From Physics to Daily Life

Health Surveillance

Dr. David Manset, CEO www.gnubila.fr

Ebola

- The problem
  - 5 843 cases since 03/2014
  - 2 803 deaths
  - 337 infected heatlhcare workers
    - > 181 died

- Pandemic diseases: Avian Infuenza A(H7N9), Corona Virus Infections, Pandemic H1N1, Influenza at Human Animal Interface…

Health Surveillance

- Absolute necessity in a globalised world

epidemiology
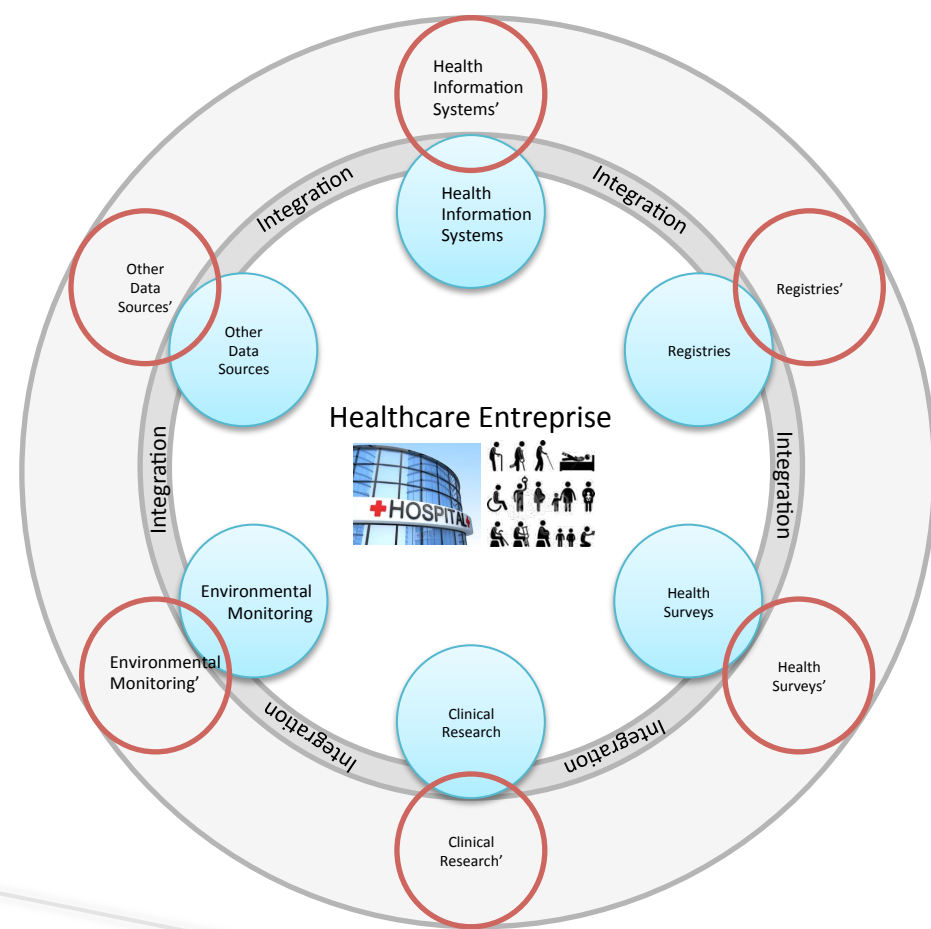
practices

informed policies

decision support

Data Silos

What the experts say…

- **Many centers** of transmission
- **Many teams** of clinical specialists
- Need **to trace** contact
- Information is **fragmented**
- **Lack of access** to basic information

