Artificial **I**ntelligence in **M**edicine

INFN - CSN5 proposal
2019-2021

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AIM in short

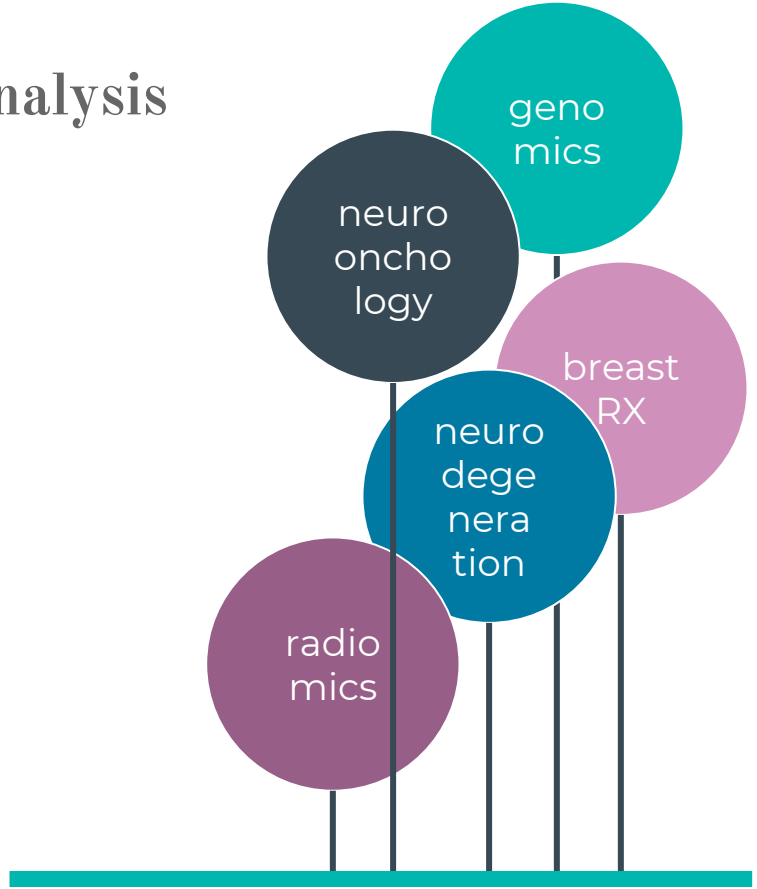
- a **network of expertise** in applied **data analysis**
  - focus on medical data & radiomics

- INFN-wide collaboration
  - PI / GE / CA / BO / BA / (FI / RM / NA)

Seeks to grow and develop existing and new curriculum in applied data science

Developments are CNTT-oriented

(e.g. DORIAN [A. Chincarini], R4I 2018)



background

gather and builds on a tradition of applied physics @ INFN

sharing the expertise

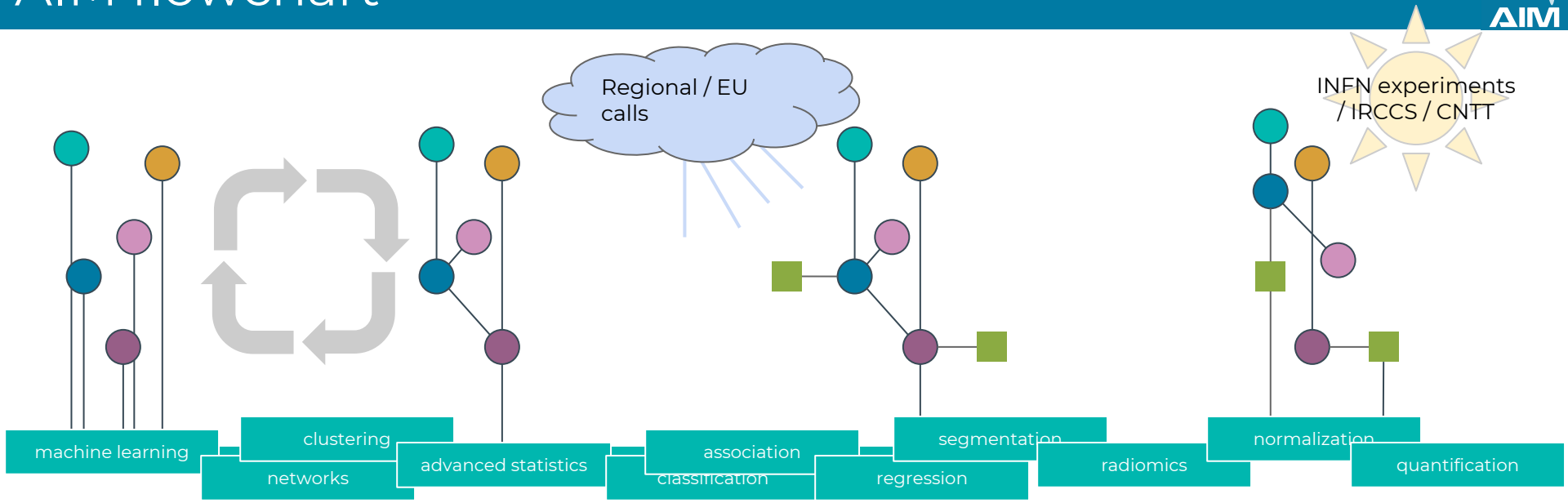
AIM role is grounded into expertise sharing:

