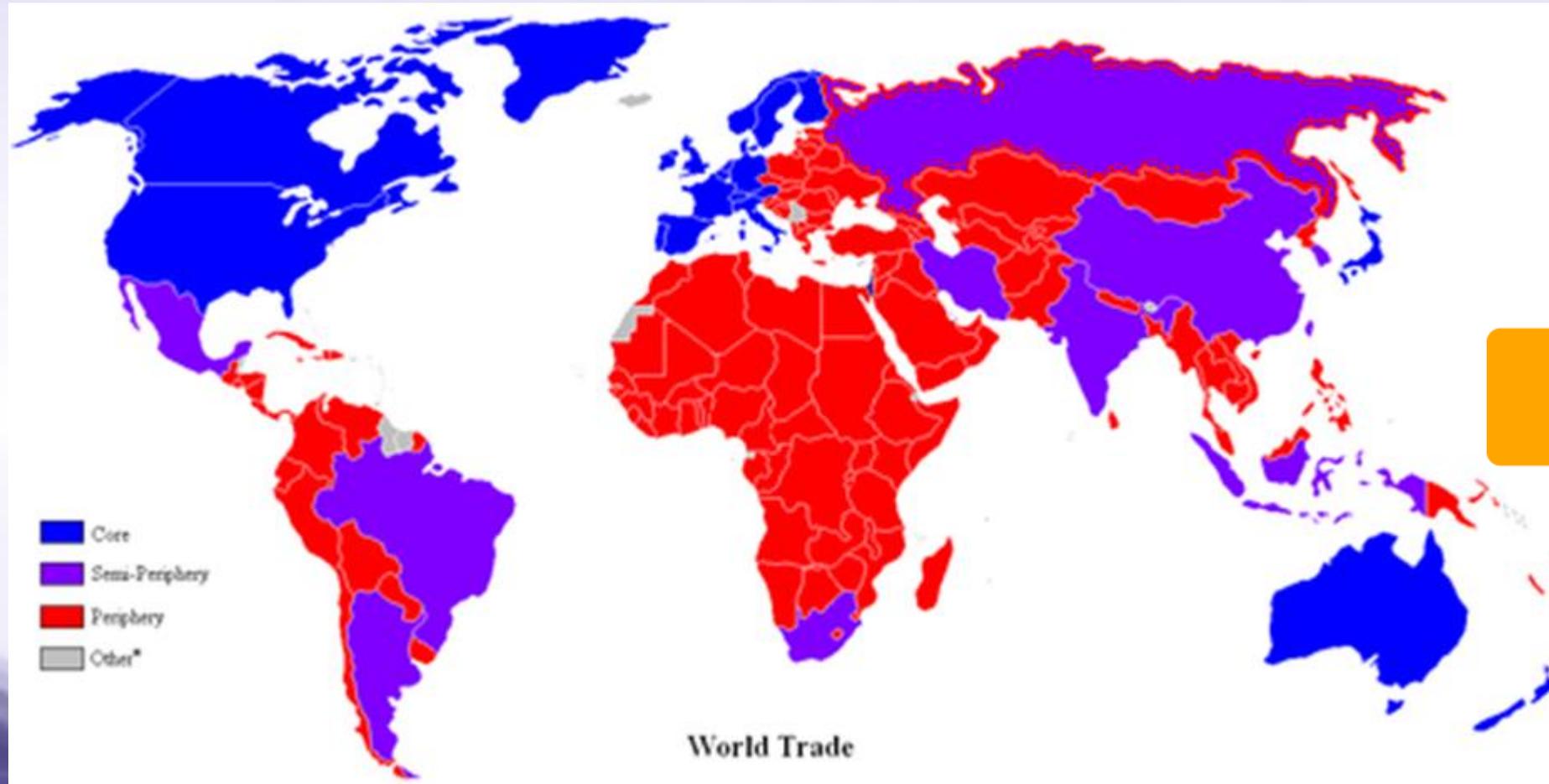
1. Introduction;
2. Admiral Braga's Equation;
3. Standing at the Periphery;
4. Modern Liquid EW; and
5. Final Considerations and Conclusions.

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1. Introduction

- What is this work all about?



1. Introduction



ZYGMUNT BAUMAN
(1925-2017)

WE LIVE LIQUID
TIMES. NOTHING
IS MADE TO
LAST.

- **Liquidity** means to be **unstable**, **time dependent**.
- **Flexibility** has replaced solidity!

1. Introduction



Alvin & Heidi Toefler: A society makes war resembles the way it makes wealth

Liquid enemies are *time dependent* and scattered. Political borders are meaningless. Their **loyalties, alliances and danger** are **time sensitive**. They will change before being defeated.

1. Introduction

- Developing countries have access to some pieces of the latest technologies, but not to a critical number of others.
- A balanced mix of late and old technologies can be a hedge both against economic and operational failures.
- Sometimes, it can be wise to use obsolete items in a creative way.



- Everyone looks for **Speed and accuracy** but these key features are not in the grasp of everyone.

