PRO.M.I.S.
Programma Mattone Internazionale Salute

CONFERENZA

"Artificial Intelligence and Chronic disease management"

Mobilizing healthcare for you with big data

18 – 19 Giugno 2018
Palazzo della Provincia Autonoma di Trento
P.zza Dante 15
TRENTO

Giulia Pellizzon
Arsenàl.IT - Regione Veneto

Who is Arsenàl.IT?

Arsenàl.IT is a voluntary consortium of 9 LHAs, 2 HTs and one oncology research center

arsenàl.IT
centro veneto ricerca e innovazione per la sanità digitale

It was established 12 years ago to align and make interoperable the systems of Local Health Authorities and Hospital Trusts and create an integrated network of digital health services to enhance the excellences of regional context.

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Conferenza delle Regioni e delle Province Autonome

What is HIE?

"l'insieme dei **dati** e documenti digitali
di tipo sanitario e socio-sanitario
generati da eventi clinici presenti
e trascorsi, riguardanti l'**assistito**"

"the **dataset** and digital documents
from health and social-health area,
generated by clinical events now or in the past,
concerning the **patient**"

art. 12 law 179/2012, converted with law 221/2012

What is HIE?

"The concept and use of the HIE system
are intended to be extended to the various areas:
Hospital, Territorial, Social,
Prevention and promotion of health.
The tool must be unique, at the regional level
regardless of the area
from which information comes"