And…

Data is…
Fragmented
Heterogeneous
Locked in

- Understanding data is…
  - A science in itself,
  - Computationally demanding

- Dasta is potentially sensitive
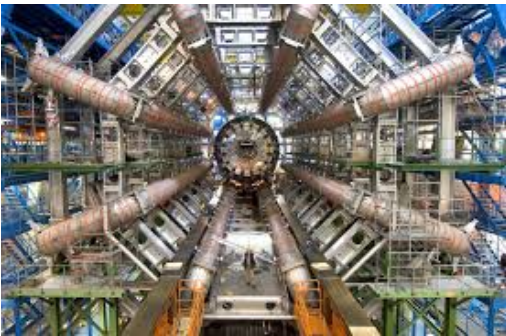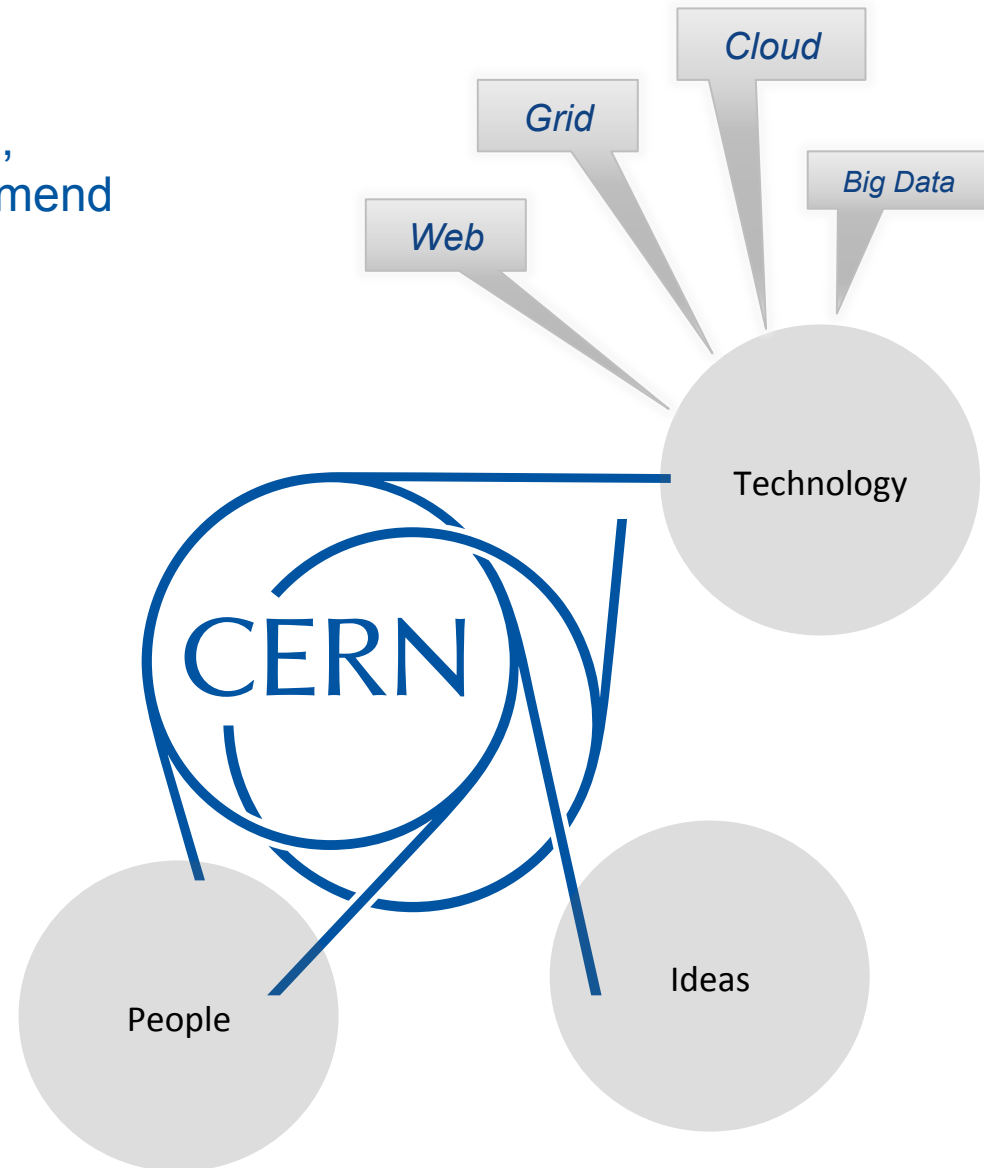 - Data protection and associated access rights
  - Patient safety