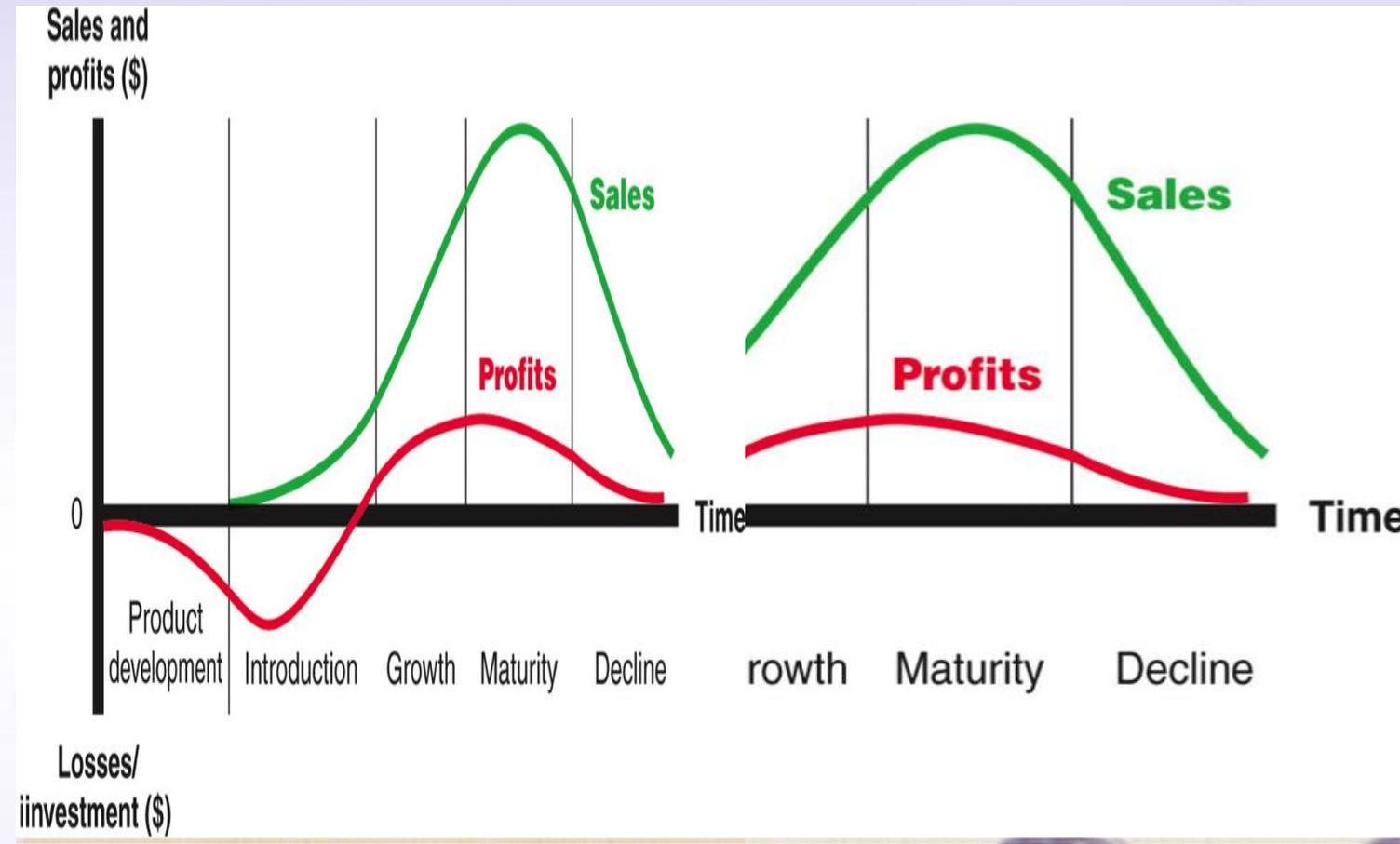
1. Introduction

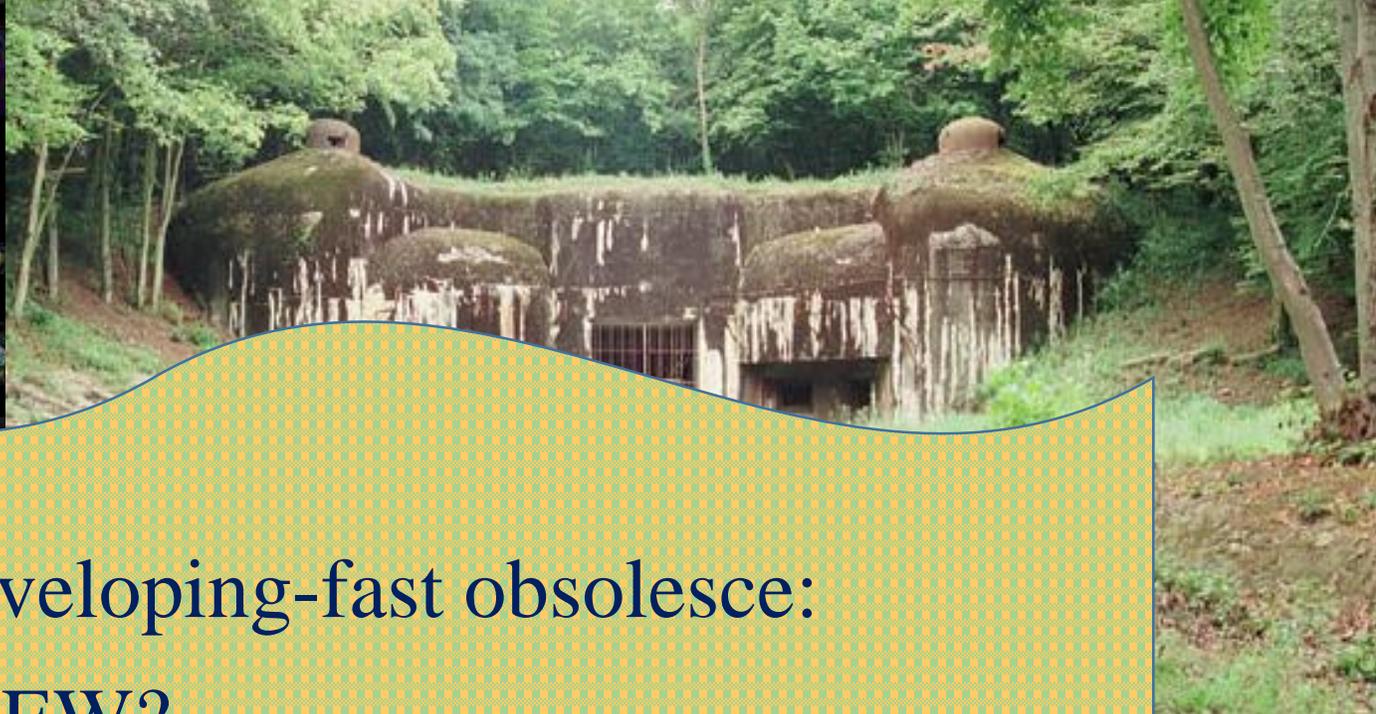
The first results make the difference!

In thesis, product lifecycles are reducing, but, in practice, they are stretched by **suitable strategy**.

Then effectiveness dilutes, and it is hard to stop it, no matter how the technology is advanced

Maturity → Profits





Thus, in times of fast developing-fast obsolesce:
What are the Trends for EW?
What can Peripheral clients do?
How Global Powers producers must deal with them?



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2. Adm Braga's Equation

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

\mathfrak{H} is a *T-norm*

Where:

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

None of these five (5) factors must go too close to zero

2. Adm Braga's Equation

Most decision make

High **performance**

To **produce** own

Technical sop

equ

technic

Low \$ → pe

High **per**

logistics

Performance





There are no frontiers at
cyber-space!
Technology Mastery is
essential!

2. Adm Braga's Equation

Sending parts to be repaired abroad → too long and too expensive;

Technical Mastery → improve and adapt → stretch lifecycles.

MTBF, **Turn-around times** are decisive to design a maintenance structure, this is an advantage for indigenous systems.

It is a mistake to take **performance** alone as the key factor to choose a system.

Maintainability seems more important!

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3. Standing at the Periphery

PESSOAL

Em 2013, o Ministério da Defesa gastou R\$51,2 bilhões com pagamento de pessoal (incluindo benefícios e encargos sociais).

INVESTIMENTO

Os gastos com investimentos (projetos de aquisições, revitalizações etc.) somaram R\$8,9 bilhões.

CUSTEIO

As despesas de custeio (voltadas à manutenção de bens e serviços) totalizaram R\$9,3 bilhões.

DÍVIDA

A dívida foi de R\$1,2 bilhão.

R\$78,8 bi

GRUPO DE DESPESAS

O orçamento do Ministério da Defesa, que em 2013 chegou a R\$78,8 bilhões, é o quarto maior do Governo Federal.

Cerca de 72% dos recursos destinam-se ao pagamento de pessoal. Pelas funções que exerce, é inerente à Defesa Nacional ter grande quantitativo de pessoal.

Aproximadamente 13% destinam-se ao custeio, e outros cerca de 13% são transformados em investimentos.

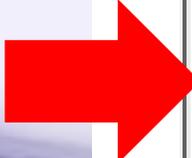
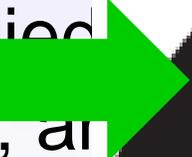
DÍvida Pessoal Investimento Custeio

Grupo de Despesa

3. Standing at the Periphery

Leading-edge worldwide (they applied Readers, and

Readers, and



	IDEATION	PROJECT SELECTION	PRODUCT DEVELOPMENT	COMMERCIALIZATION
NEED SEEKERS Identify unmet customer needs through direct feedback and strive to be the first to market with breakthrough products. Example: DeWalt (power tools)	<ul style="list-style-type: none"> Gather customer insights and analyze customer needs Segment customer base 	<ul style="list-style-type: none"> Rigorously manage return on innovation investment 	<ul style="list-style-type: none"> Design products that respond to customers' priorities 	<ul style="list-style-type: none"> Successfully launch, position, and price wholly new products
MARKET READERS Focus on incremental changes to products and use a second-mover strategy to keep risk low. Example: Plantronics (audio equipment)	<ul style="list-style-type: none"> Conduct market research Gather competitive intelligence 	<ul style="list-style-type: none"> Maintain strong process discipline 	<ul style="list-style-type: none"> Bring products quickly to market with an emphasis on increased modularity and simplicity 	<ul style="list-style-type: none"> Carefully manage product life cycle and retirement
TECHNOLOGY DRIVERS Rely on technological breakthroughs from internal R&D efforts and seek to meet their customers' unarticulated needs. Example: Siemens (engineering and electronics)	<ul style="list-style-type: none"> Scout new technologies Map emerging technologies and analyze trends 	<ul style="list-style-type: none"> Manage risks 	<ul style="list-style-type: none"> Test rigorously for quality 	<ul style="list-style-type: none"> Capture customer feedback

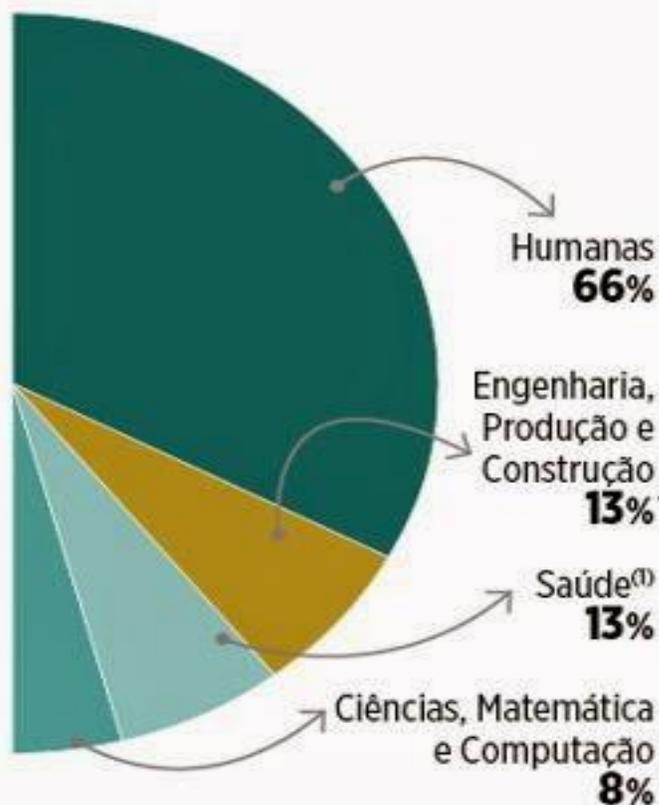
of it and that) Market

O FUNIL DA ENGENHARIA BRASILEIRA

No Brasil, há um descasamento entre a demanda e a oferta de engenheiros, considerados os protagonistas da inovação. O número de formandos até aumentou, de 18 000 em 2001 para 41 000 em 2010, mas ainda faltam bons profissionais

Na hora de escolher a carreira, apenas uma pequena parcela do 1,6 milhão de aprovados no vestibular⁽¹⁾ ingressa em cursos ligados à engenharia...

