Innovation

Complexity

Home as central location for Health a paradigm shift

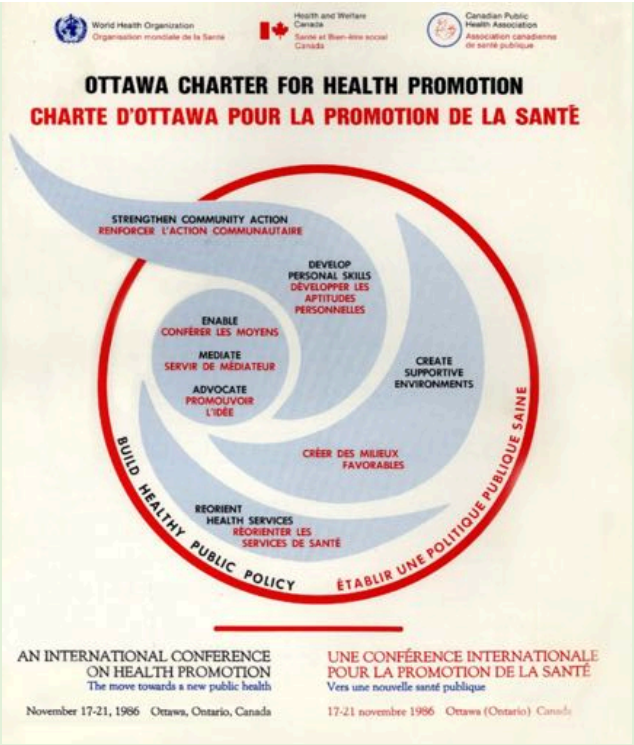
Translation

Translation

Health

Philippe.Cinquin@univ-grenoble-alpes.fr

Conflicts of interest *: Philippe Cinquin is co-founder of SentinHealth*



Health promotion is the process of enabling people to increase control over, and to improve, their health. To reach a state of complete physical, mental and social well-being, an individual or group must be able to identify and to realize aspirations, to satisfy needs, and to change or cope with the environment.

Health Issues

Baruch Spinoza
conatus… Ethique III, 6

Everything, as much as it can, strives to persevere in its being.

