



GemelliGenerator

beyond ontology awareness



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Gemelli in Numbers



1.526

Total beds



94.919

Total discharged



about 400

Transplants performed
(*kidney, liver, cornea and bone marrow*)



25,9%

Hospitalized patients
(Emergency Dept.)



10.514.533

Outpatient services



53.701

Surgical procedures



2.500

Number of Scientific Publications per Year



11.125.475 €

Total value of our research projects



167.386

Internal Private Practice
Outpatients services
Performed at the Gemelli's
ambulatories



4.110

Babies born



about 1.600 points

Assigned
«Impact Factor Normalizzato»



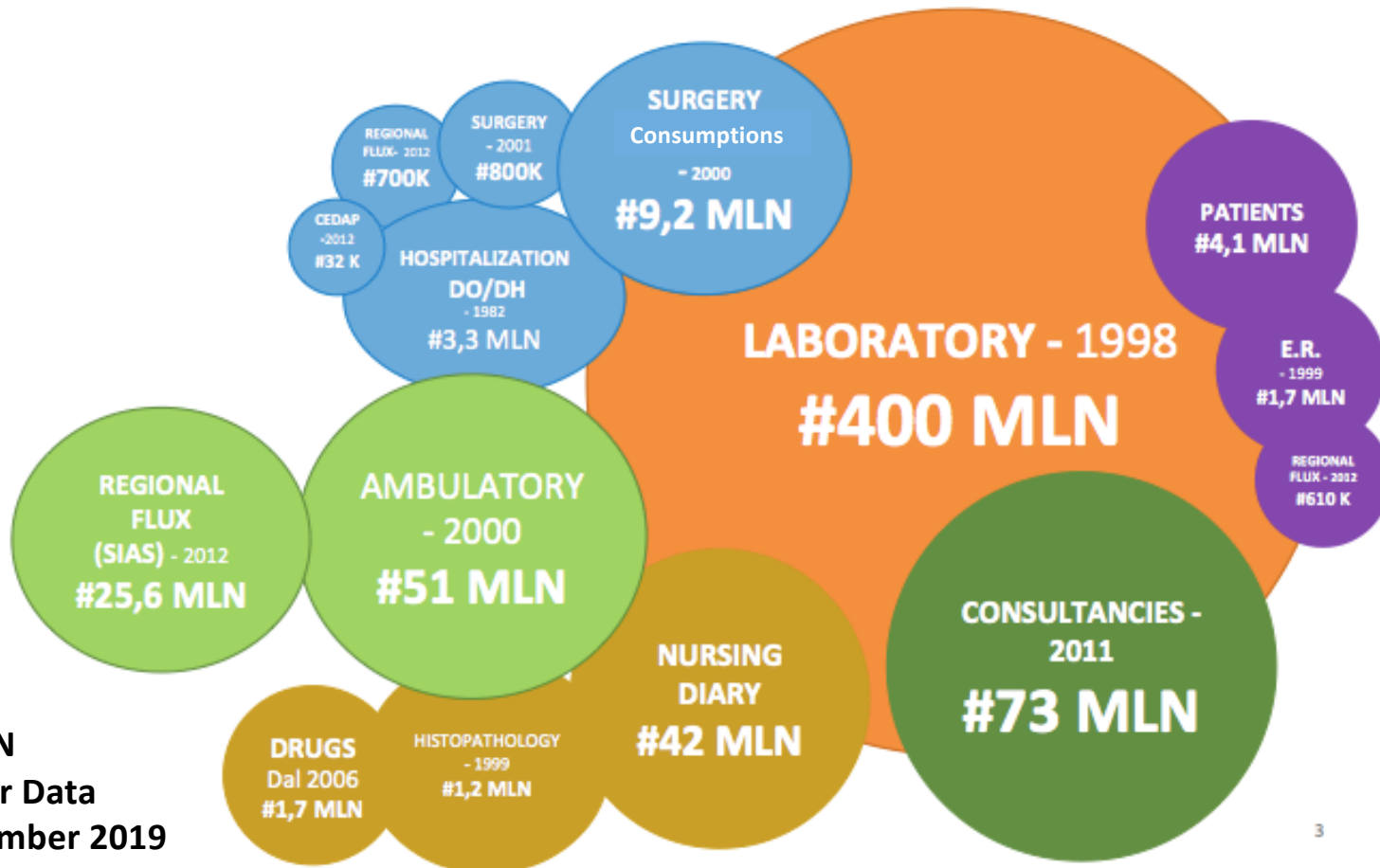
1.157

Researchers and
Clinicians



20+ years of data

Gemelli DWH



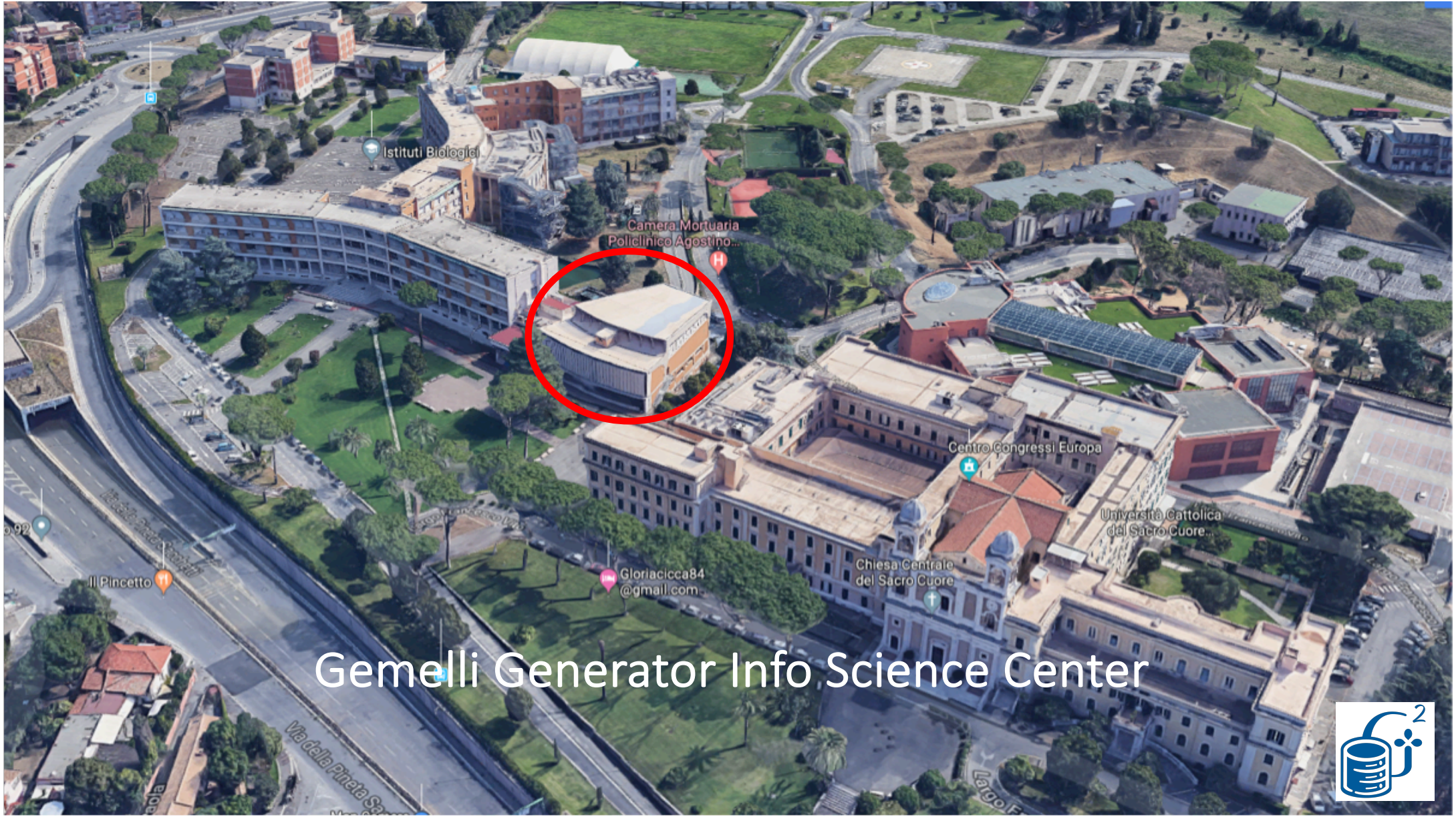
615 MLN
Granular Data
@ December 2019



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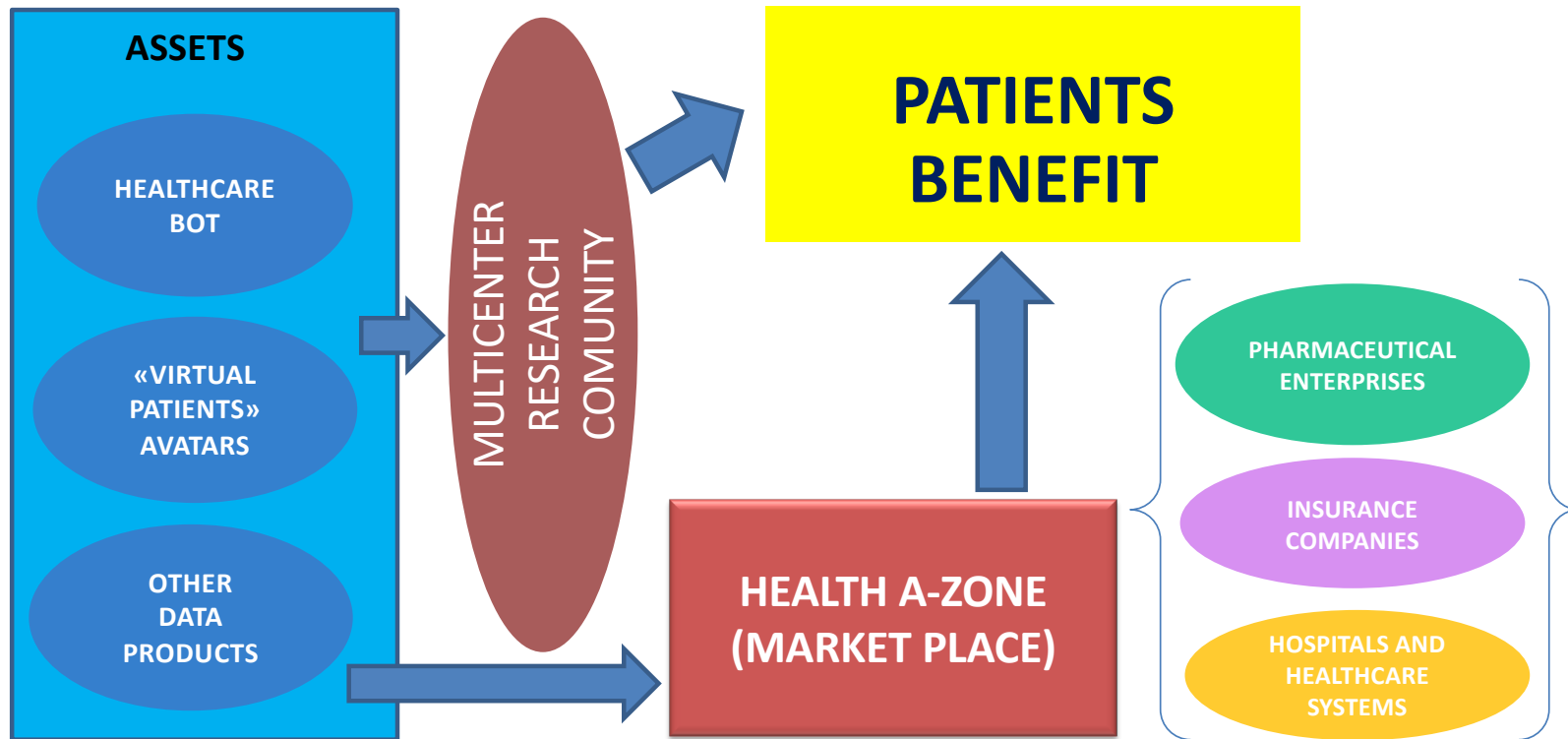