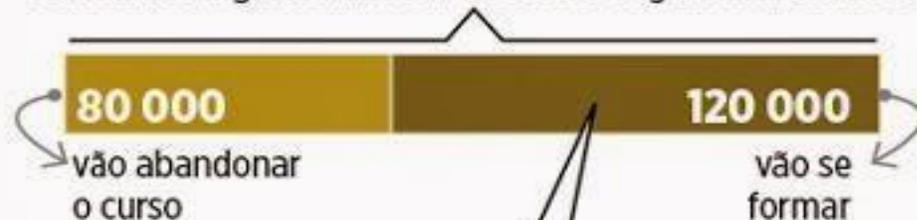
(distribuição dos estudantes por curso)



...e uma minoria vai concluir a faculdade adequadamente

200 000

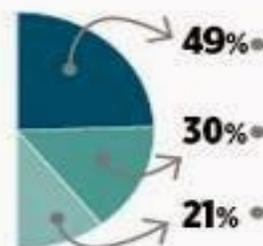
estudantes ingressaram em cursos de engenharia em 2010



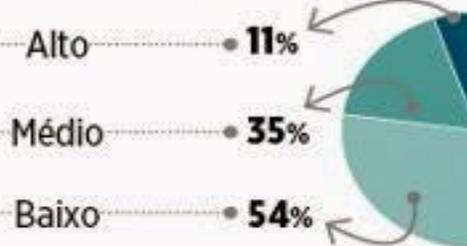
A maioria não estará preparada para o mercado

(desempenho dos formandos por tipo de instituição)

Faculdades públicas
49 000 estudantes



Faculdades privadas
71 000 estudantes



Ao final de cinco anos, apenas

32 000

terão desempenho adequado para o mercado

Ou seja, 16 de cada 100 estudantes estarão preparados para o mercado brasileiro

● Profissionais qualificados, em 100

BRASIL • 16

Mas um número menor estará apto para atender aos padrões do mercado internacional, que são mais exigentes

● Profissionais qualificados, em 100

China • 10

BRASIL • 13

Índia • 25

Hungria • 50

3. Standing at the Periphery

Thus, **top** **innovative** projects
However → **P**
Local smaller
help to build a
Partnerships
startup enterpr
brains.



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4. Modern Liquid EW

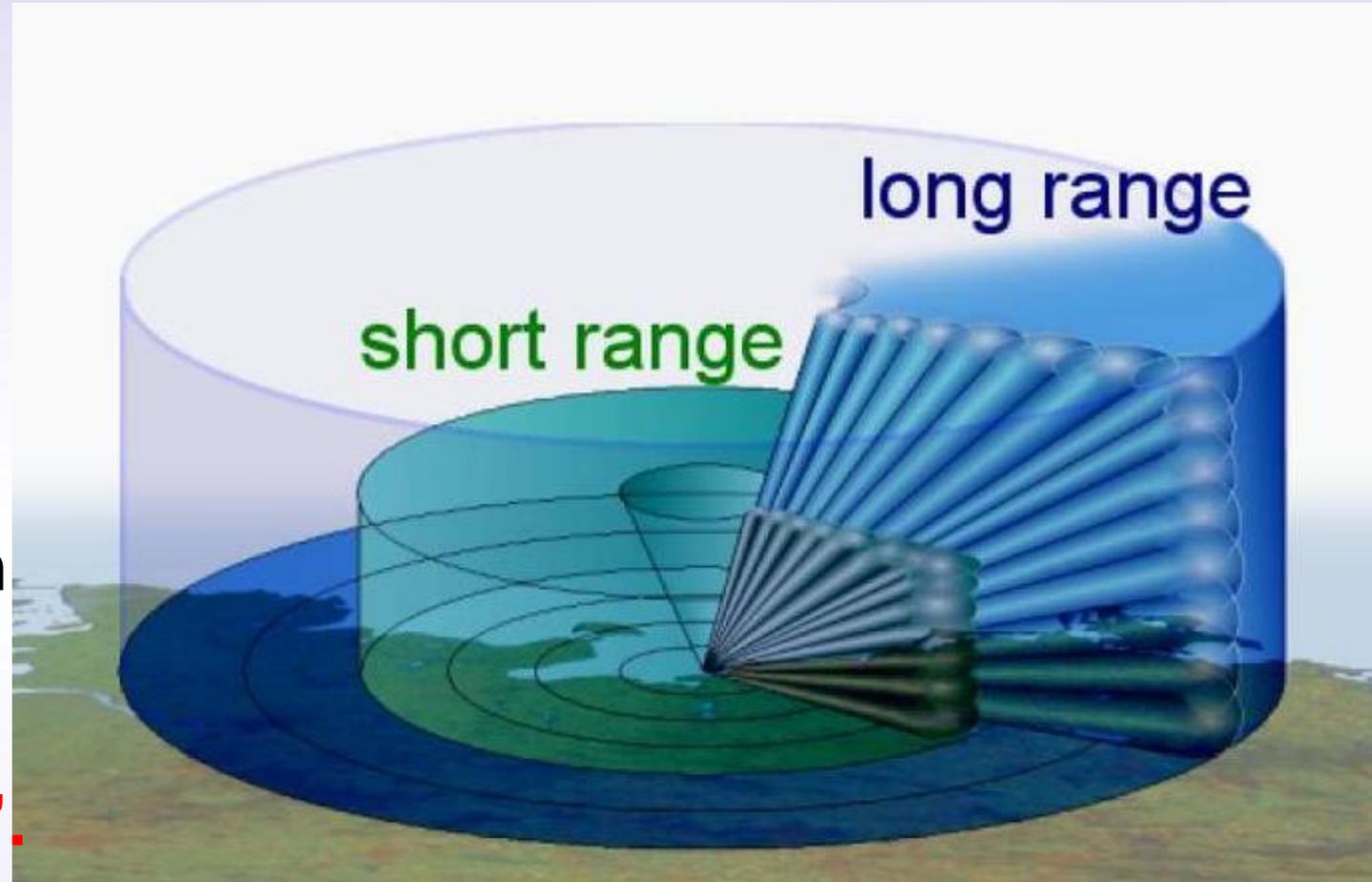
- **Liquid strategies** → objectives and missions are **fluid**.
- **Gamification** seems to be the best solution for planning.
- Gamification is understood the use of game theory to improve knowledge about something. **Correct game model** → **good situational awareness**.
- This will be the **main EW and IW contribution** to the conduction of **liquid wars**.



4. Modern Liquid EW

Traditionally, ES → search for, intercept, identify and locate emissions for the purpose of threat recognition, targeting planning and conduction of future operations.

In *liquid* environments, emission identification is running into obsolescence, and replaced by leveling the emissions “**danger**”.



4. Modern Liquid EW

Now, it is more important to understand technologically what kind of information the emission intends to collect and the enemy's intention.

The focus will lay on strategic interaction (players recognize the mutual interdependence of their decisions).

Liquid ES systems must, then, **analyze the EM environment and unveil, most of all, the enemy strategy**. Thus, **AI techniques** becomes attractive.

Peripherals can do this....

4. Modern Liquid EW

Swarms of Small Platforms

Strategy identified systems, but Van Creveld for **extincted**. Their use destroyed. The survival of these forms will be highly related to EW. In contrast, **missiles, small drones and all kind of unmanned platforms** (UAVs UUVs, ULVs, etc) will be massively employed.