Acquired

Metabolomics

Proteomics

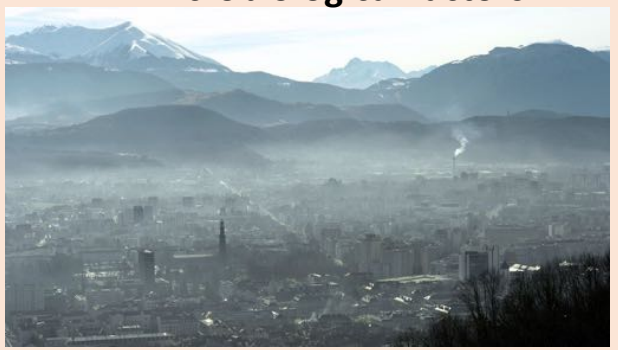
Transcriptomics

Genomics

Innate

Health Issues

Microbiological factors



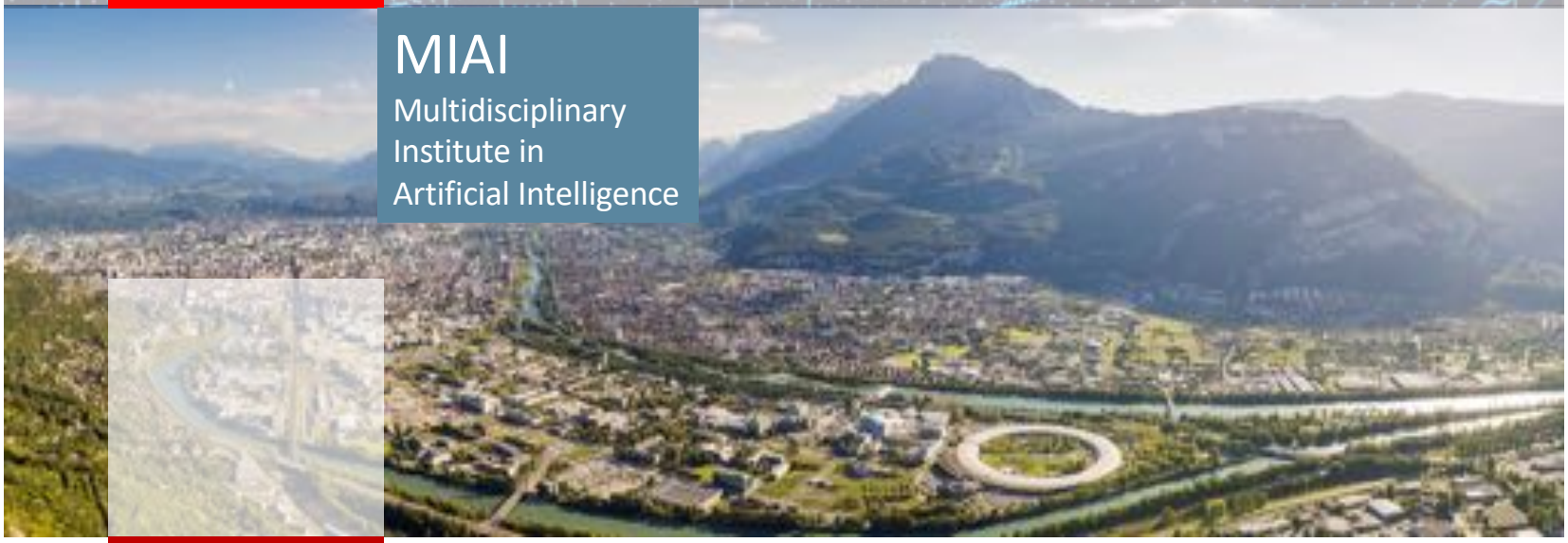
Environmental factors

Psycho-social factors

Communauté UNIVERSITÉ Grenoble Alpes

Grenoble hosts one of the 4 French *Interdisciplinary Institutes for Artificial Intelligence*

MIAI @ Grenoble Alpes (Head E. Gaussier)



MIAI

Multidisciplinary Institute in Artificial Intelligence

Deep Care: *Real life data* to empower patient!

T1 Empowerment by smart data capture in real life

ETISENSE Technologies

Etisense
Jacketed monitoring for life sciences

Instrumented Jackets:
- Deformable sensors integrated in tissue
- Already industrialized for animals
- On-going developments for human beings

Patented virtual flowmeter
- Respiratory and cardiac flows
- Validated at TIMC-IMAG
- On-going developments for human beings

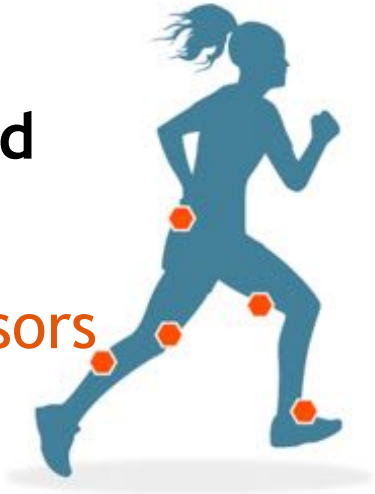
Bluetooth acquisition platform:
- Multisensor electronics (accelerometer, ECG, …)
- Integrated and evolutive platform
- Advanced AI for physiological parameters interpretation
- Distant and web-based Data Acquisition and Visualization