Technology Transfer

- Detect trends
- Evaluate risks
- Prioritize, plan,
- Inform, recommend

- Integrate
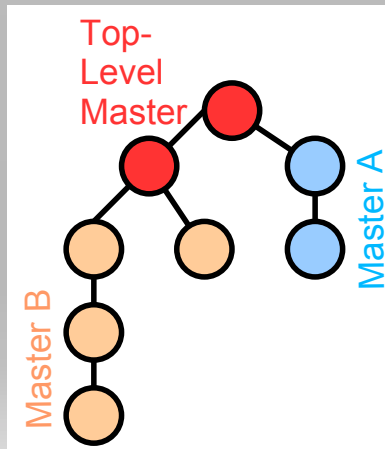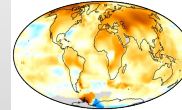- Process

- Collect
- Filter
- Control

Web

Grid

Cloud

Big Data

Technology

CERN

People

Ideas

AMGA

- Metadata catalogue in grid environments

- Distributed/Federated

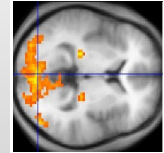- Interoperable with standard databases

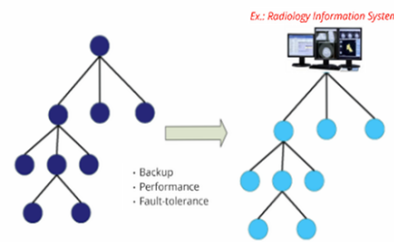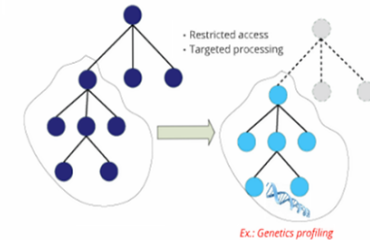- Paired with computational power
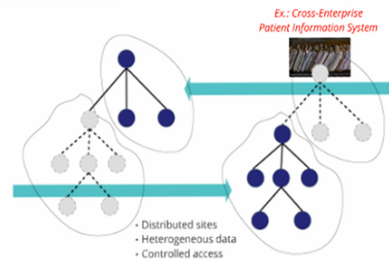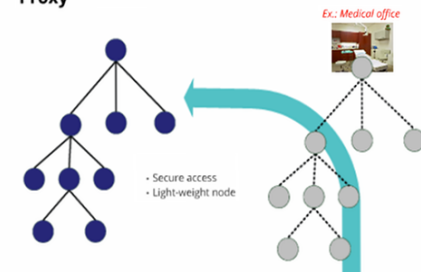

HEP   Climate   Digital Lib.   Medical

Full Replication   **Partial Replication**

Ex.: Radiology Information System
- Backup
- Performance
- Fault-tolerance

- Restricted access
- Targeted processing

Ex.: Genetics profiling

Distribution   **Proxy**

Ex.: Cross-Enterprise Patient Information System

- Distributed sites
- Heterogeneous data
- Controlled access

Ex.: Medical office

- Secure access
- Light-weight node

ject-arda-dev.web.cern.ch/project-arda-dev/metadata/

Top-Level Master

Master A

Master B

Courtesy of B. Koblitz

gnúbila

YEARS / ANS CERN

GINSENG Project

A light-weight e-infrastructure for e-health and epidemiology,

Private and dedicated e-infrastructure focusing on
- Breast and colon cancer,
- Perinatal pathologies

