



Large scale data workflows for medical applications

> **9th Dec 2016**

CERN openlab
Technical Workshop 2016

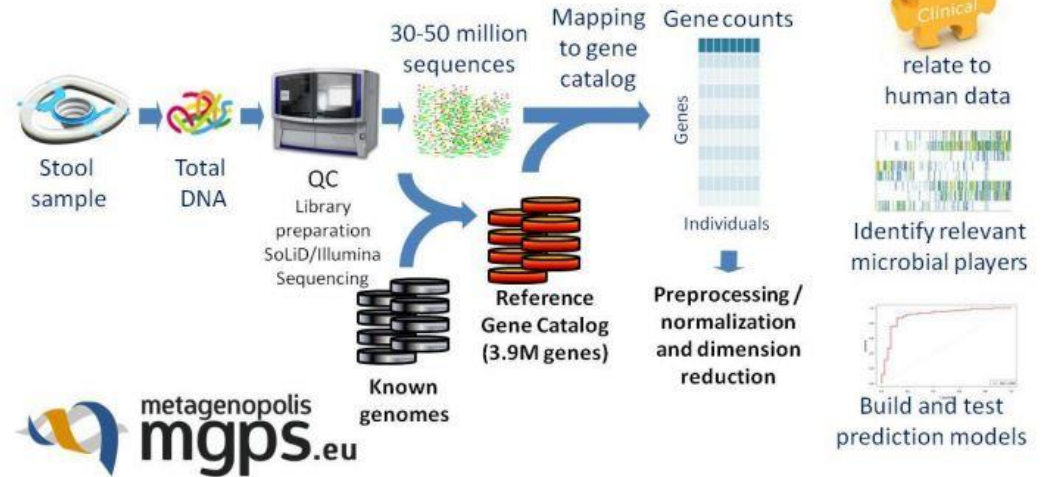
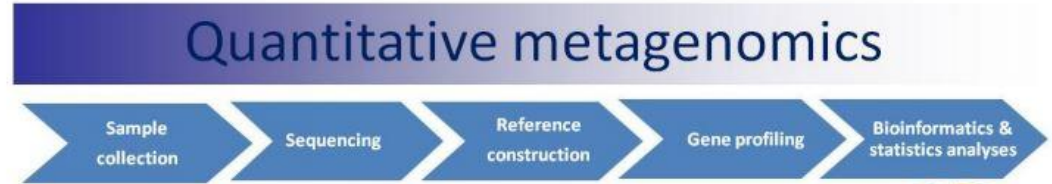
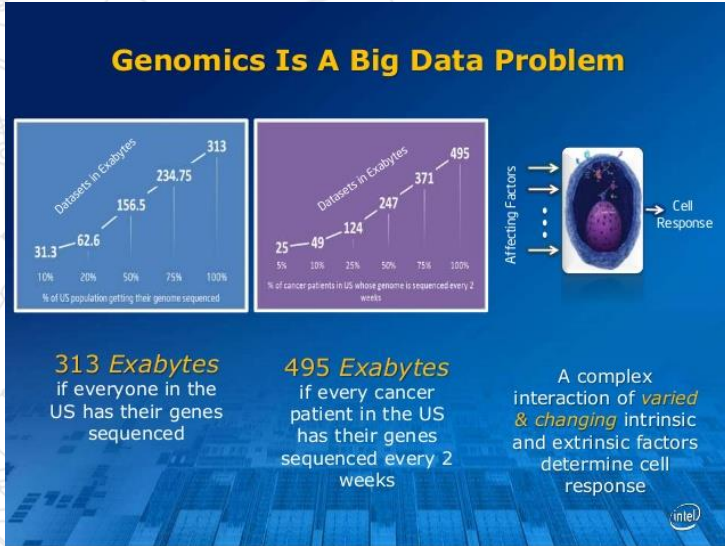
Marco Manca, MD