MySmartMove

PRODUCT

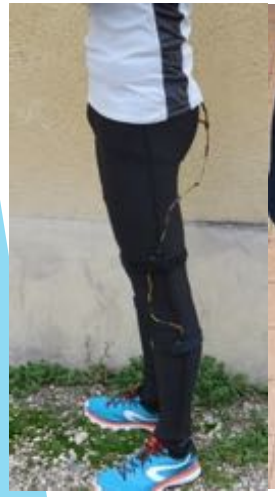
Connected Harness

Inertial Sensors

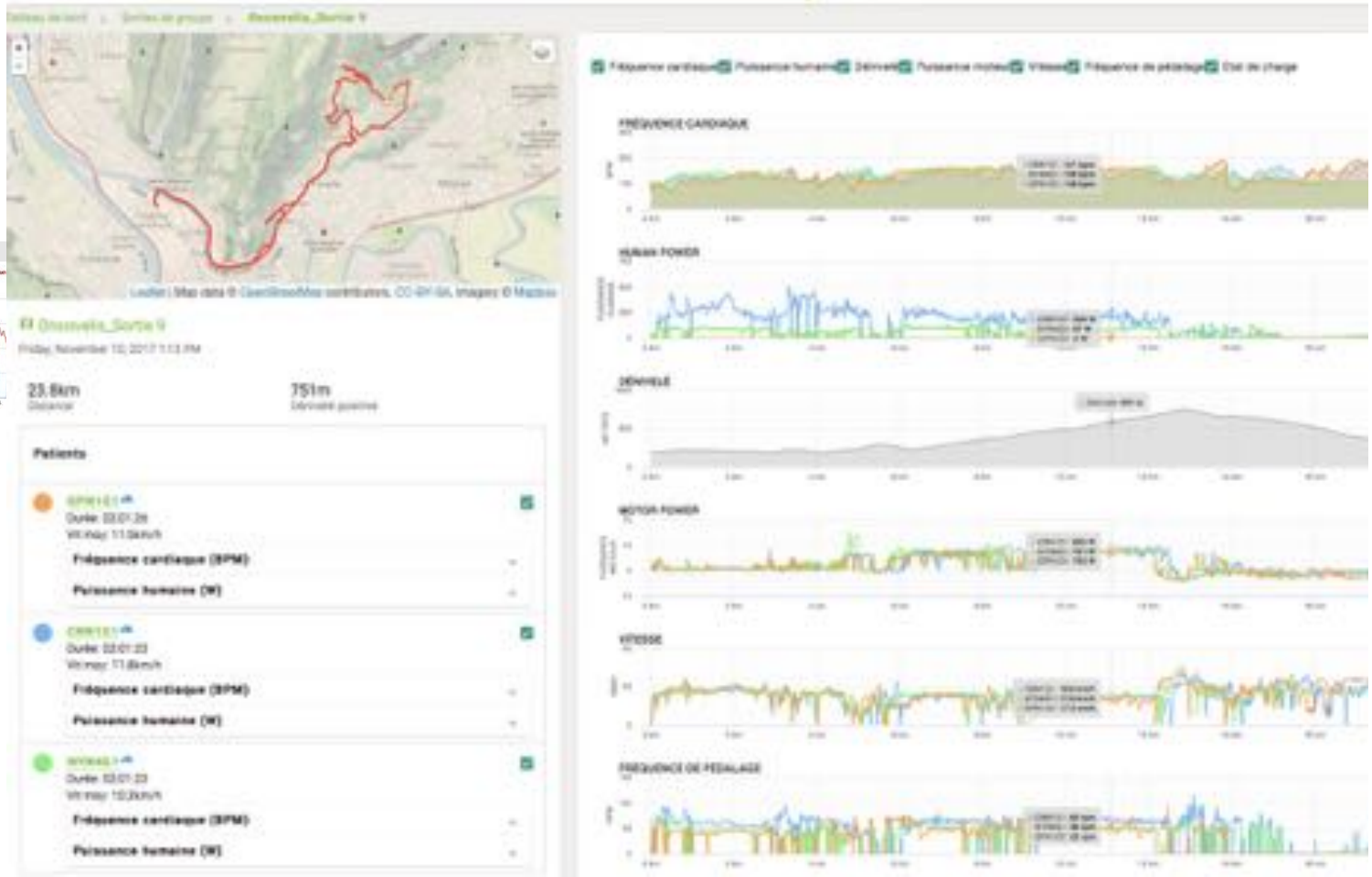


Data Processing and Fusion

Digital tablet or smartphone applications

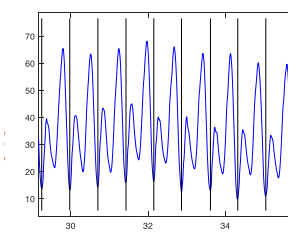


VELIS : Heart Rehabilitation in real life by connected bike and multimodal signal processing (ECG, body power, …)