rate of *liquid* EW action times. **will be progressively** a conflict or be

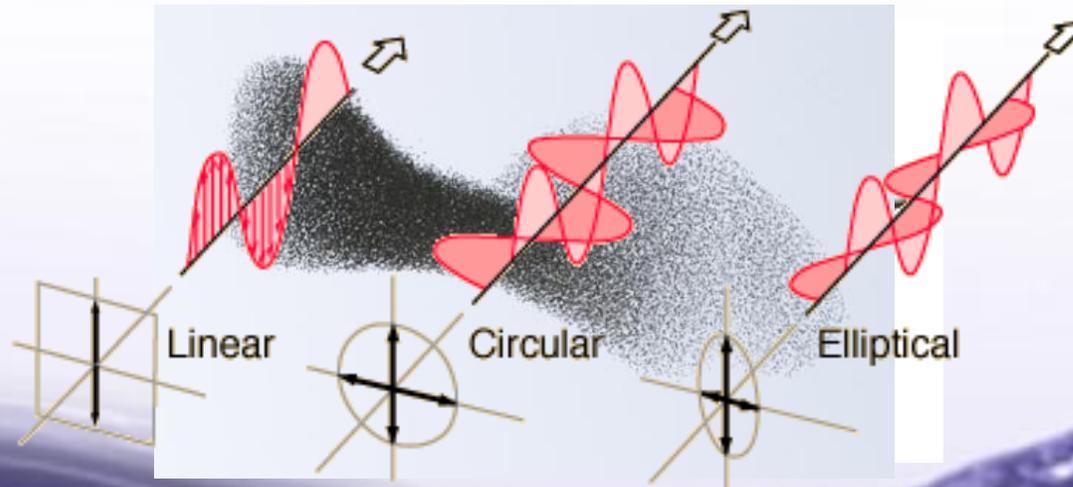


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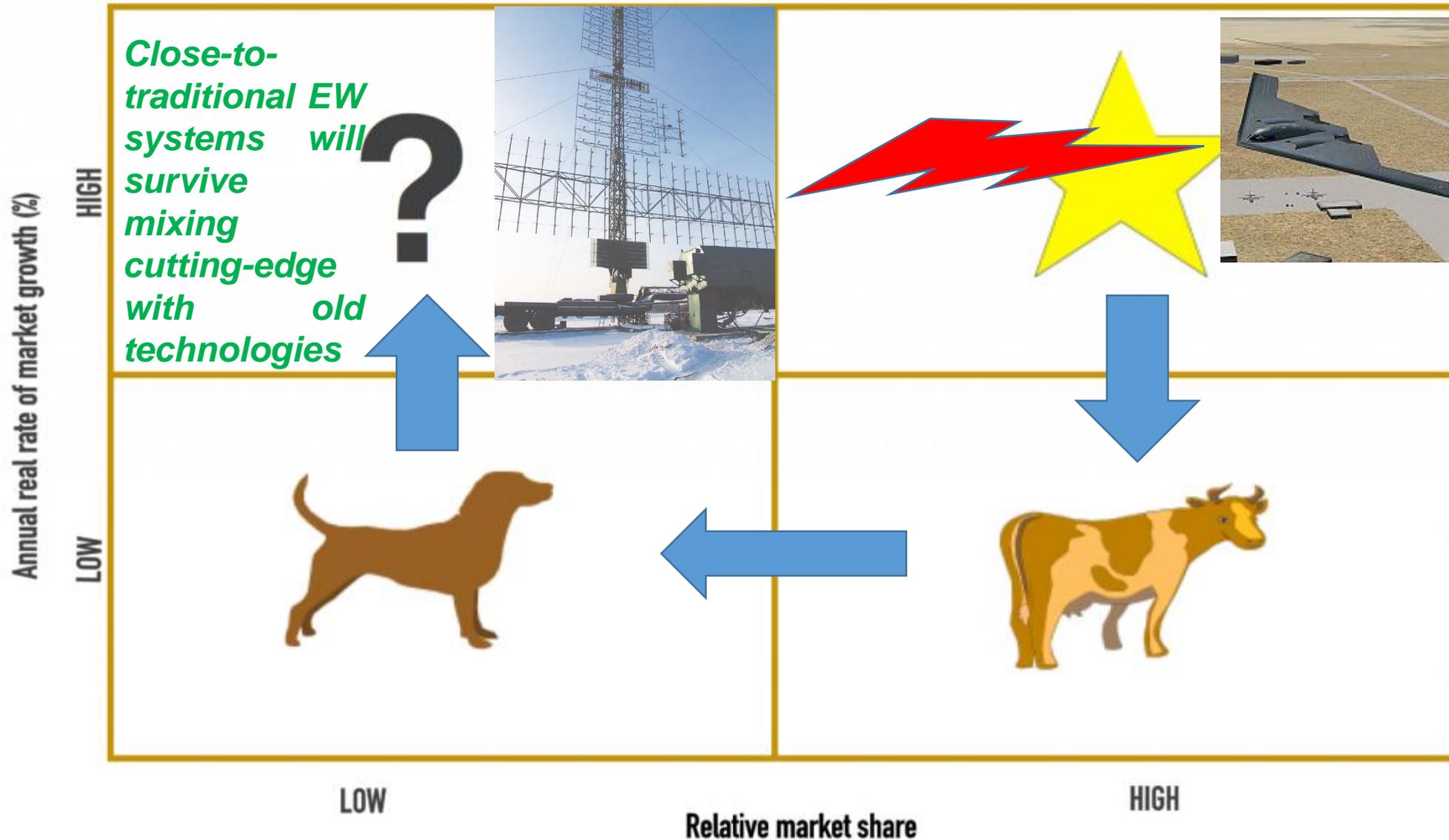
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5. Final Considerations and Conclusions

Uncertainties will be the key point of *liquid wars*



5. Final Considerations and Conclusions



5. Final Considerations and Conclusions



It's high Tech, but I feel no Quality

You need local help!

5. Final Considerations and Conclusions

To this
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Thanks!

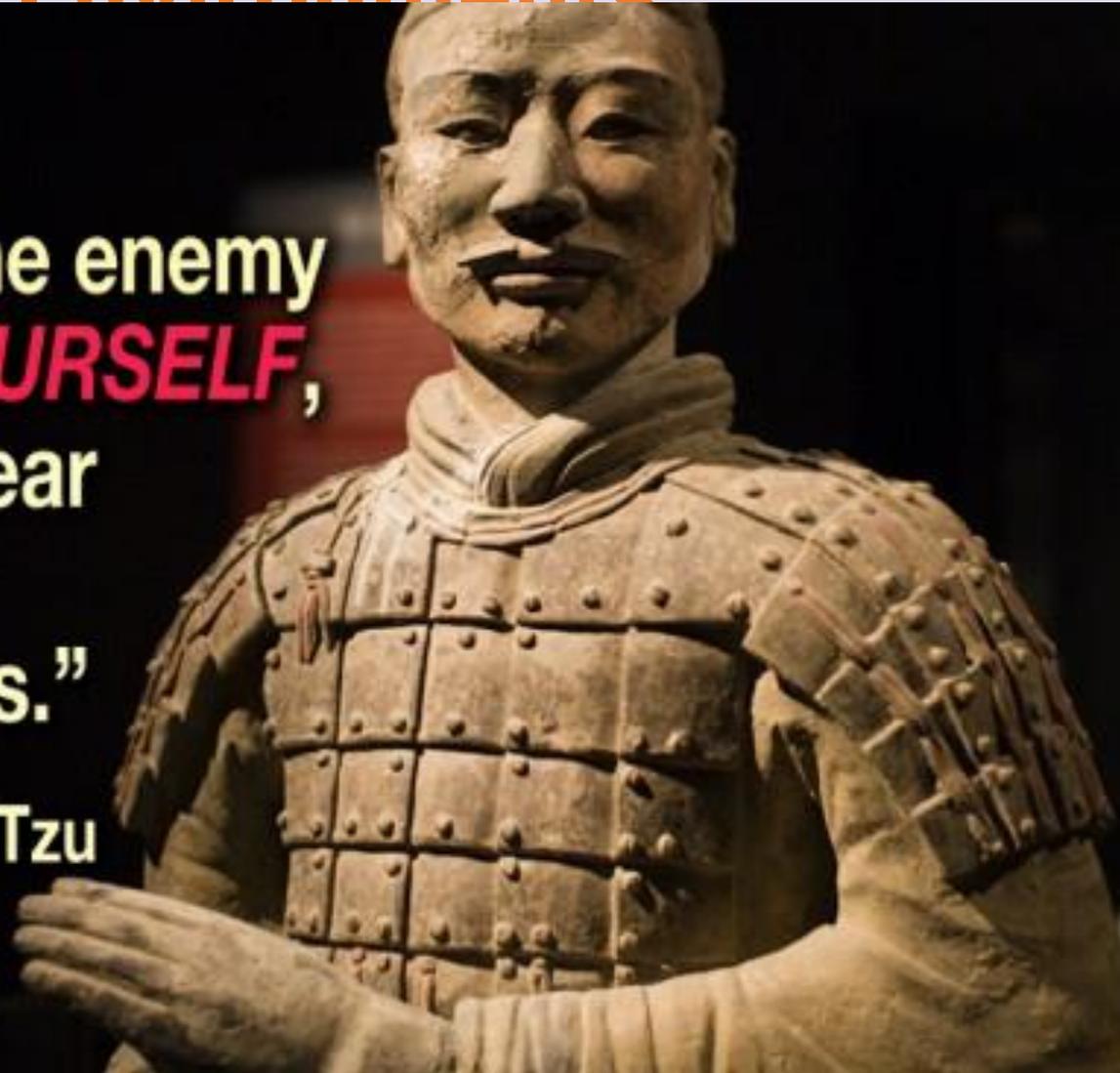
Contacts: admacedof@iee.org
jrrtalves@gmail.com

4. Liquid EW in Liquid Operational Environments

- **Nash** game.
- **situatio**
- It is a r they ca the oth react.
- **Unreal**

“If you know the enemy and **KNOW YOURSELF**, you need not fear the result of a hundred battles.”