- workshops: 2/year (one internal, one open)
- slots into INFN software schools
- shared PhD training
- generation of consortia for regional / EU / health-related applications

JPND research
EU Joint Programme – Neurodegenerative Disease Research

- geared towards an INFN-Medicine infrastructure
  - following a CNTT proposal

AIM flowchart



local developments on a specific problem / data / technology

workshops / shared training / knowledge exchange

ad-hoc consortia

new applications / services

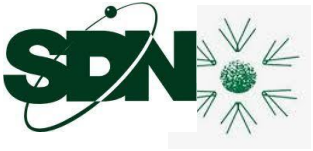
partners & dataset

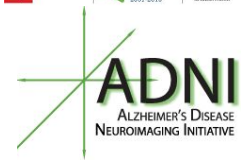
Clinical partners

- IRCCS S. Martino (GE)
- IRCCS Stella Maris (PI)
- IRCCS Gaslini (GE)
- IRCCS Centro S. G. di Dio (BS)
- IRCCS G.Paolo II (BA)
- IRCCS SDN (NA)
- AOUP (PI)
- Policlinico (BA)
- Osp. Pediatrico Meyer (FI)

EU / consortia

- IMAGO7 (Fondazione di Ricerca)
- EADC (EU)
- ADNI (US)
- ABIDE (EU/US)
- ENIGMA (WW)

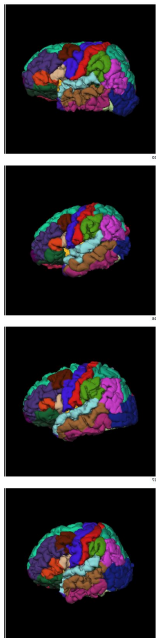




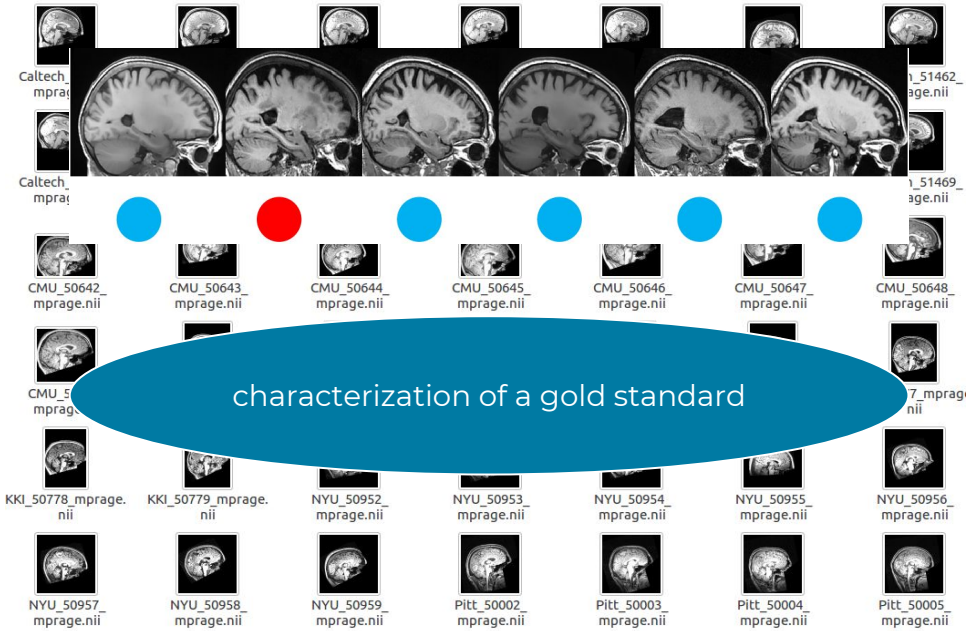
AIM 1: multi-site data standardization

data gathered by different sites and/or acquisition systems carries local "fingerprint", often to the detriment of the much more subtle information of interest.