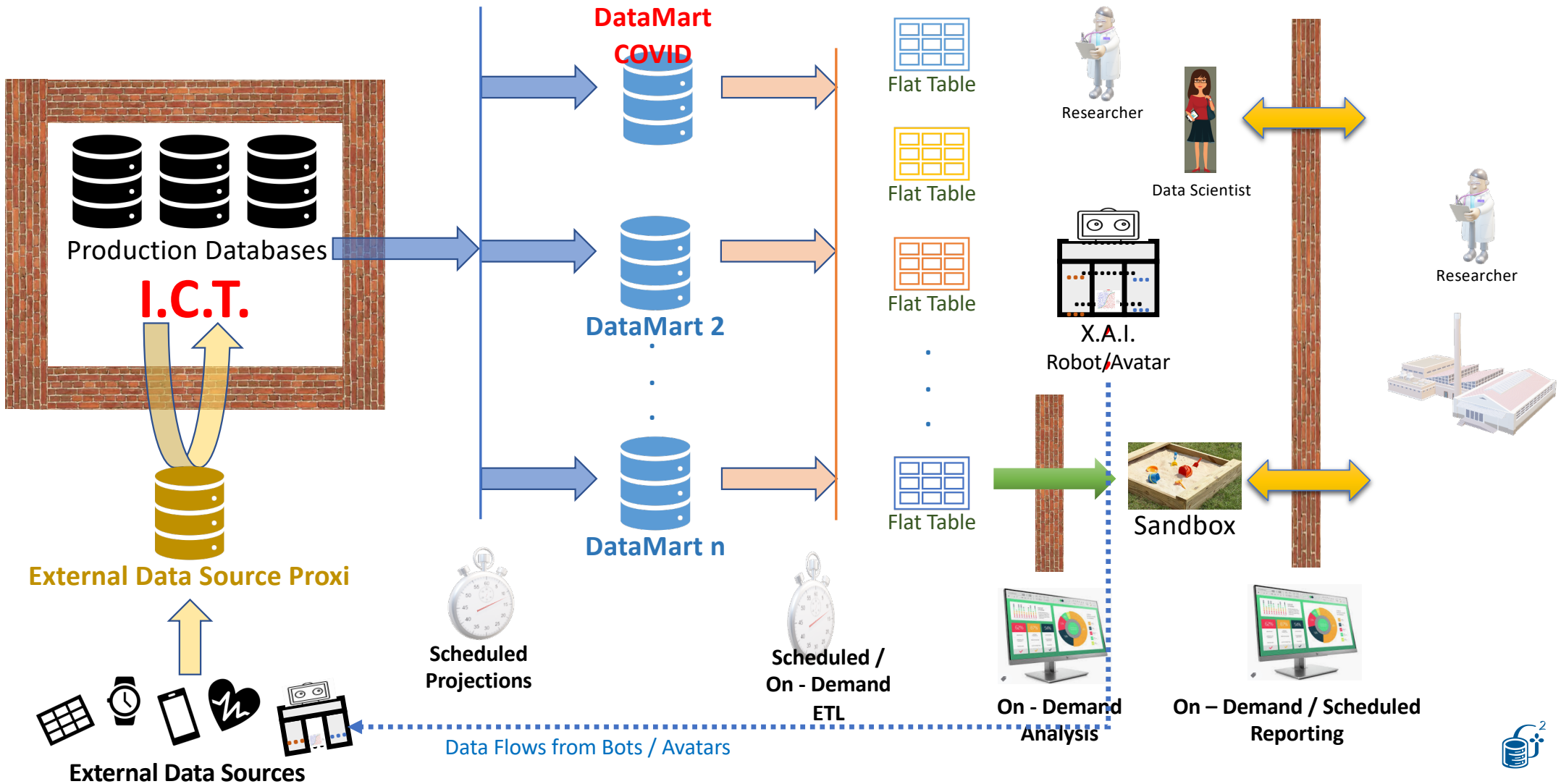
Gemelli Generator Info Science Center



Platforms → Research Communities → Patient Benefits



GENERATOR Logical Data Paths



GENERATOR AI / ML assets

1

Healthcare Bot: statistical and AI tools for decision support and predictive tasks. Designed to perform: automated data retrieval, preliminary data analysis & rapid learning, prediction and risk scoring processes, independent validation, clinician-oriented reporting