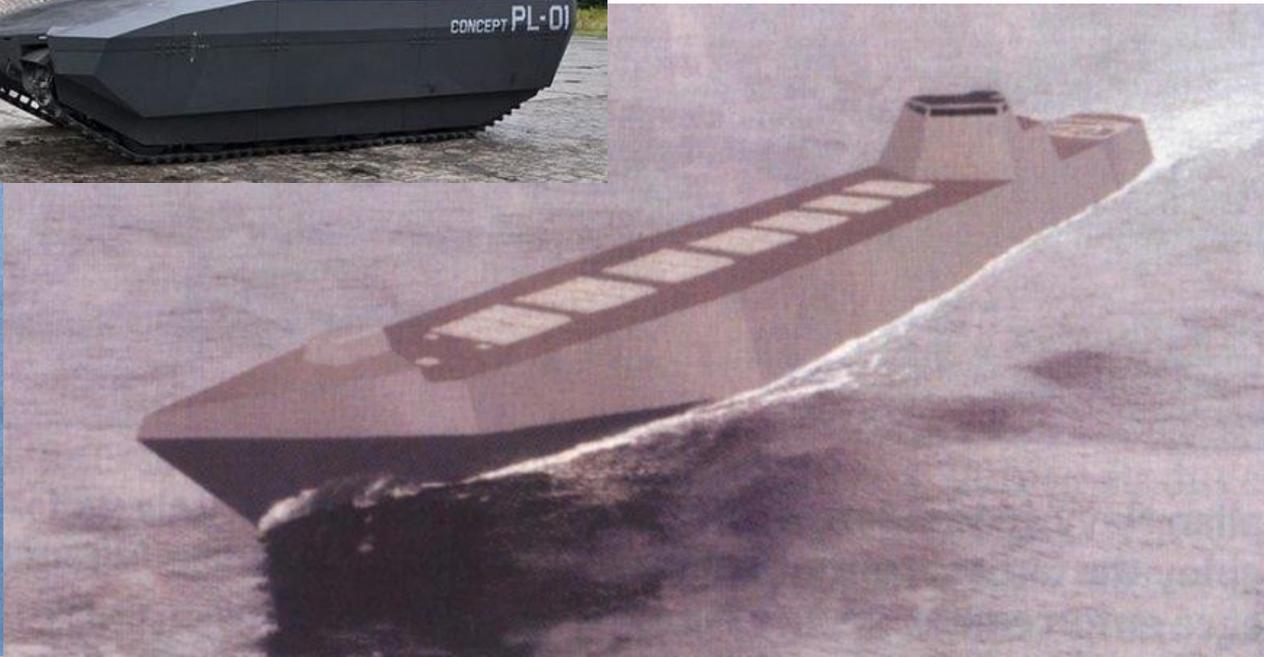
~ Sun Tzu



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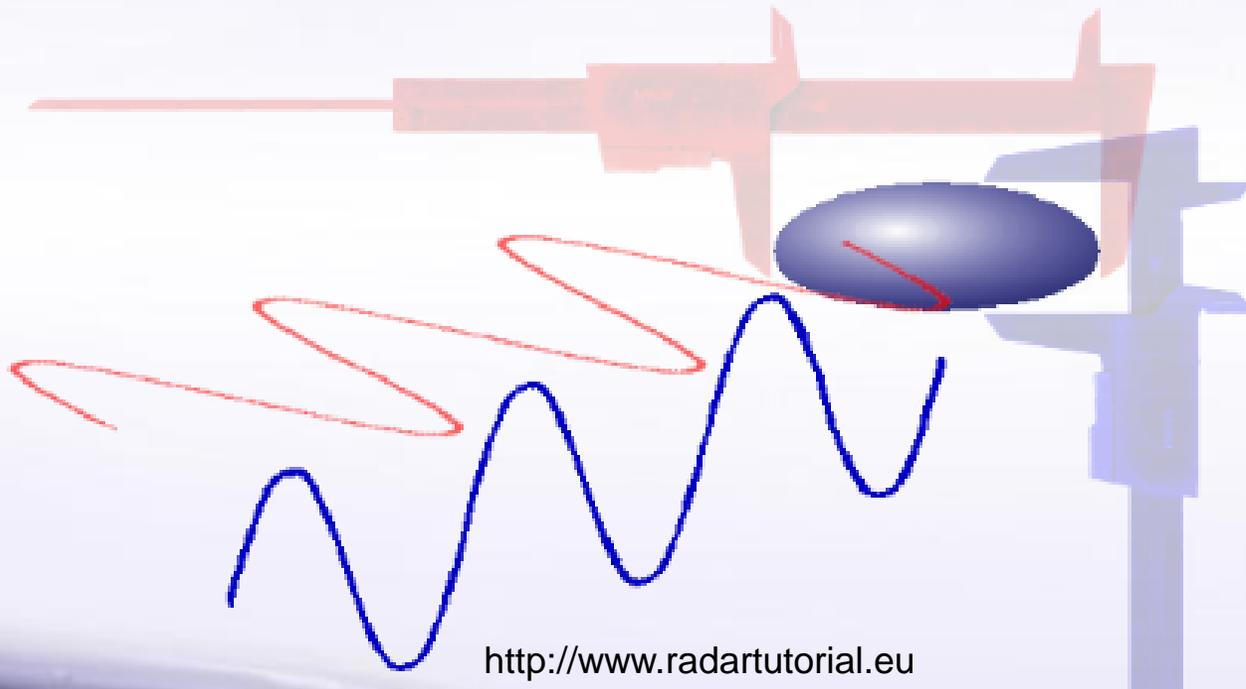
4. Liquid EW in Liquid Operational Environments

Fast, small and low RCS ships and aircrafts will be intensively used to gather in-time intelligence. Their cost will be much lower than missiles, thus they become non-economic targets. However, missile costs will have to come down....



5. Liquid EW in Liquid Operational Environments

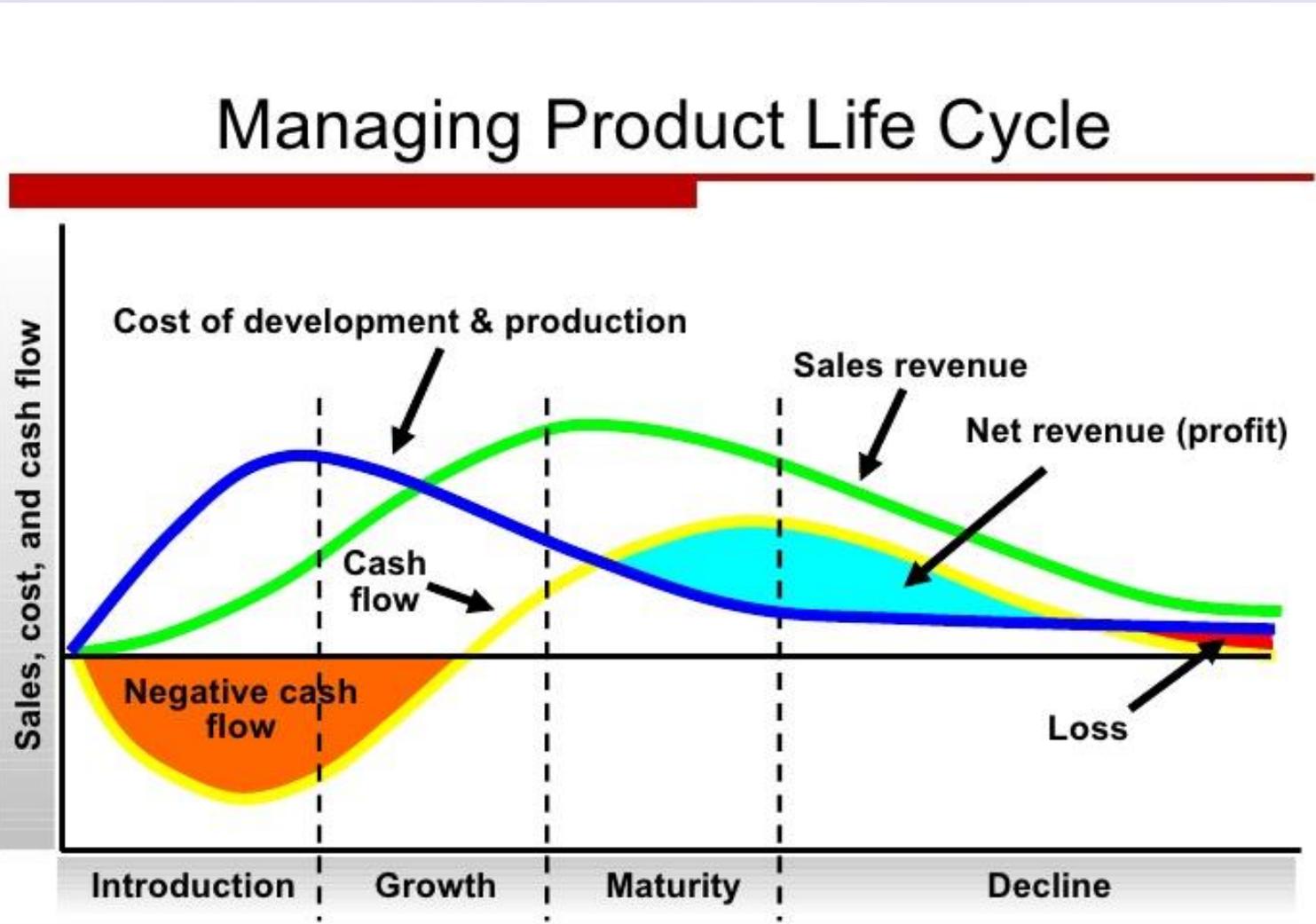
New *materials* and *3D printing* will soon give birth to *adaptive RCS* platforms in terms of *frequency and polarization*. That is polarization will become an important parameter to be measured in *Liquid ES*.



<http://www.radartutorial.eu>

5. Liquid EW in Liquid Operational Environments

The *life cycle*
After they
However,
liquid EV
Therefore
to propos



ards obsolesce.
he time. Thus,
new features.
to be done is

4. Liquid EW in Liquid Operational Environments

IW merges with EW → *nerds* in the Armed Forces.