PSSR 2014-2017

HIE purposes

HEALTHCARE

prevention, diagnosis, treatment and rehabilitation

RESEARCH

study and scientific research in clinical, biomedical and epidemiological area

GOVERNANCE

healthcare planning, quality check and evaluation

HIE: first purpose

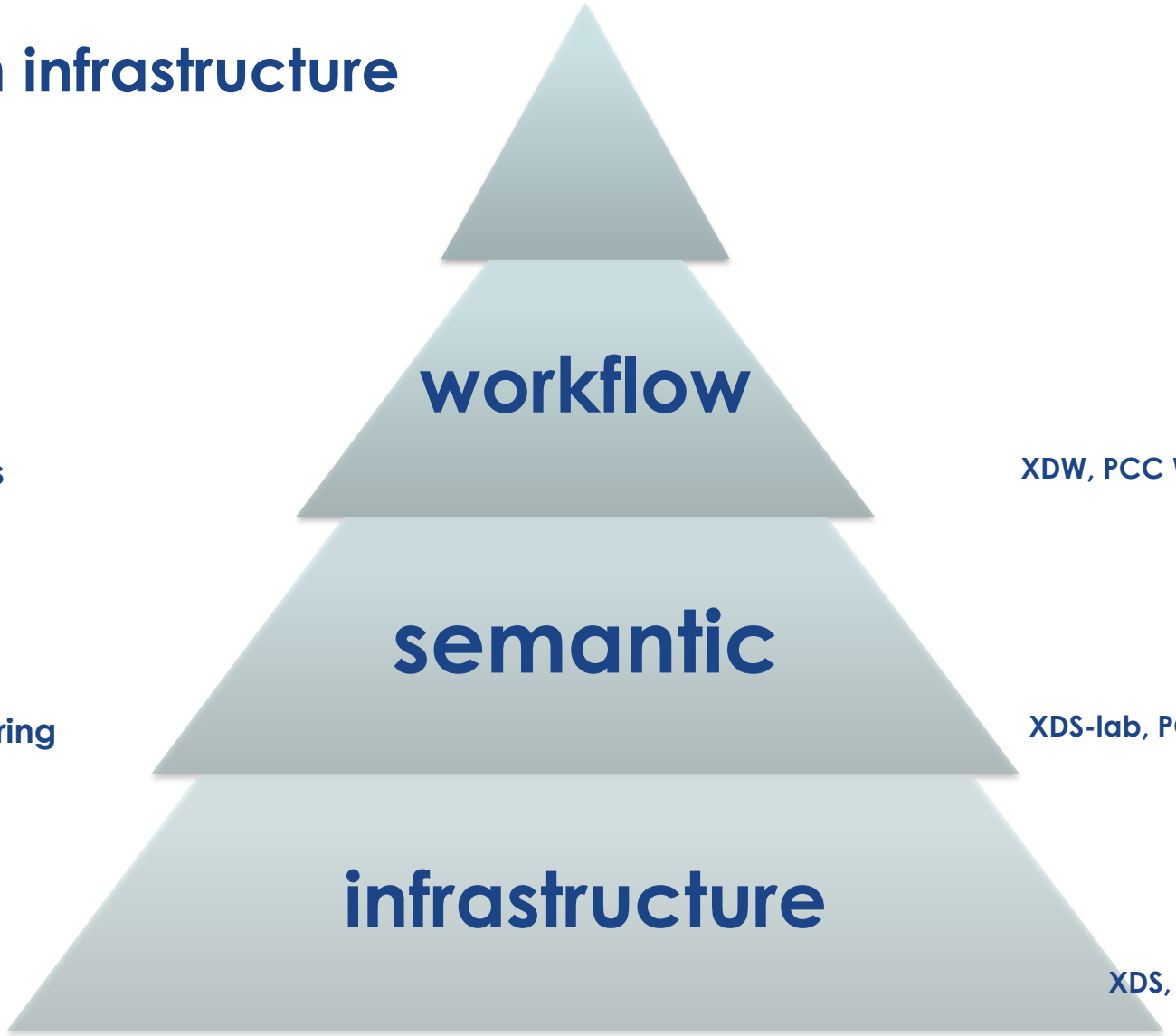
HEALTHCARE

prevention,

diagnosis, treatment

and rehabilitation

IHE system infrastructure



Clinical Pathways

XDW, PCC WD profiles

Clinical Data Sharing

XDS-lab, PCC profiles

Data Sharing

XDS, XUA, BPPC

HIE system: an integrated cloud of data

ePrescriptions
40M/year
eRefferrals
20M/year

4000 GPs

From 01.01.2017:
discharge letters,
Emergency Reports,
RX Reports, Lab
Reports, ePrescriptions,
eReferrals

70000 health workers (8000 professionals)

1330 pharmacy

ePrescriptions
and "Sanità KM Zero" app for citizens

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HIE documents at today

Dettaglio documenti disponibili nel Fascicolo

Tipologia di documento	Numero di documenti disponibili
Ricette Farmaceutiche	121.586.123
Ricette Specialistiche	64.091.607
Referto di laboratorio	6.507.119
Referto di radiologia	2.417.812
Verbale di Pronto Soccorso	1.720.404
Lettera di dimissione ospedaliera	559.084
Referto di visita specialistica	493.224
Referto di anatomia patologica	363.247
Verbale operatorio	276.167
Referto di cardiologia	35.136
Referto di gastroenterologia	21.866
Referto di diabetologia	15.485
Referto di oncologia	13.103

BUT it is not only a documents storage….

HIE system in Veneto Region

The HIE in Veneto Region is a driving force to the concept of Sanità KM Zero. This is expresses a double purpose:

- **Services** → facilitate access to services by exploiting the potential of digital world
- **Needs** → bringing the health system closer to the real needs of citizens and professionals, involving them in the process of redefining services

New paths and new tools for access to health
for citizens and operators everywhere and at any time

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Sanità km Zero

A new way of thinking:

- Reduced distances in access to services
- Increased opportunities for citizens and health professionals
- Simple, close and immediate health

All patient data available in the FSEr:

➢ Booking online
➢ Online download
➢ Online payments
➢ Telemedicine
➢ Co-creation

And not only…..