2

Avatars: clinical decision algorithms trained on historical patient data to create “virtual patient”. Designed to help predicting prognosis and efficacy of experimental therapy with personalized care for different class of patients; support and run virtual trials, combined with classical clinician study design for clinical trials

3

General **Synthetic Data Products** that provides insight from historical clinical data to support virtual trials and enable open innovation for cooperation between Reserch, Industries and Patient communities



CRITIC.Bot

Aim: predict time-to-delivery for exams requested by the ER department

Data: 7.5M individual data points for 170k ER accesses (2017-2018)

Methods: clustering of exams into classes and regression models with hour of day, day of week, and patient triage as predictors

Results: the model has a mean absolute error (MAE) of less than 10 mins in 90% of test cases. The average MAE on test cases is 6 mins.

Model Dissemination: A website was developed to use the model

***Process Healthcare BOT* → automated support for clinician and healthcare managers to design the most effective and compliant process across the treatment or diagnosis for patients/patient groups;**



BACTERIUM.Bot

Aim: early detection system for bloodstream infections (BSI) and validation of best practices based on decision support systems.

Data: 8500 consultancies and 7500 patients (2016-2018)

Methods: logistic model with renal failure, solid tumor, dialysis, previous sepsi, urea nitrogen, white blood cells, platelets, pressure, dyspnea, tachycardia, fever, bladder catheter, venous catheter and hypoxemia as predictors

Results: the model has a negative predictive value of 93% of test cases and a sensitivity of 82%. The average MAE on test cases is 6 mins.

***Guardian Healthcare BOT* → alerts clinician and healthcare managers about risks of emerging pathologies or negative outcome for a treatment**



FOCUS ON COVID -19

On going projects

Guardian CoronaVirus BOT

Predict risk of disease /critical evolution → faster execution

Hospitalization phase

- Key alert / detectors
- Clinical + Image (RX / ECO / TAC)
- Likely evolution to IV / intensive care

Pre- post- Hospitalization phase

- Link with Tele Medicine / Remote Assistance
- Early symptoms detection
- Additional exams (eg breathing tests, portable ecography ...)
- Support to patient/family phisician
- Link with wearable devices
- Leveraging AI for reusable best practices and specialized remote support

Process CoronaVirus BOT

Combine clinical evidences, AI-driven learning, logistic information

Best hospitalization path

- COVID Hospital
- Connected support structures

Optimal use of critical resources

- Hyperventilation, assisted breathing unit
- Intensive care structure
- ...



Data Structure (Mart/Big Data), Brokers, AI/ML techniques, Advanced Web Design/Development