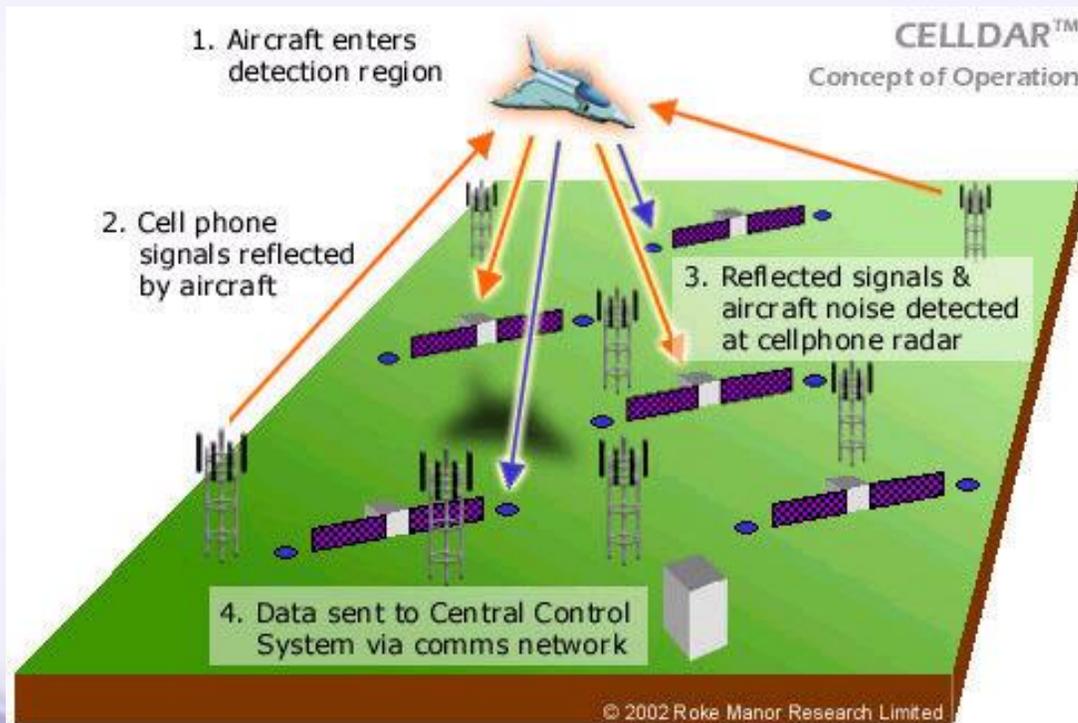
They are the ultimate *liquid warriors*.

At this point, a question arises: *Are the Armed Forces, in fact, prepared for nerds?*

They have their own objectives, are poorly disciplined (at least in the usual sense), their loyalty is fluid, and, usually, consider challenges more appealing than money. They face life in a radically different form and with different values than the traditional military man.

4. Liquid EW in Liquid Operational Environments

Anti-stealth radars using commercial cell-phone infrastructure, as the **Celldar**®, which are quite *liquid* in its essence, may become more popular.



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



4. Liquid EW in Liquid Operational Environments

Skilled and trained warriors or technicians are expensive.

Fortunately, they will not need to be in the front line anymore.



4. Liquid EW in Liquid Operational Environments

Thus, *the role of ES is vital in liquid wars.*

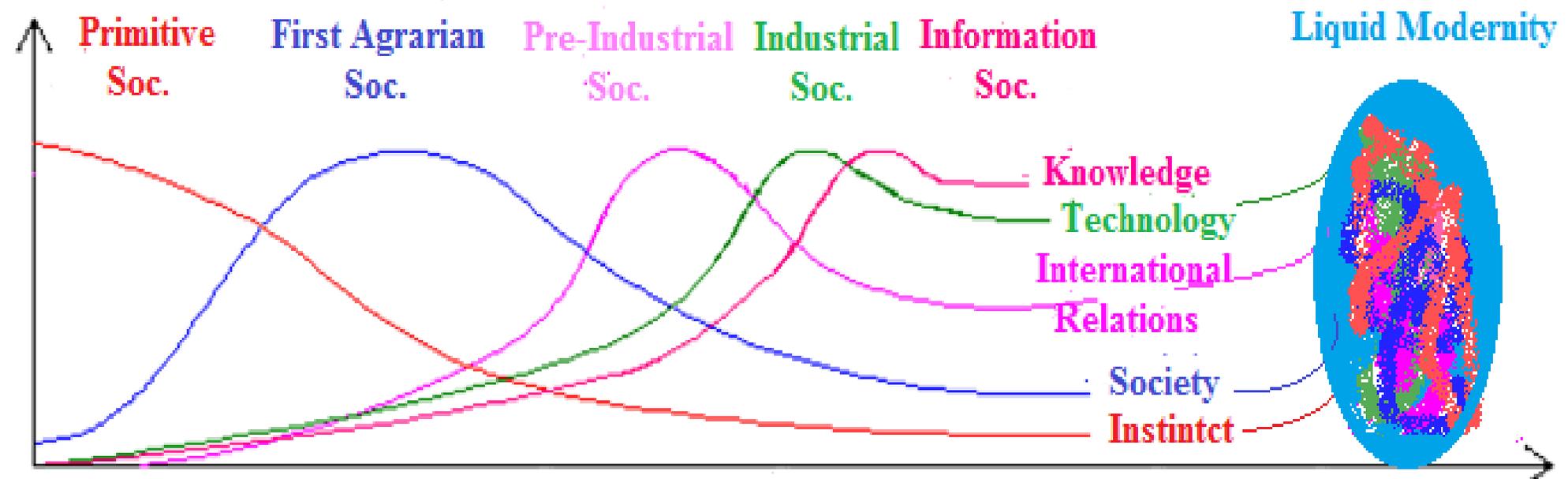
However, in localized conflicts, one will find in both sides emitters constructed by the same manufacturers.

Thus, the *transmission modes will be tailored to match the needs of the force to which it belongs.*

If this is done by the manufacturer, he will gain the power to unbalance the force scale.



(Level of Influence)

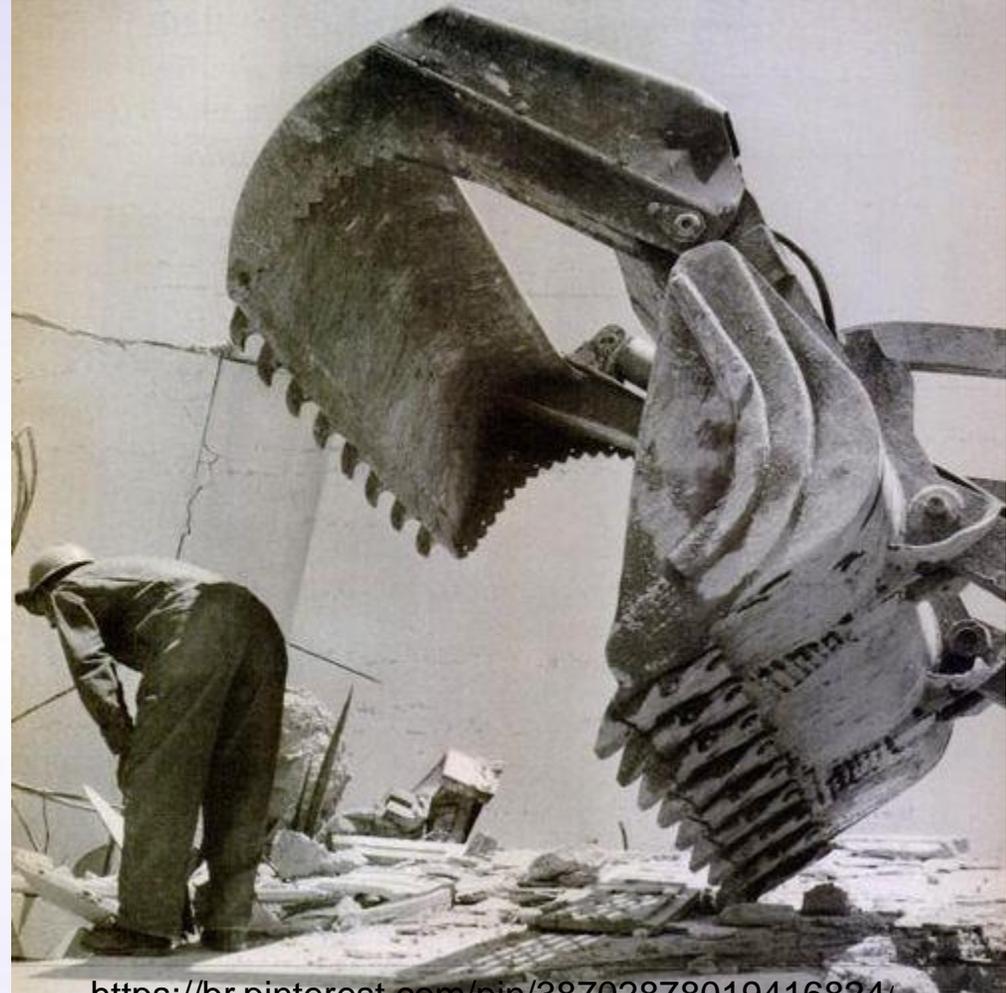


Primitive Wars First Agrarian Wars Pre-Industrial Wars Industrial Wars Information Wars Liquid Wars



4. Liquid EW in Liquid Operational Environments

- Uncertainties in the situation awareness will blur the created models. However, acting with speed, making suitable pressure on such gravity centers and well-done negotiation assertiveness will lead to an advantageous position.