A network of healthcare professionals to collect, agregate and analyze medical data,
- Screening associations
- Anatomopathologists
- Health surveillance organizations
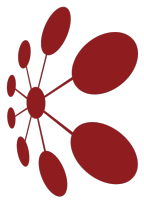- Hospitals
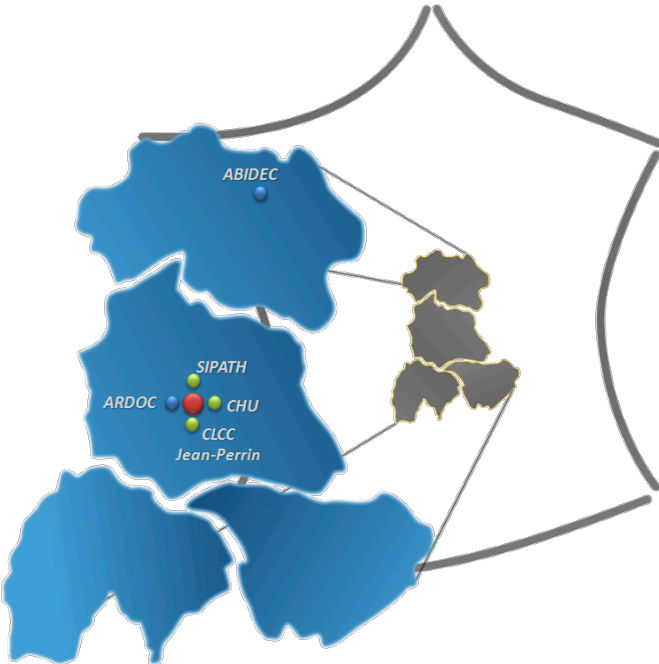
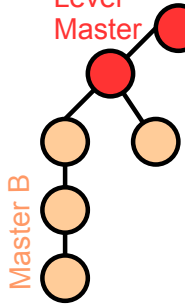Breast cancer   Colon cancer   Pregnancy follow-up   Trisomy 21

Lydia Maigne (MCF, LPC),
Vincent Breton (DR, LPC),
Sébastien Cipière (IR LPC),
David Sarramia (MCF, LPC),
Quentin Bisson (Stagiaire, LPC),
André Lautier (Association RSCA),
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Laurent Gerbaud (PU-PH, CHU Clermont-Fd),
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Aline Guttmann (AHU, ISIT-UA),
Xinran Li (Doctorant, ISIT-UA),
Sébastien Gaspard (IR, gnúbila),
Boris Vacher (IR, gnúbila),
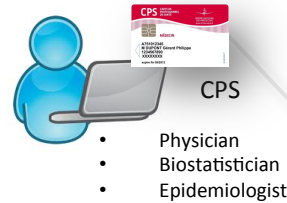Nicolas Mugnier (IR, gnúbila),
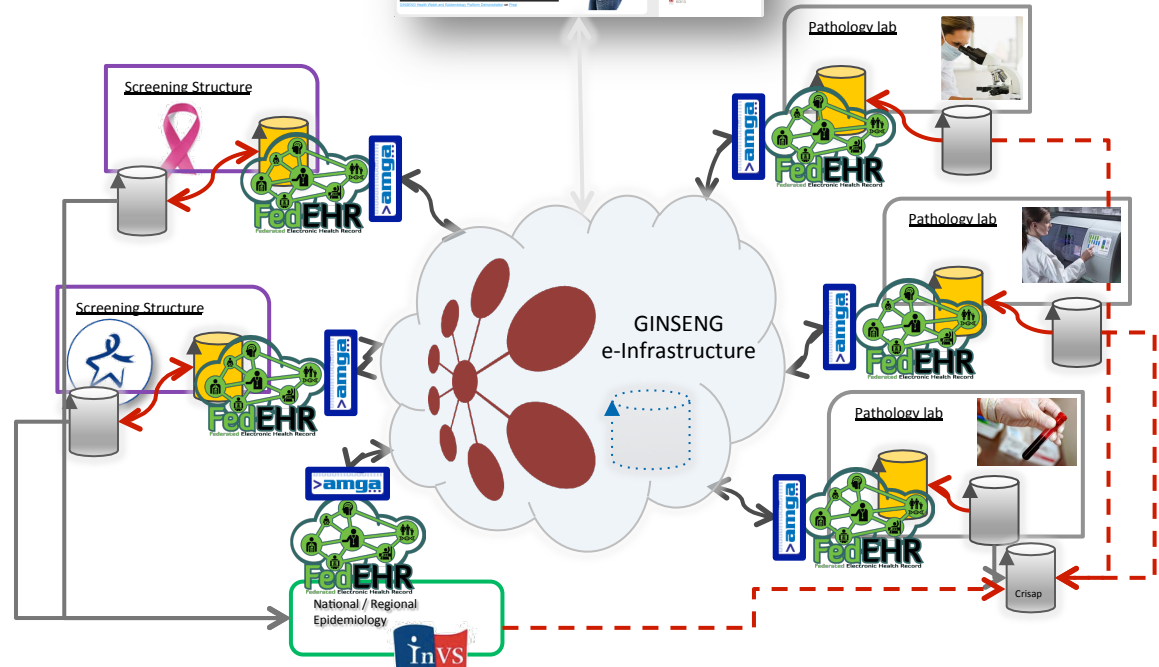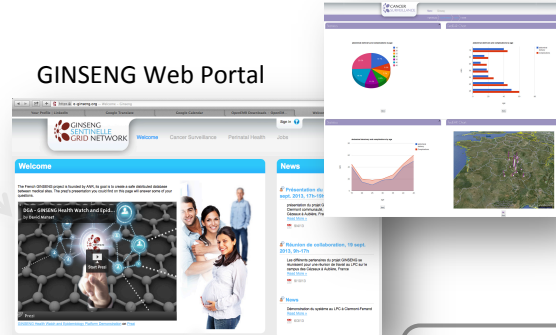Jérôme Revillard (CTO, gnúbila),