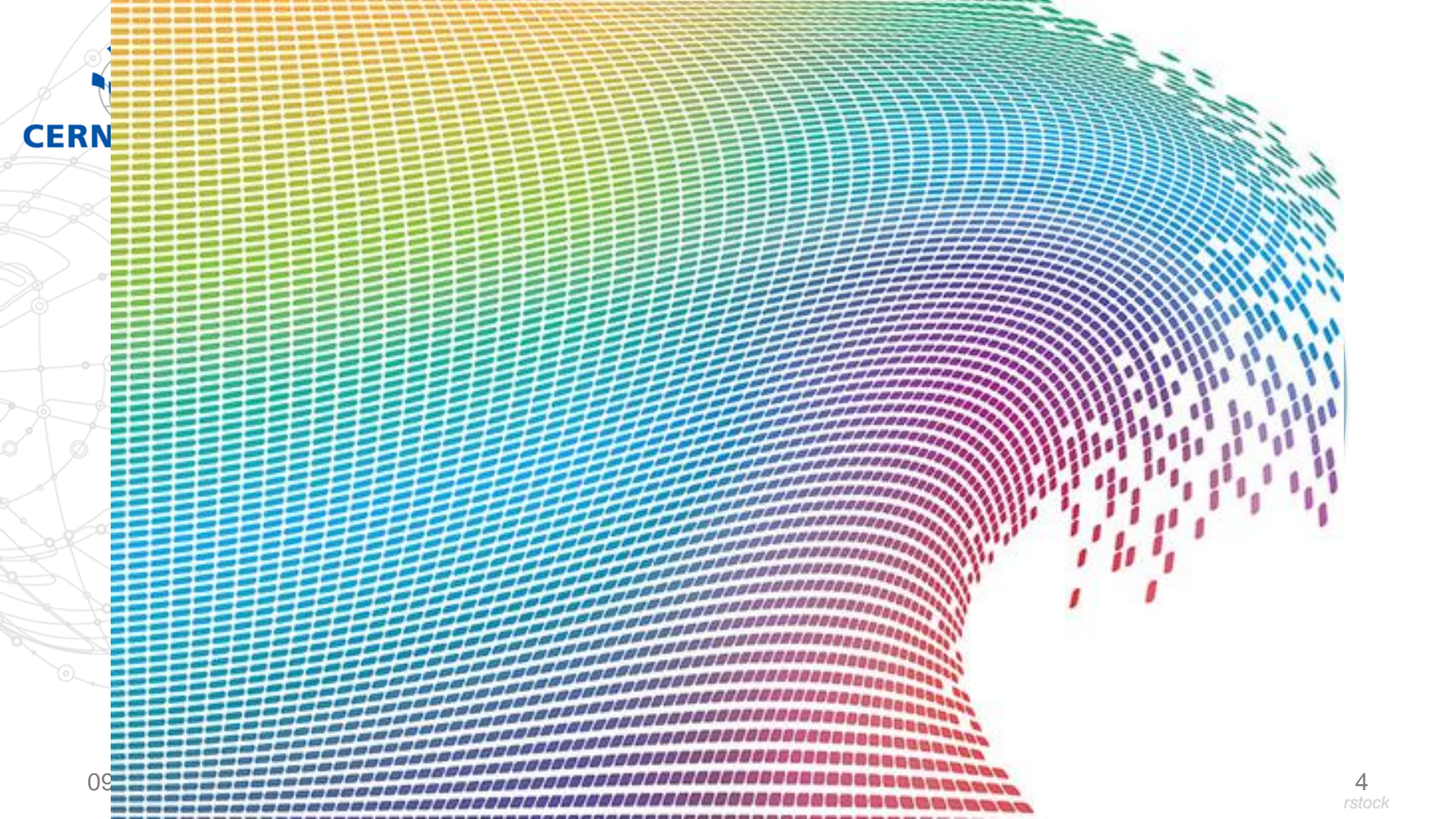


The background features a complex network diagram with various nodes and connecting lines. A prominent, thick black line forms a large, irregular loop on the left side. Other thinner lines and nodes are scattered across the upper and right portions of the image, creating a sense of interconnectedness and data flow.