<https://br.pinterest.com/pin/38702878019416824/>

6. Final Considerations and Conclusions

The 3.5 questions quiz for the next war:

1) *Who will be the next war enemy?*

It doesn't matter. We will know it when it begins;

2) *Where will next war be?*

It doesn't matter. We will know when it begins.

3) *What will be the next war weapons and systems?*

It doesn't matter. We can use everything or nothing.
We will know them when the war begins.

6. Final Considerations and Conclusions

The 3.5 questions quiz for the next war:

3.5) *How must we think during the next war?*

Oooops!!! This is the tricky question!

We can start learning how to think, and what to learn right now.



6. Final Considerations and Conclusions

Not only criminals and terrorists, but security forces as well, will violate the privacy in telecommunications. Intelligence will be gathered from data obtained by any possible on-line activity such as credit card use, cell phone localization, social networks posts, etc.

Peripherals can do this...



6. Final Considerations and Conclusions

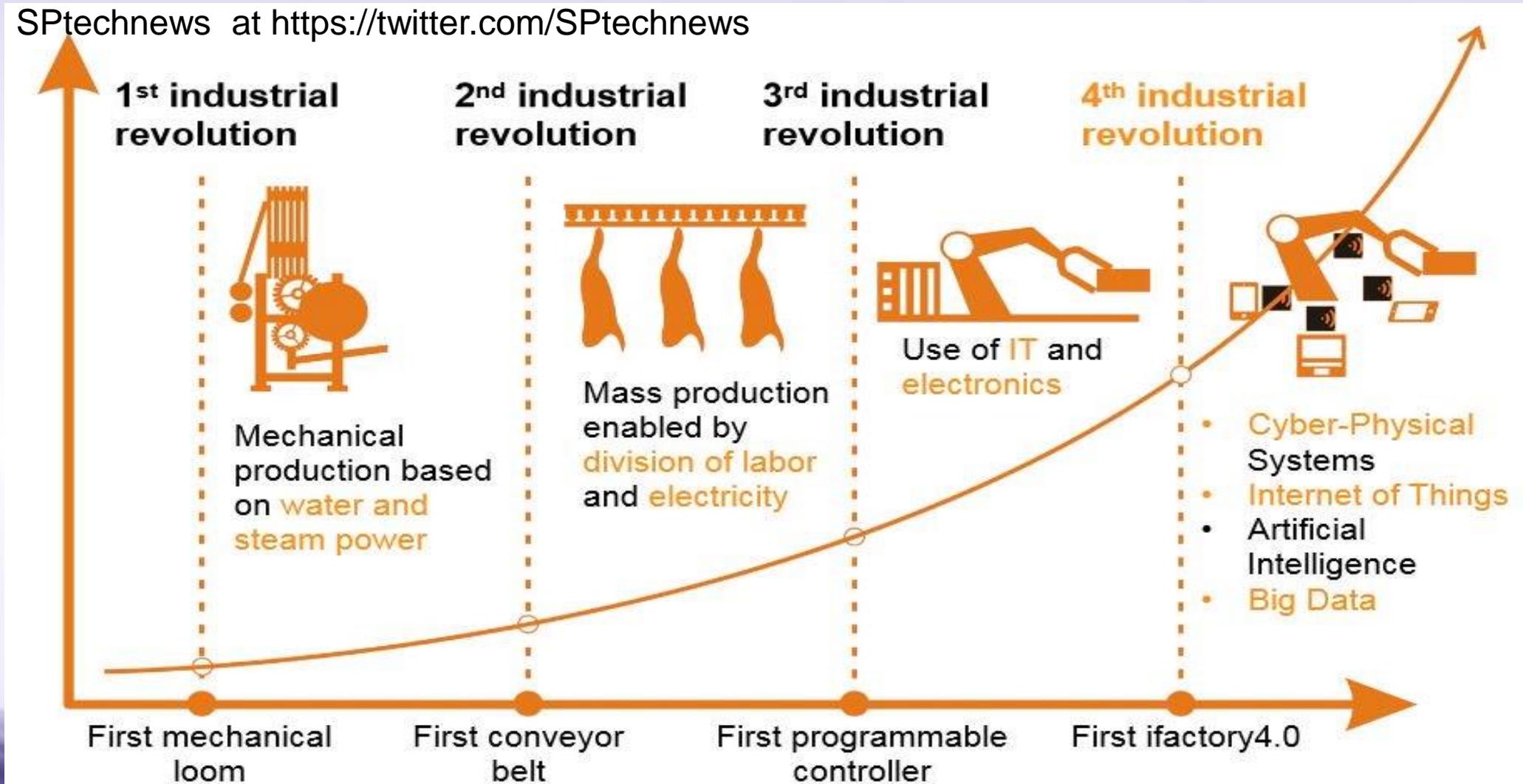
There will be too much data, and the actors will have to undertake some risks. Any *strategy* will rely on what are the *acceptable risks*.

EW and IW will somehow merge and give rise to a new generation of systems, covering wide bands and with powerful processing. *Close-to-traditional EW systems will survive mixing cutting-edge with old technologies*