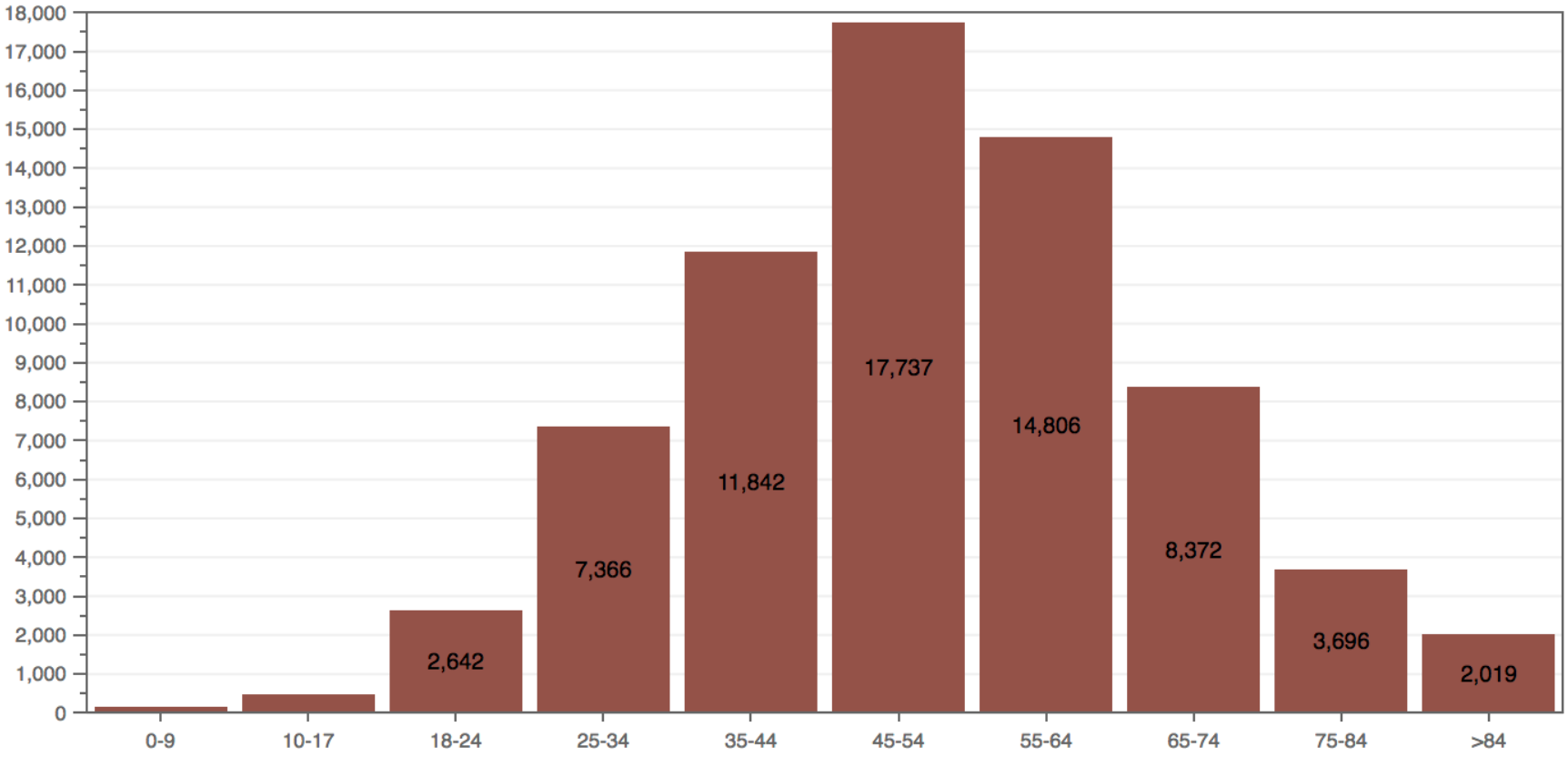
Sanità km Zero

Through this app, users could:

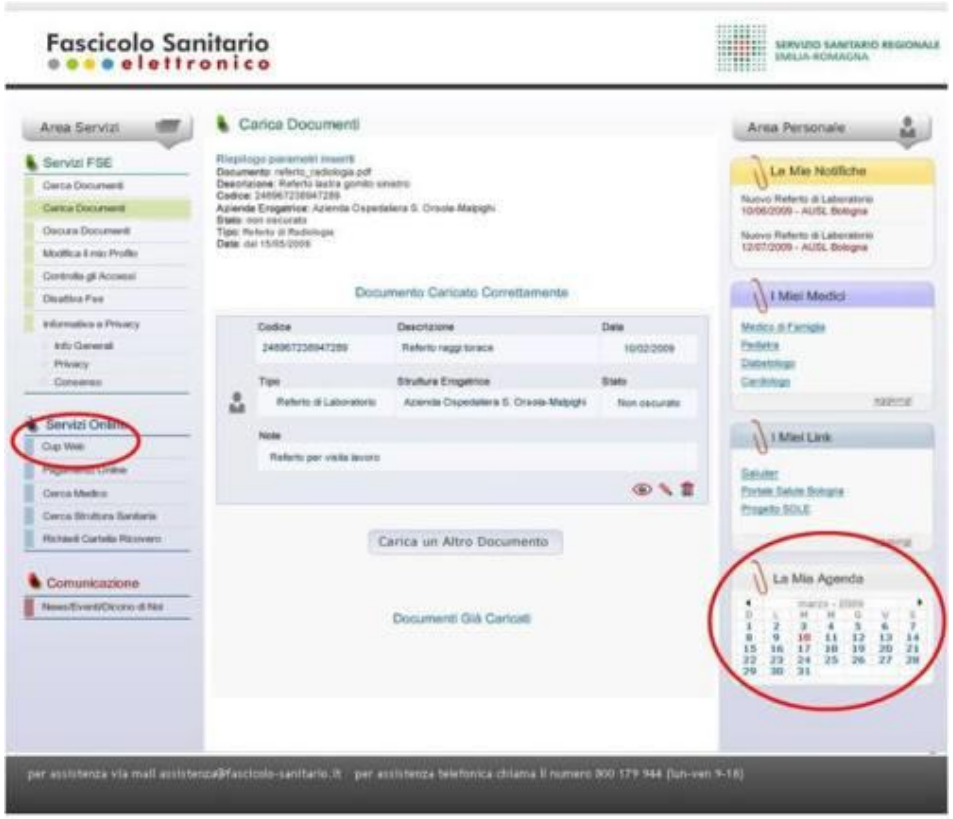
- Ask the GP for a **prescription renewal** (via e-mail, SMS, WhatsApp…)
- Receive a **notification** whenever a new ePrescription is available
- See the list of **all prescribed drugs**
- Get the prescribed drug(s) at the pharmacy without any further written authorization by their GP