Genomics bigdata geneROOT

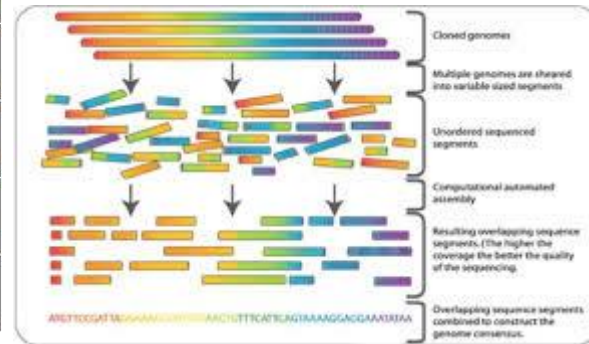
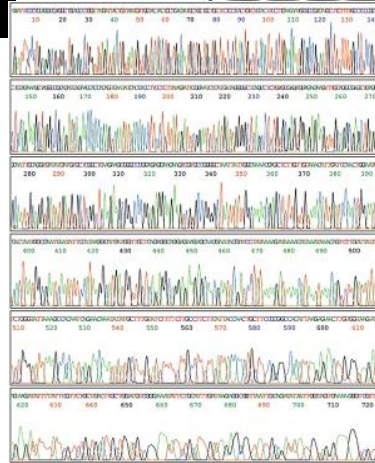
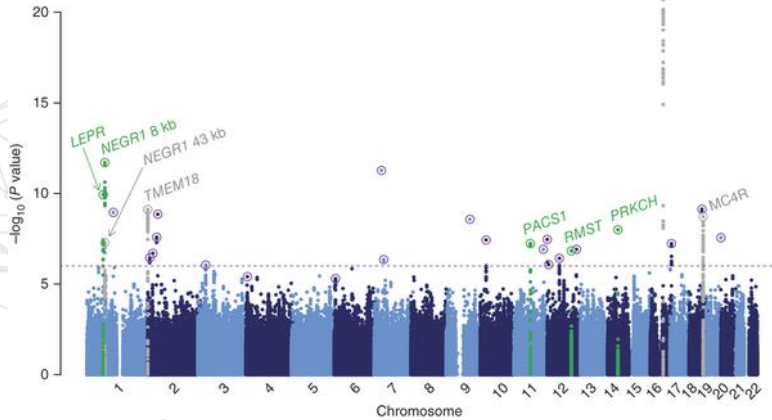
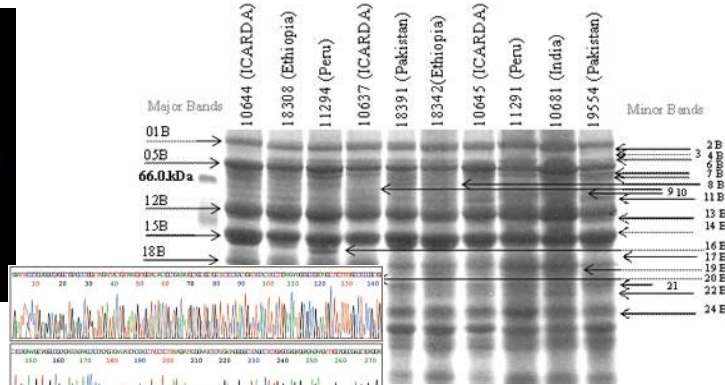
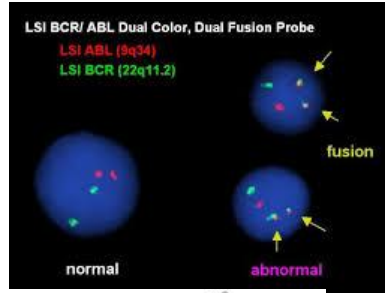
Background image: Shutterstock



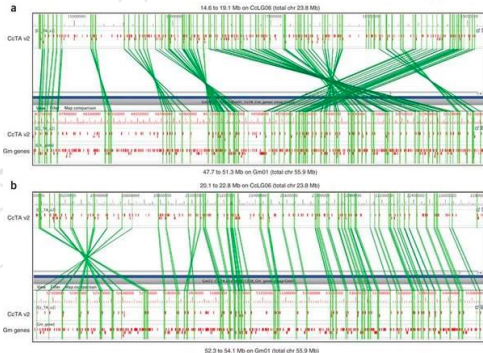
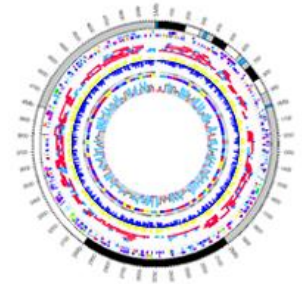
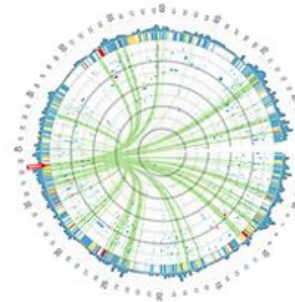
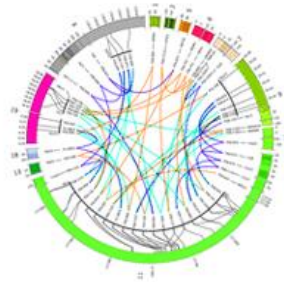