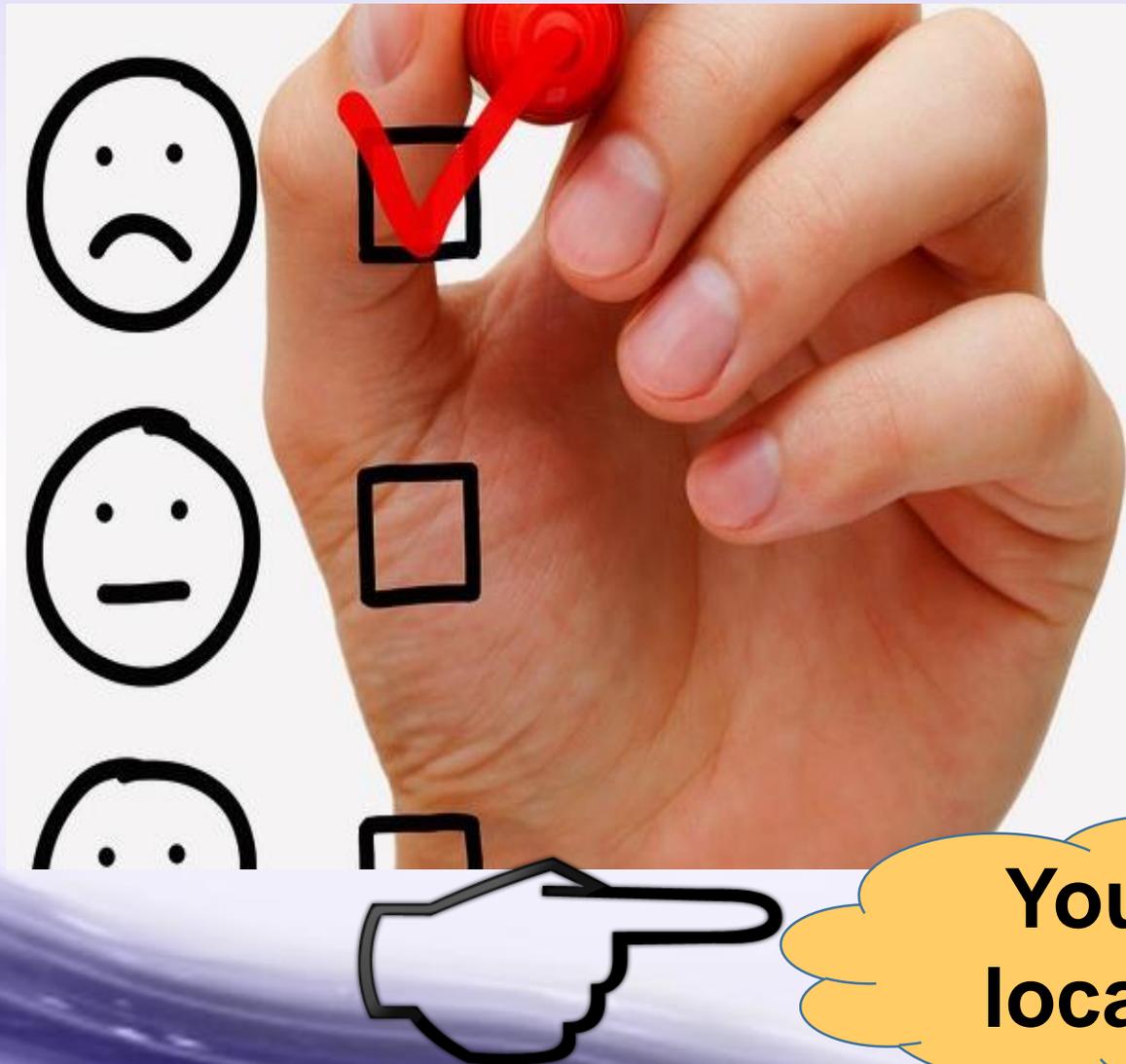


3. Standing at the Periphery

SPtechnews at <https://twitter.com/SPtechnews>



6. Final Considerations and Conclusions

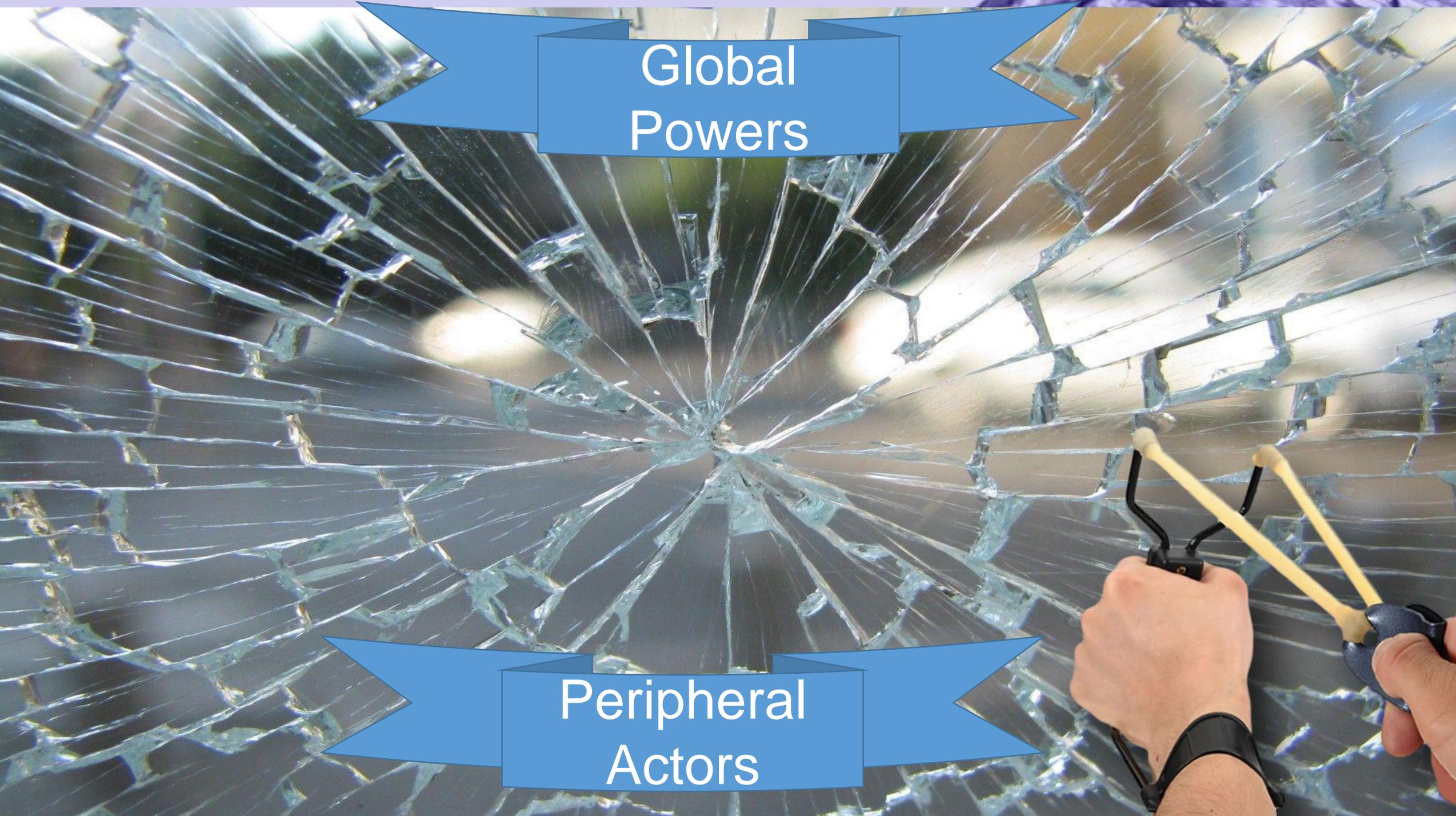


Compel products and maintenance structures beyond client's level of development is to deny them to get the most of the system.

Penalty: If the customer doesn't feel quality in what he buys, never mind how high-tech and innovative it is, a second business will not be closed.

**You need
local help!**

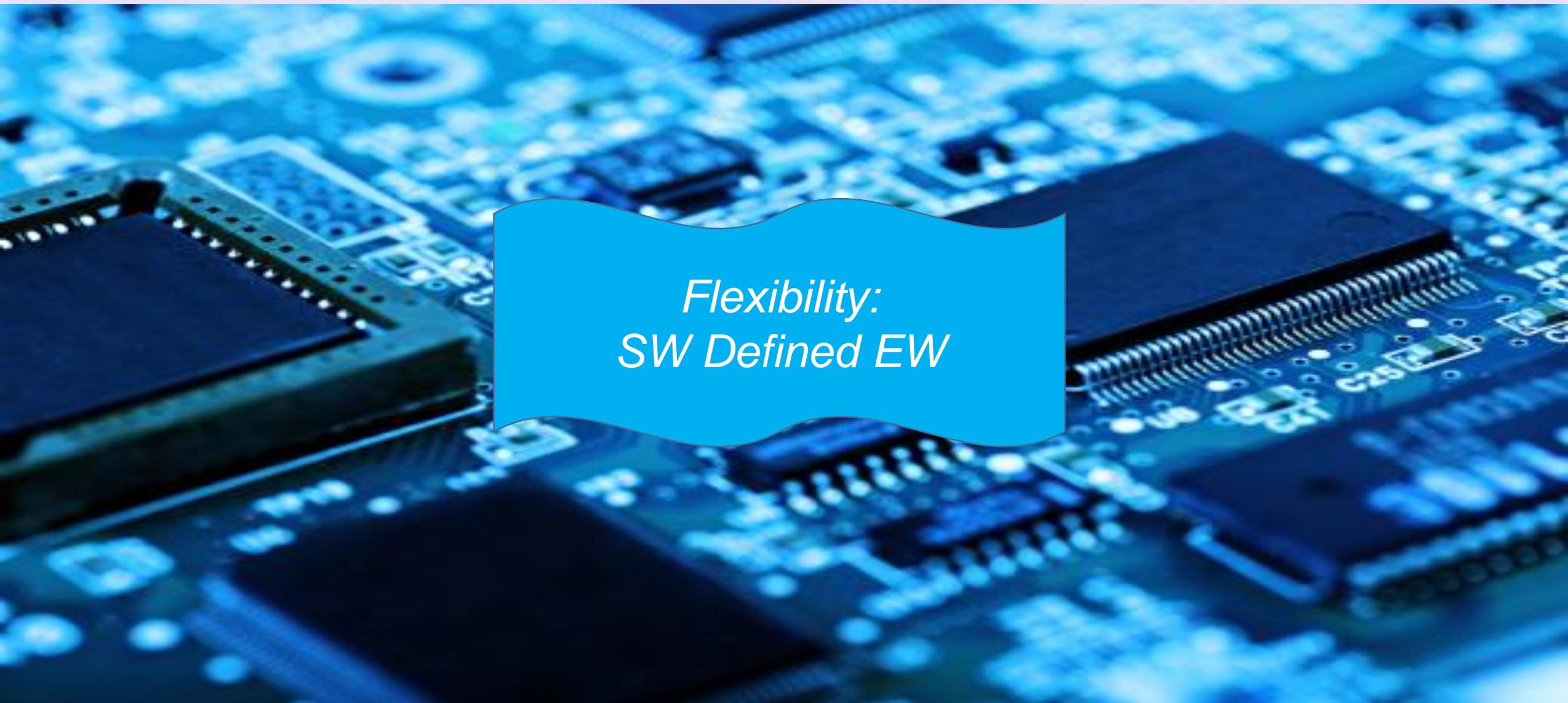


A hand is shown using a hammer to smash through a pane of glass. The hammer is positioned on the right side of the frame, with the head of the hammer striking the glass. The glass is shattered, with many sharp fragments and a large crack radiating from the point of impact. The background is a blurred indoor setting with lights. Two blue banners are overlaid on the image: one at the top and one at the bottom. The top banner contains the text "Global Powers" and the bottom banner contains the text "Peripheral Actors".

Global Powers

Peripheral Actors

4. Modern Liquid EW



*Flexibility:
SW Defined EW*

4. Modern Liquid E

- **Liquid strategies** → objectives are
- **Gamification** seems to be the best
- Gamification is understood the use of game mechanics about something. **Correct game m**
- This will be the **main EW and IW** of **wars**.



		MARY strategy		
		Rock	Paper	Scissors
JOE strategy	Rock	(0, 0)	(-1, 1)	(1, -1)
	Paper	(1, -1)	(0, 0)	(-1, 1)
	Scissors	(-1, 1)	(1, -1)	(0, 0)