1. Data Mart

2. Radiomics
Integration

3. Text Mining
Integration

4. Bot / Avatar

5. Distributed
Learning

6. Fast
Research
Facilities

7. xAI
interfaces and
Sandbox

Fast testing of clinical
hypotheses

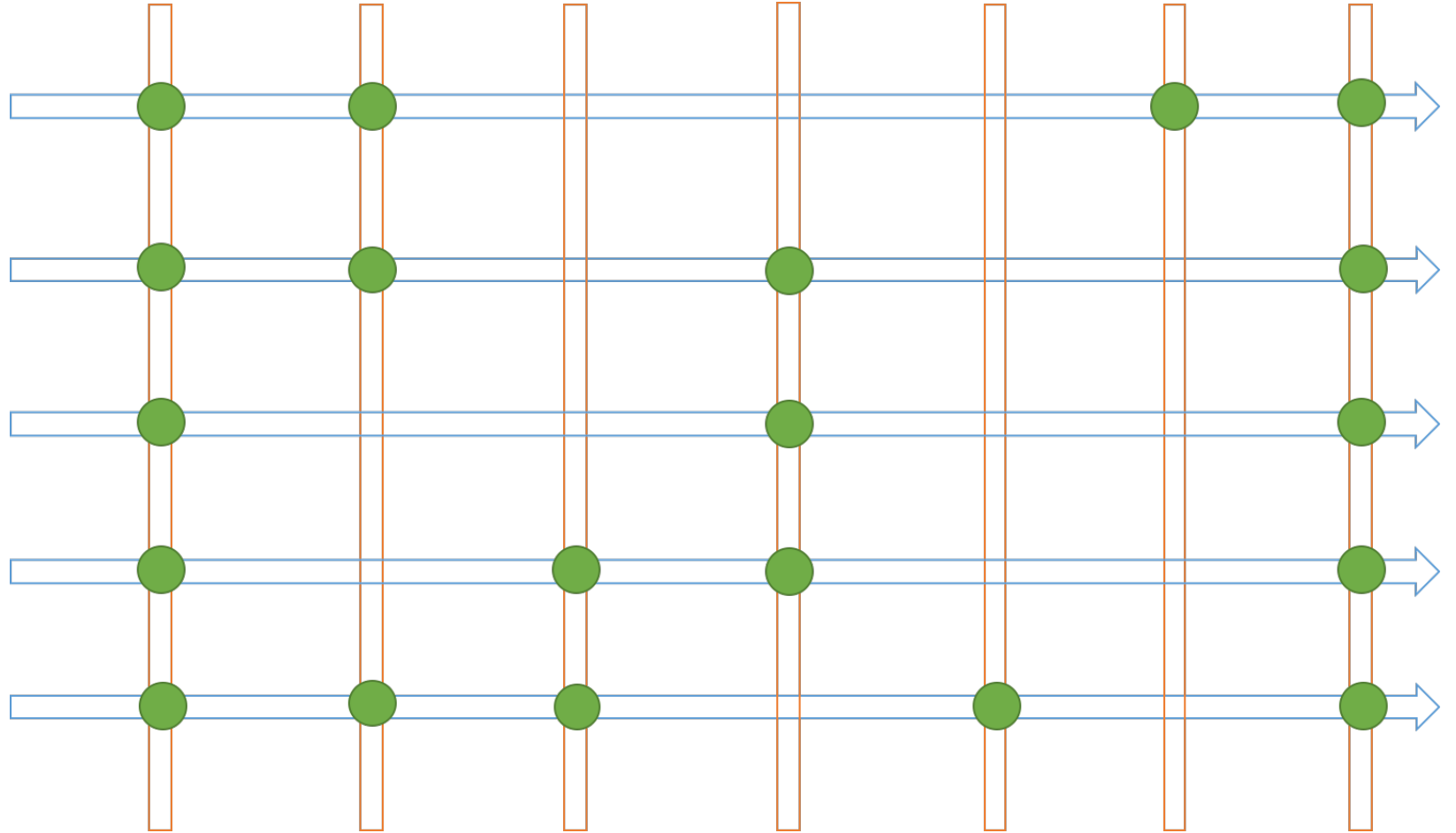
Predictive System for
Rapid Diagnostic

Live Screening and
Advising system

Clinical path
Optimizer

Big Data Analyzer w.
Data augmentation
and Text analysis

Clinical Research Verticals, External Service Factory



Data Structure (Mart/Big Data), Brokers, AI/ML techniques, Advanced Web Design/Development

PARTNERSHIP / SERVICE MODELS

IT Developments

- Big Data / Data Mart / Data Hub
- Web Design & Development

Advanced algorithms

- AI / Machine Learning
- Advanced Web Methods

Data Science / AI & Machine Learning

- Statistical Methods → Machine Learning
- Partnering on Clinical Verticals (including Industries)

JOINT PROJECTS

**HIRING IN GENERATOR
TEMPORARY ASSIGNMENT**

Clinical Research Verticals, External Service Factory