Integrating 3 Health Sensors in VELIS

MySmartMove



→ Reconstruction of mean cycling, detection of activity (dancing, sitting, …)

→ Measuring and characterizing posture and movements of trunk

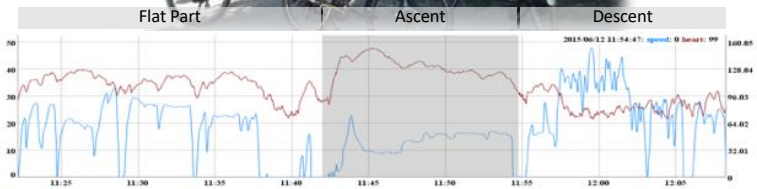
Etisense

Jacketed monitoring for life sciences

→ Fuctionnal Respiratory Monitoring

→ Non-invasive measure of heart flow

eBikeLabs



→ VELIS : Heart Rehabilitation in real life by connected bike and multimodal signal processing (ECG, body power, …)

PARIS 2024

Microbiota

- One body
  - 10^{12} cells
  - 25 000 genes
  - Billions of bacteria
    - 3.10^{13} to 10^{14} bacteria
    - 400 to 1200 ≠ Bacteria
    - $3.3\ 10^{6}$ genes
  - Virus
  - Fungi
  - Skin, mouth, vagina, placenta?, brain?, **gut**

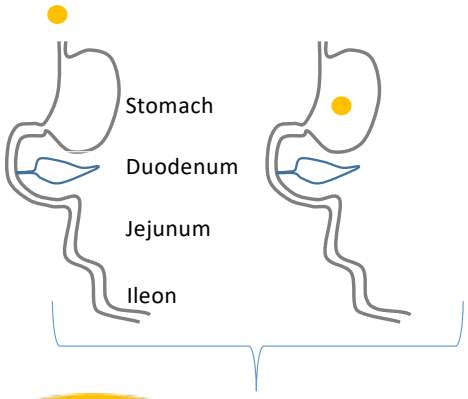
Microbiota

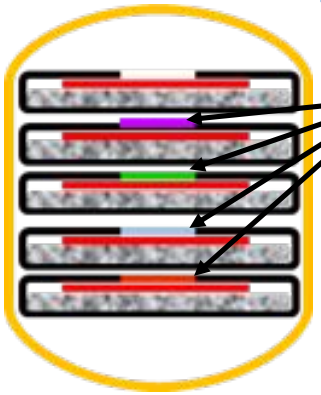
- Its role
  - Digestion
  - Immunity maturation
  - Protection

