What is Global Systems Science?

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Is there a Definition of Global Systems Science?

"Global Systems Science (GSS) is about understanding, analysing, developing, and influencing complex systems that require global coordination."

"ICT changes the human beings from locally aware to globally aware..."

A "wordle" contributed by Patrik Jansson based on section "3. Enabling Knowledge Technologies" from the report "GSS. Towards a Research Program for Global Systems Science", 2013-06-08:

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GSS Features

- studies global systems like the internet, the global city system, and more

- develops evidence, concepts, and doubts concerning such systems

- helps practitioners dealing with them to reflect on the experiences and to assess possible consequences of their actions

- combines advanced computing technologies with conversations bridging the gap between science and society

GSS Examples

- The energy, water, and supply systems

- The global financial system

- The global city system

- Agents, resources, and mechanisms involved in climate policy

- The web of military forces and relations

- Globally spreading diseases (pandemics)

- The scientific community

- ...

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Policy Challenges Driving GSS

- The energy nexus – the increase in per capita energy..

- Global health – individual health, population health, ecosystem health

- Financial markets – sustainable finance

- Climate change

- Urban development - dynamics

Enabling Knowledge Technologies

- HPC – scalable models (simulations), scalable tools, visualisation (validity, reliability, relevance)

- Big Data

- Programs, Tests, Proofs
    "Global systems, if they fail, may fail big!"

EU Funding and Global Systems Science

Horizon 2020 – supports research from 2014-2020.
See http://blog.global-systems-science.eu/.

Horizon 2020 has a €80 billion budget!

Provides € 31 748 million to help address major concerns shared by all Europeans such as climate change, developing sustainable transport and mobility, making renewable energy more affordable, ensuring food safety and security, or coping with the challenge of an ageing population.

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A time line for Horizon 2020

From Dec 2013: Parliament and Council negotiations on the basis of the Commission proposals

Ongoing: Parliament and Council negotiations on EU budget 2014-20 (including overall budget for Horizon 2020)

Mid 2012: Final calls under 7th Framework Programme for Research to bridge gap towards Horizon 2020
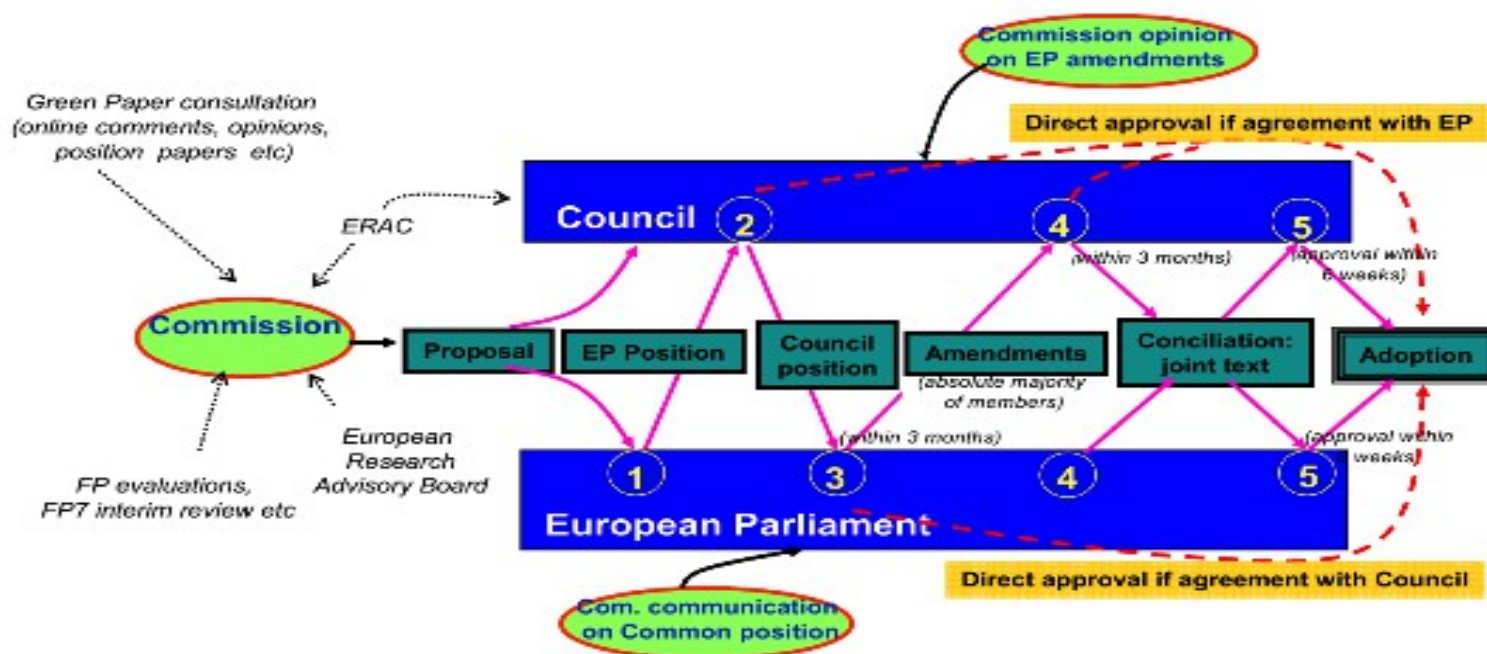
By end 2013: Adoption of legislative acts by Parliament and Council on Horizon 2020

1/1/2014: Horizon 2020 starts; launch of first calls

Horizon 2020 Adoption

The "Ordinary legislative procedure" (ex "co-decision")

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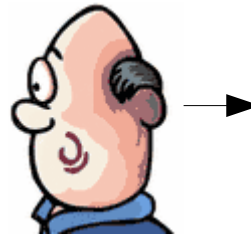# HIPERFIT and Global Systems Science

The Past

Big data
Data grows!

Learn from history:
  - model calibration
  - analytics

walking backwards through time

sight

You/Society
Decision Making

The Future

Predict consequences
Big simulations
Increasing complexity
Complex modeling

ICT challenges

"*The free lunch is over*":
    Halt in CPU clock cycles
Moore's Law still holds some
    years to come → more
    transistors

To the rescue:

Parallel computing
Functional and *declarative*
    programming
Exploit *domain knowledge*

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