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The problem



Everyday practice

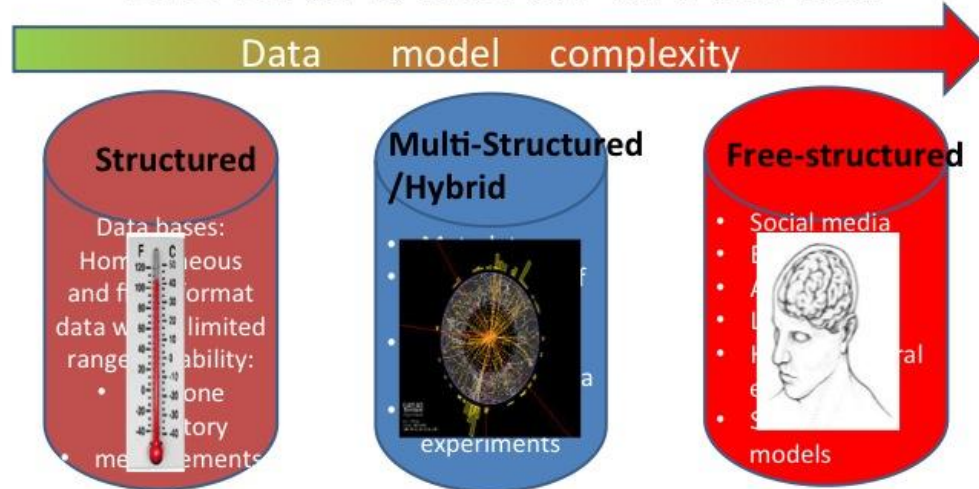


Global Alliance
for Genomics & Health

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Epidemiological Study - Medical Use case

BIG DATA: not all the same:



- Data model fixed
- Small parametric space to represent the data
- Prevalent deduction based analysis

- Data model evolving with data
- Variable parametric space
- Data driven induction and deduction

- Data model evolving with experience
- morphing parametric space
- Analogy based induction and deduction

