

**Innovation and systems engineering**

**After the economic crisis**

**in the 21st century**

contact: [eric.verhulst@altreonic.com](mailto:eric.verhulst@altreonic.com)

[www.altreonic.com](http://www.altreonic.com)



**Every crisis is an opportunity**

From Bakunin to Schumpeter:

**“Creative Destruction”**

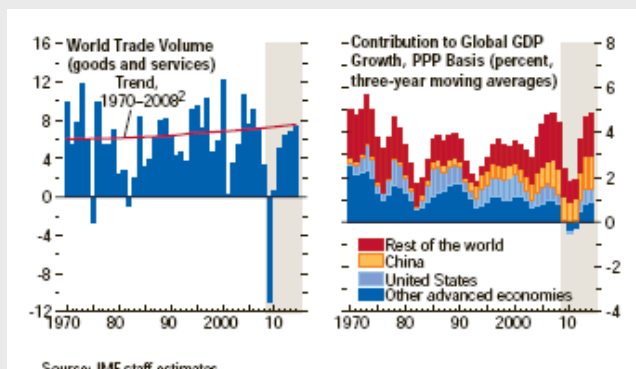


# Who's Altreonic?

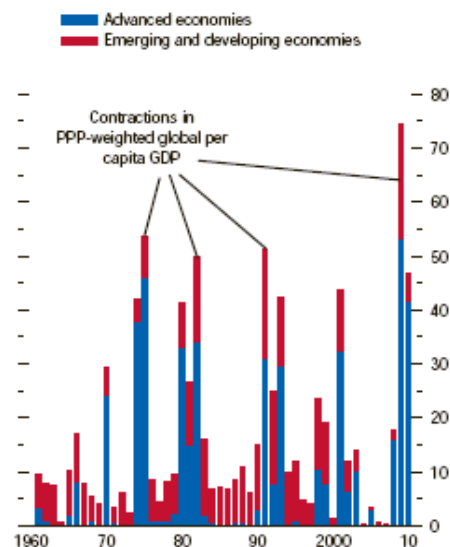
- Eonic (Eric Verhulst) : 1989 – 2001
    - Parallel RTOS Virtuoso (=> Wind River Systems)
    - Formally rooted in CSP (Hoare): “pragmatic superset of CSP”
  - Open License Society: 2004 – now:
    - R&D on Systems and Software Engineering
    - Unified Semantics & Interacting Entities
    - Formally developed network-centric OpenComRTOS
    - Supporting methodology from requirements capturing, over modelling and formal software to processing modules
  - Altreonic: 2008 – now
    - Commercialises and develops OLS results
    - HQ close to Brussels, Development group in Ukraine
- => **Systems thinking**



## Historical data IMF



Countries Experiencing Recessions<sup>1</sup>  
(Purchasing-power-parity (PPP)-weighted percent of countries)



- Economic crisis will last 2 to 3 years
- Current crisis is deeper:
  - structural reasons
  - credit expansion rather than value creation
  - over consumption and over production of less valued goods



# What not to do?

- Crisis is rooted in USA post 2001 policy
  - Extreme low base rate of FED
  - Housing bubble
  - + criminal schemes of money creation
  - Pyramid schemes
  - World has become global
- The remedy is not to create another money bubble
  - Value = capital
  - Capital and money are not the same



# What to do?

- Create value that has a future
  - New technologies
  - Energy and resource efficient
  - Develop and produce, not just assembly
- Needed:
  - Entrepreneurship: culture + personality
  - Innovation: culture + personality
  - Capital: still available but risk avoiding
  - Labour: a lot of unused capacity



# Should governments help?

- Cars = steel and coal anno 2009 ?
- No sense to keep world-wide overproduction going
- Recover know-how and labour skills
- Invest in the future
- Two domains:
  - Mobility platform: not based on fossil oil but scalable solution
  - Energy: not based on fossil fuel



## Example 1: Mobility (1)

- Mobility should not be confused with the transport modus
- Mobility need is universal
- Is not: more trains, more cars, more buses, ...
- But:
  - Door to door, decentralised
  - Seamless connection of different transport modi
  - Factor of efficiency, not of waste



## Example 1: Mobility (2)

- How:
  - What if a generic mobility and modular “platform” could change its transport mode while moving ?
  - As a small car for local transport, as a train for longer distance?
- It is a matter of time anyway
  - (Semi)-electrical vehicles (already exist!)
    - Automated cargo transport (incl. tunnels, not roads)
    - Semi-automatic persons transport
  - Develop standardised scalable moving platform
  - Adapt infrastructure
  - Competitive advantage in the economic sense



## Example 1: Mobility (3)

- Possible platform:
  - Electric motors in wheel, high torque
  - Minimum module is 2 wheels!
  - Design it as “modules” for scalability (2 pers, 5 pers, cargo, ...)
  - Solves many issues
    - Drive by wire becomes fault tolerant
    - No transmission losses
  - Put electronics in chassis
    - Reduced cable harness
    - Use high speed busses
- Power:
  - Battery packs, for exchange or charged at home
  - Small Wankel or Stirling motor for “off-road” use and emergency
- From 3-wheelers to trucks
- Automatic “train-forming” using adaptive sensors on highways for high speed (200 km/hr).



# A few examples



See other examples:

[http://www.ted.com/index.php/talks/shai\\_agassi\\_on\\_electric\\_cars.html](http://www.ted.com/index.php/talks/shai_agassi_on_electric_cars.html)

<http://www.hybridcars.com/>

<http://www.zapworld.com/>

<http://www.teslamotors.com/>



# It is already happening

- Hybrid cars are paving the way, but are an intermediate solution
- Daimler bought 10% shares of Tesla Motors
  - Tesla car:
    - Faster than a Porsche
    - Comparable range
    - If charged by small Wankel-engine: < 3 l/100 km
- UK Uni St Andrews
  - Developed prototype of carbon based battery
  - Potentially 10 better than Li-On
  - Cheap, doesn't use Lithium



## Example 2: Energy

- Fossil fuel  $C_xH_yO_z$  is over its peak
- Bio-fuels not a solution, on the contrary
- CO<sub>2</sub> is just an excuse
  - Geopolitical dependence is high risk
  - Health risks
- “Ecological” can also be “efficient”
- Nuclear + soft energies + preventive measures (insulation) can cover all needs of a country: no CO<sub>2</sub> needed!
- Needs decentralised network:
  - Solar power, wind mills, hydro-generators
- Competitive in economic sense



## Conclusion

- Economic crisis can be opportunity
- Needs will never change, what will change is the way human provide solutions
- Solutions = value
- Opportunity to develop, produce and to export these to the whole world
- Small countries can be the winner:
  - Finland: from rubber to mobile phones (and No.1)
- Mobility and energy are the next challenges