Global Initiative for Sentinel E-health Network Grid

GINSENG Architecture

GINSENG e-Infrastructure

- Improve cancer screening process
- Support epidemiological studies
- Enable practices benchmarking
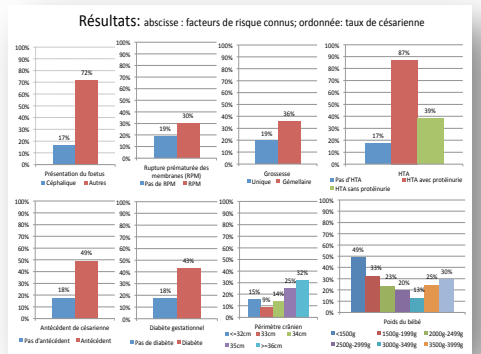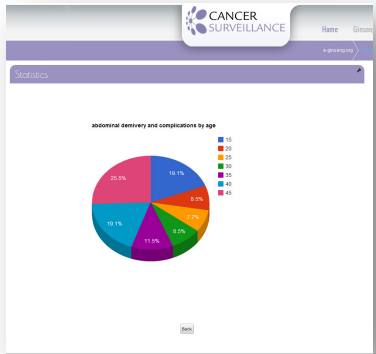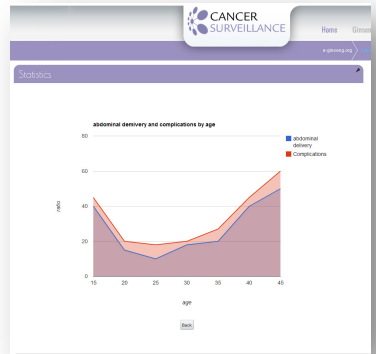
Délibération n° 2013-364 du 14 novembre 2013

mHealth

Internet of Things

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FedEHR
Federated Electronic Health Record

eHealth

- Major paradigm shift

- Unlocking data

- Raising new data protection concerns

- Patient-centered policies

- Global Information System