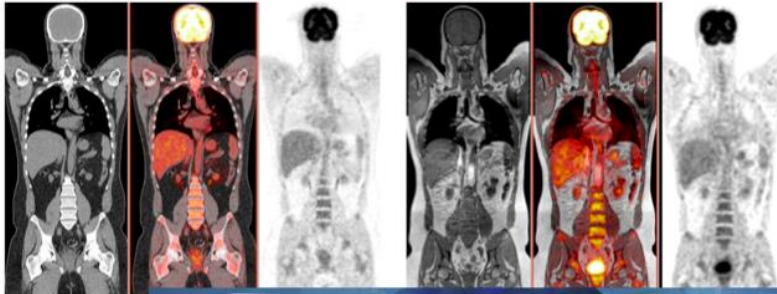
Medical bigdata

Augmented vision in the operating room

PET-CT

Credits: PINLab HUG

PET-MR

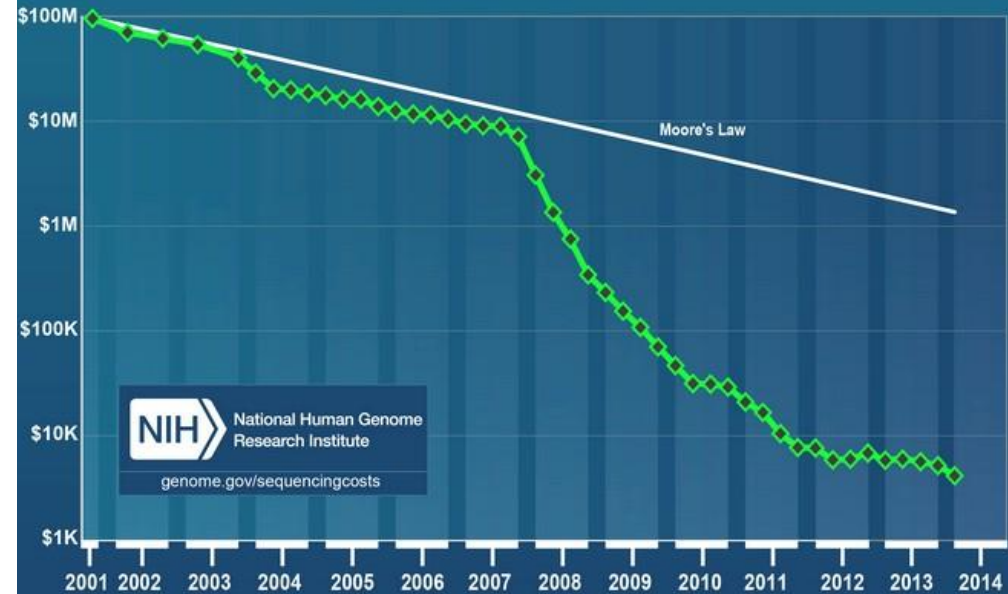


Hybrid surgical room

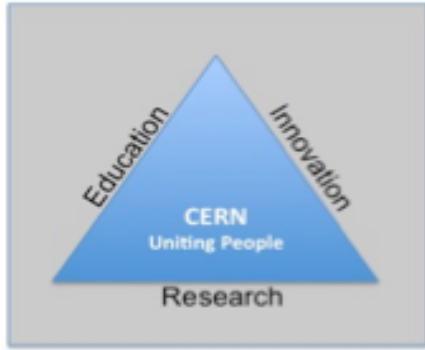
Gemelli Hospital,
Rome (IT)



Cost per Genome



Why CERN



PUSH BACK the frontiers of knowledge
DEVELOP new technologies for accelerators and detectors
TRAIN the scientists and engineers of tomorrow
UNITE people from different countries and cultures

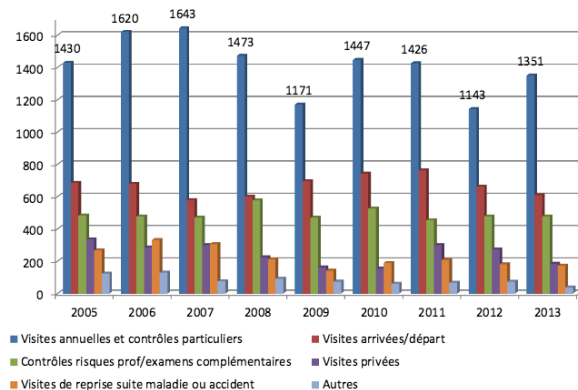
22 member States
>600 Institutes and Universities use the facilities
~2'400 employes
BUT
>11'000 visiting scientists from >120 Countries

Visites médicales effectuées par les médecins

Année	Nbre de visites	Nbre de personnes vues
2012	2875	2764
2013	2910	2758

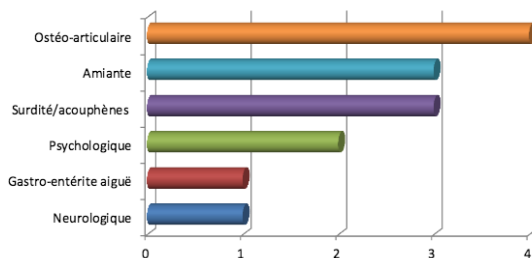
Why CERN - 2

Détail des visites médicales effectuées

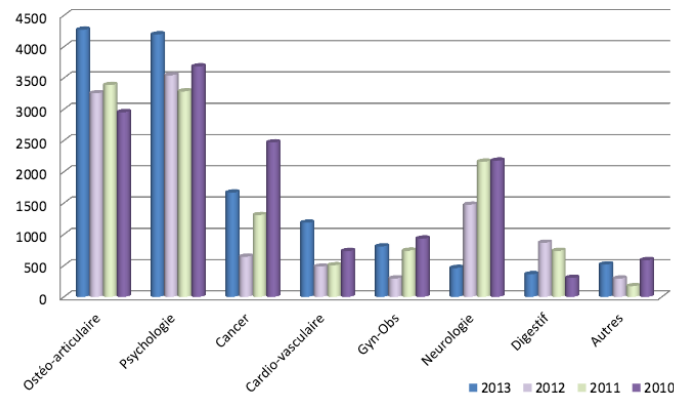


Maladies professionnelles les 10 dernières années (2004-2013)

Total = 14



Nombre de jours civils d'arr ts de travail par motif
(Par ordre d croissant en 2013)



The CERN Safety Policy

The means are:

Continuous improvement in Safety, through:

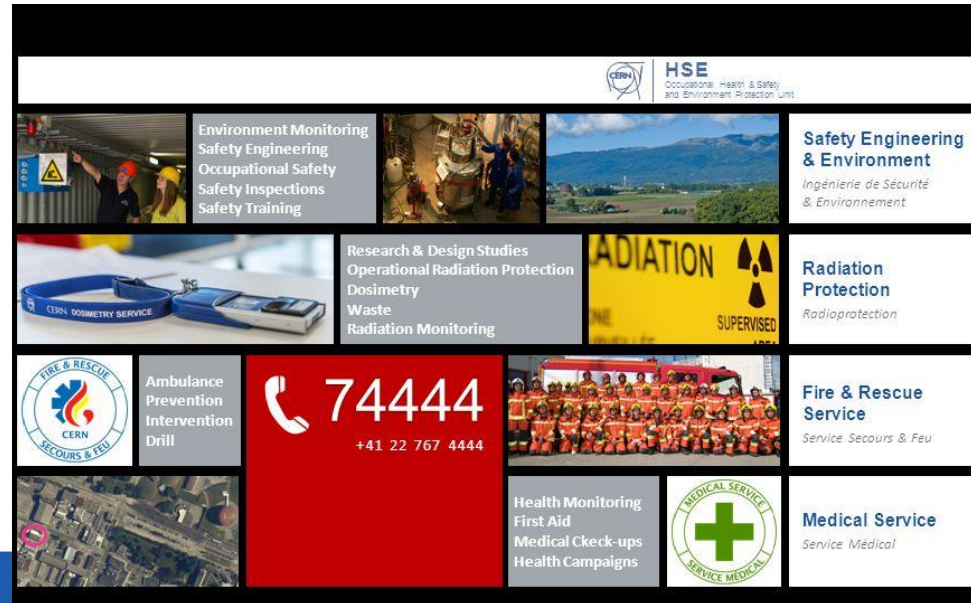
- risk assessment
- return of experience
- regulatory watch
- safety training
- safety management system

Safety Rules, as necessary for functioning, taking into account host states, EU- and international regulations

Emergency Procedures *new in Policy*

Proactive communication *new in Policy*

Collaboration with host states *new in Policy*



Indicators for well-being in a community

Source: Social Cohesion Research and Early Warning Division, The Council of Europe



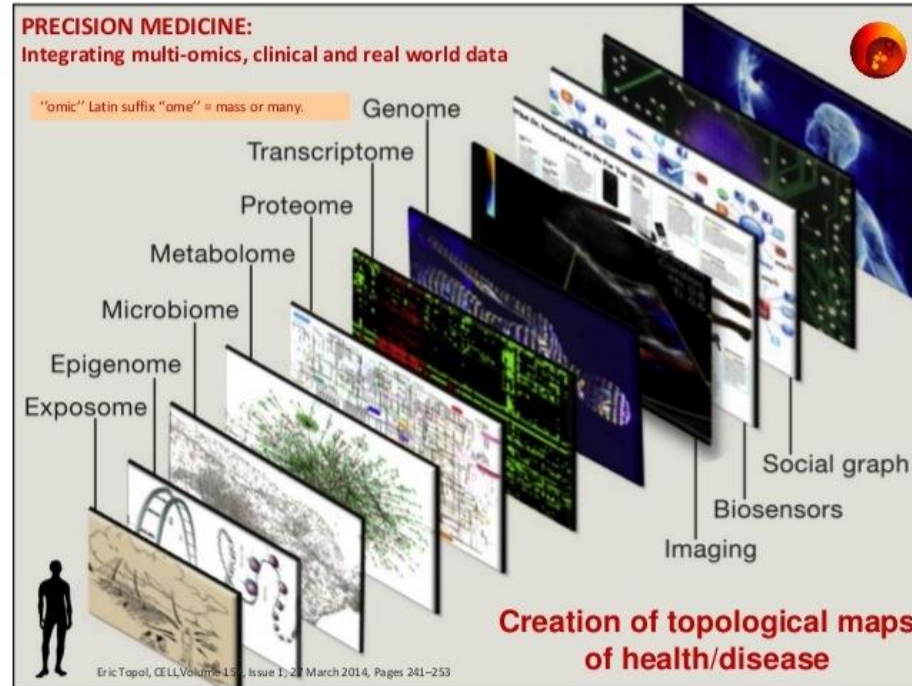
Pathways and hysteresis

Recent evidences suggest that in healthcare the outcomes are heavily influenced by the pathways of care...



A redefinition of the “individual”

N of you(s)



Thank you for your attention

Any questions?