We are an holobiont

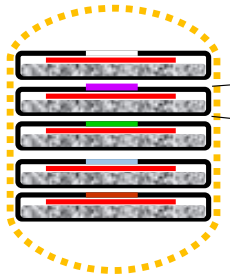
Holos Greek for whole
Biont: Organism

Multiple Sampling by a Swallowable Swelling Robot



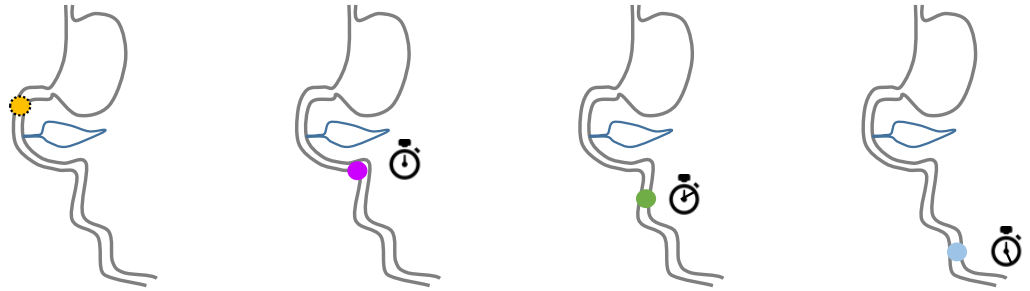


Individual Plugs with programmed delayed opening



Gastro-resistant barrier dissolves

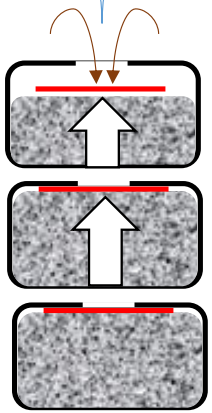
- Capsules are freed



First plug dissolves …

… second plug

… third plug …

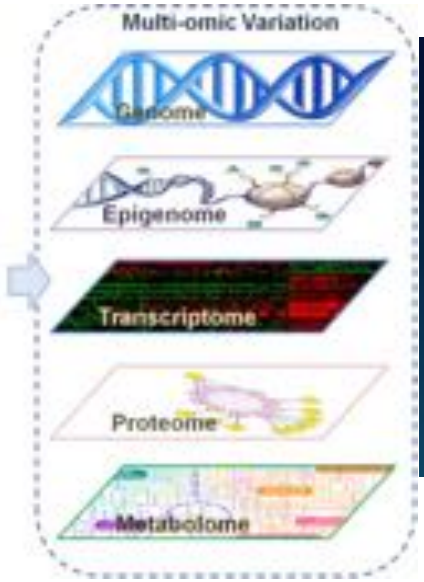


- Multiples samples in various parts of intestinal tract

From sampling to intestomics-based personalized medicine

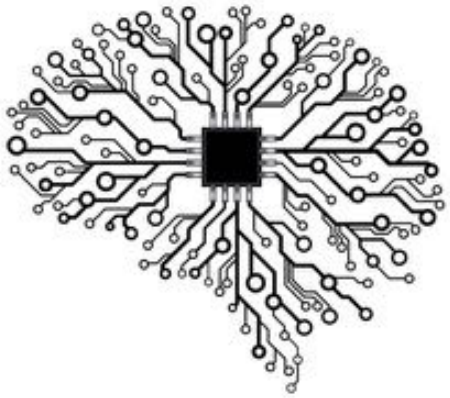
(proof of concept clinical trial scheduled Q1 2020, Pelican Health creation 2020)