this problem is akin to the management of **systematic errors**



typical application cases: MRI, RX, PET, NPSY tests



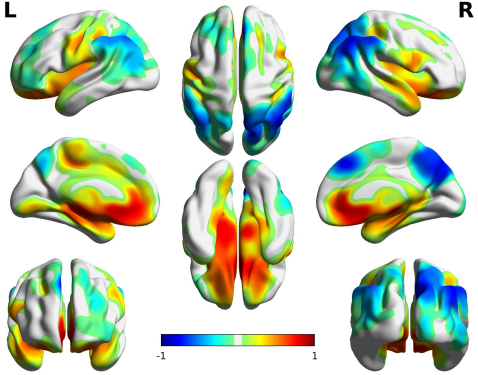
AIM 2: response modeling

the efficacy and discriminative power of a measure depends on the applied models and the features that are extracted from the data, often through the integration of external knowledge

This problem is akin to the **detection of a small signal** in an uncharacterized noise

typical application cases; genetic researches, treatment response, radiomics

functional networks



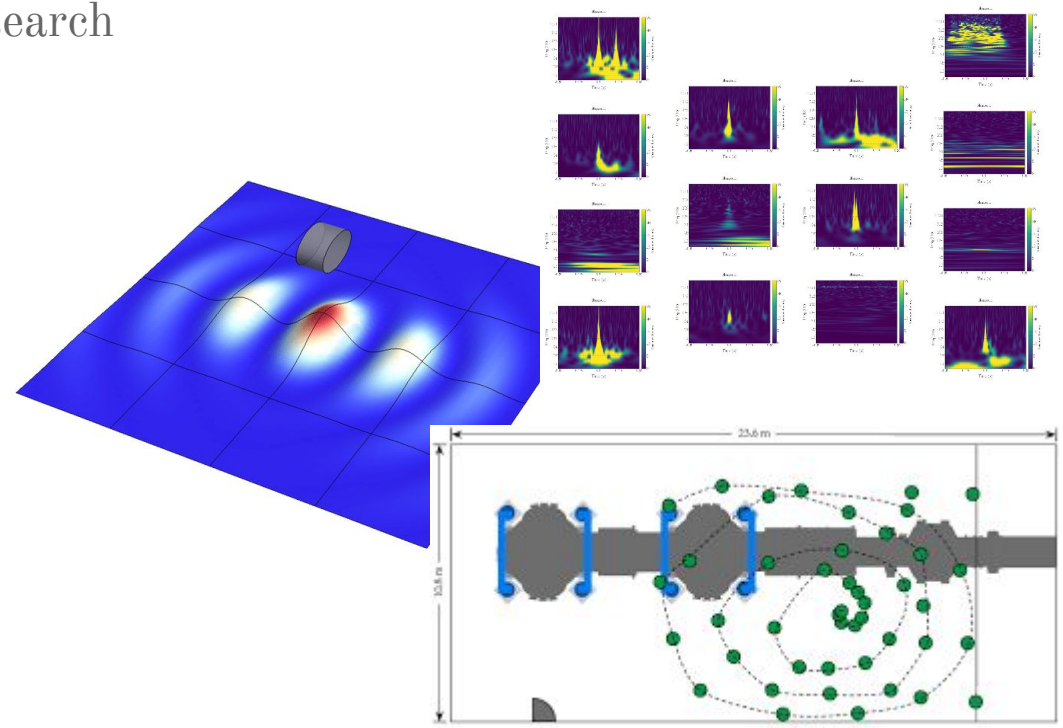
rare disease fingerprinting

feedback on INFN-core researches

developing resources, expert advice, infrastructures and practical help to assist with the management and data discovery in research

current applications in VIRGO:

- glitch detection & classification
- Newtonian Noise Cancellation
- E.M. followup



people & facilities

Nome	Ruolo	FTE
A.Chincarini	Ricercatore	0.4
E. Peira	Dottorando	1.0

Servizio Calcolo: 2 m.u.

related external funds (t.b.approved):

PRIN, Health Min. RF, TOPMED, HBP, BIOUPPER, CNTT R4I

thank you