Sample analysis
Clinical data
…



Intestomic data analyzis

A. I



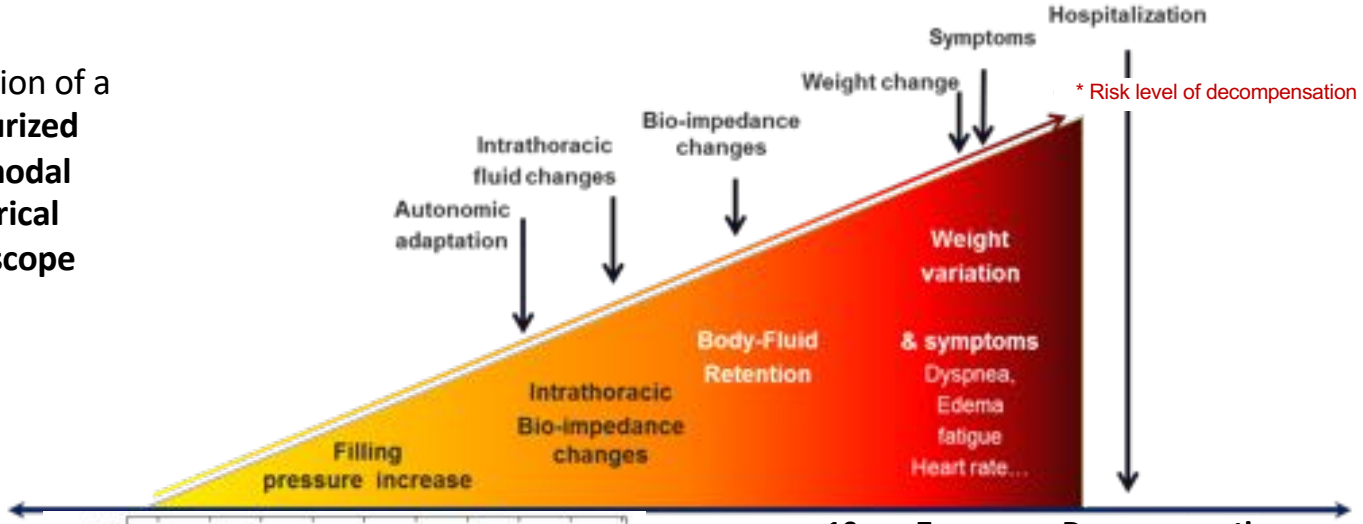
1) Clinical Trials: Statistical characterization of intestomics heterogeneity in pathologies

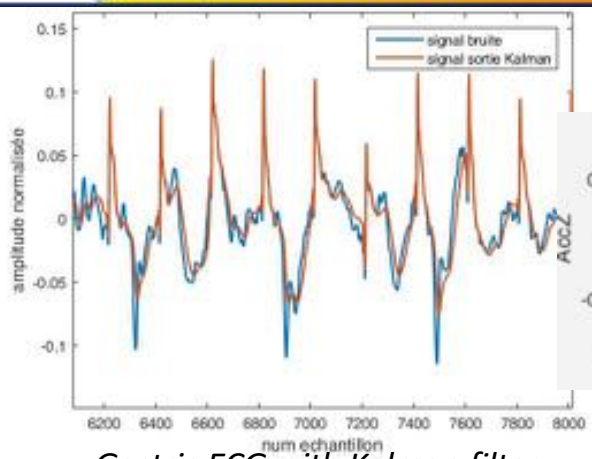
2) New patient: Deep-learning based estimation of probabilities of pathologies

Renew chronic diseases monitoring

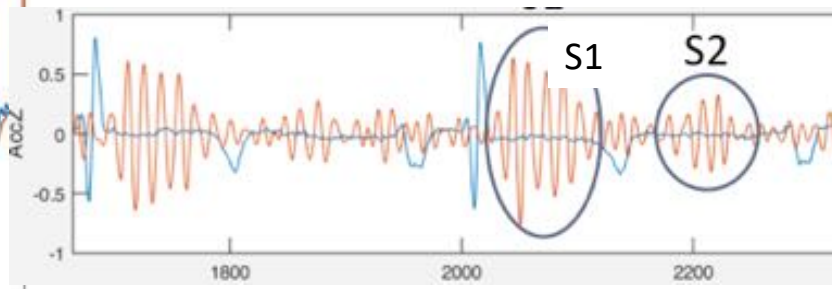
The instance of early detection of Heart Failure relapses

Implantation of a **miniaturized multimodal numerical stethoscope**





Gastric ECG with Kalman filter



Heart sounds detection from gastric sensor

SentinHealth *is a French MedTech company specialized in integrated care solutions for monitoring and preventing exacerbations of major chronic diseases*

SERENE-IoT
Secured & Energy Efficient Healthcare solutions using IoT Technologies

Penta

Music: https://www.bensound.com

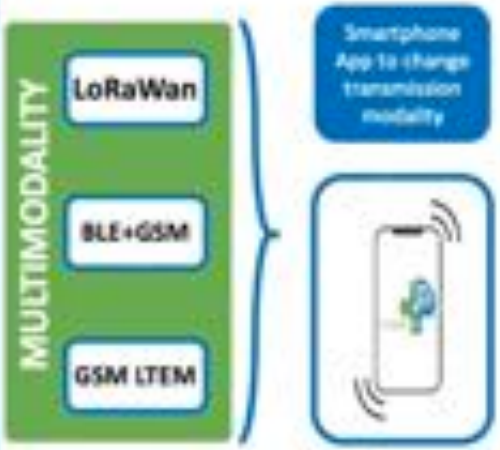
Ongoing Clinical Study : Flowchart of the patient

Inclusion visit : Start of the study for the patient.

Information about the protocol and signed consent during a consultation with the clinician

Installation of the connected pump at the patient home

Follow-up of the patient during 4 weeks



Clinical research assistant visits the patient once a week to change transmission modality.

Deinstallation of the connected pump : End of the study for the patient.

Questionnaire to the patient, to evaluate its interest on using of the connected pump

Deep Care

realize aspirations, satisfy needs, cope with environment

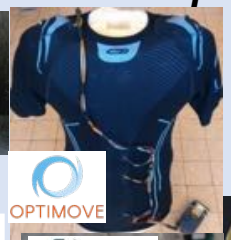
Health Issues :

Predict, Personalize

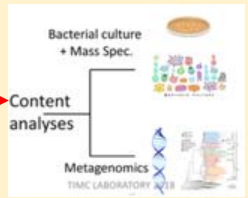
Prevent, Participate

***Real life** data to empower patient !*

T1 Empowerment by smart data capture



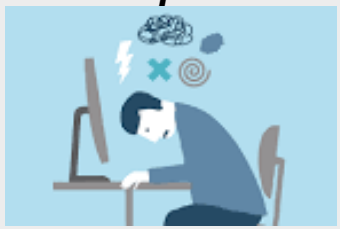
T2 Empowerment by smart data fusion



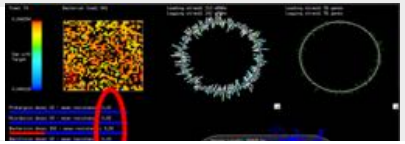
Biomarkers

Participatory Health Project

T3 Empowerment by Health Institution Optimization



Serious game (antibiotic resistance)



Simulators
Inversed Numerical Pedagogy

T4 Individual and Social adherence model

- Ethical issues
- Cost / benefit ratio perceived by the patient
- Mechanisms of acceptability
- Conditions of adherence and appropriation
- Influence of communication and technical design choices on acceptability, acceptance and adherence.

Deep Care : interdisciplinarity, openness

Communauté UNIVERSITÉ Grenoble Alpes

Deep Care

TIMC >25 years "information = key to understand life and act on health"

AGEIS, CIC, GIN, GIPSA-LAB, LBFA, LETI, LRB, LIG, LJK, TIMA, VERIMAG

+ U. SHS (*CERAG,GAEL GRESEC, LIP, PPL)*

+ several CHUGA Depts

+ …

+ very open (Patients Associations, Patients University, …)

Confirmed ~800 k€/year

nehs

msa santé famille retraite services

Medtronic Further, Together

THALES

ST life.augmented

IC'ALPS

ELSEVIER

Labcoms

SurgiQual INSTITUTE

SentinHealth

P2LINK

Etisense Jacketed monitoring For life sciences

eBikeLabs

TEXIS Sense for Life

theia.fr plateforme d'e-formation

In'Test Medical

MIAI Health Axis

Health Trajectories, Multi-omics, CAMI-Assistant, Grenoble Health Data Hub

Other Axes

CHU GRENOBLE ALPES

Public Health Research Clinical Departments

Data Institute *Health Technologies Institute*

National and International Partnerships

HEALTH DATA HUB

MINALOGIC

LYONBIOPOLE Auvergne - Rhône - Alpes

Linksium technology transfer & startup building Grenoble Alpes

INSTITUT CARNOT LSI

eit Health

Luxembourg Centre for Systems Biomedicine

profil ANSWERS FOR DIABETES