Sanità km Zero

AGE ANALYSIS OF APP USE



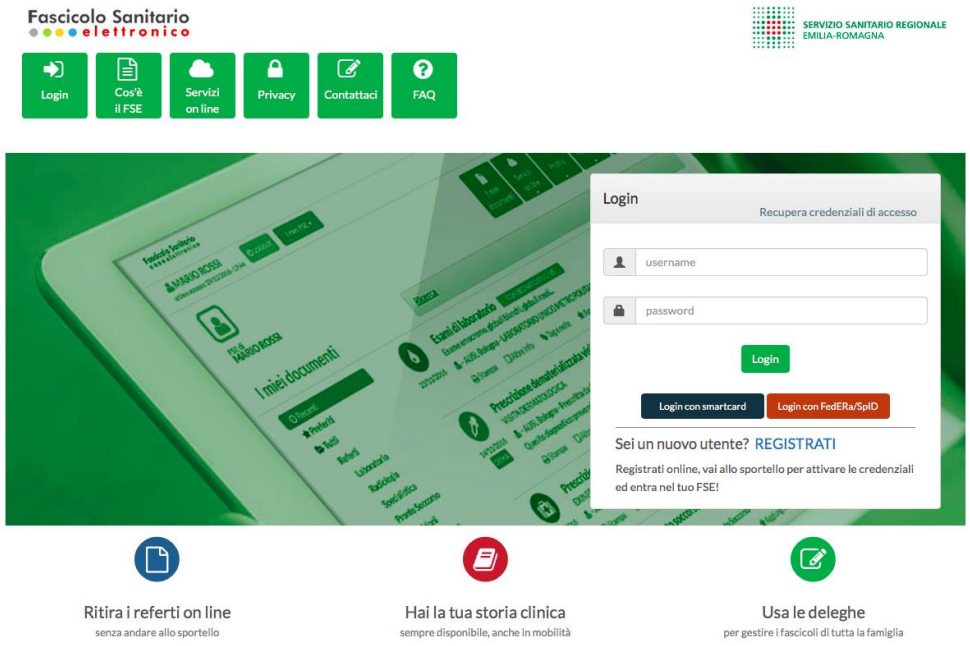
HIE first generation



The first generation of HIE systems are oriented to implement the so-called MyPage of the citizen with a consultation purpose.

In many cases, citizens can give access to health professionals to view their previous clinical data.

HIE second generation



The second generation of HIE systems are oriented towards the implementation of health services for citizens and professionals. Its are strongly based on the concept of care path and allow interactivity between citizen and operators, and between the operators themselves.

HIE third generation

Third generation of HIE system allow to share not only clinical data, but also **processes** in order to manage **continuity of care**. This architecture makes it possible to exploit the opportunities offered by third generation systems, for example **mobile applications**, social media, cloud and big data. To do this, it is necessary to "extract from traditional information systems" not only the characteristic datasets of interoperability, but also all the information and the statuses of the single activities (tasks) of clinical processes.

HIE system: other purposes

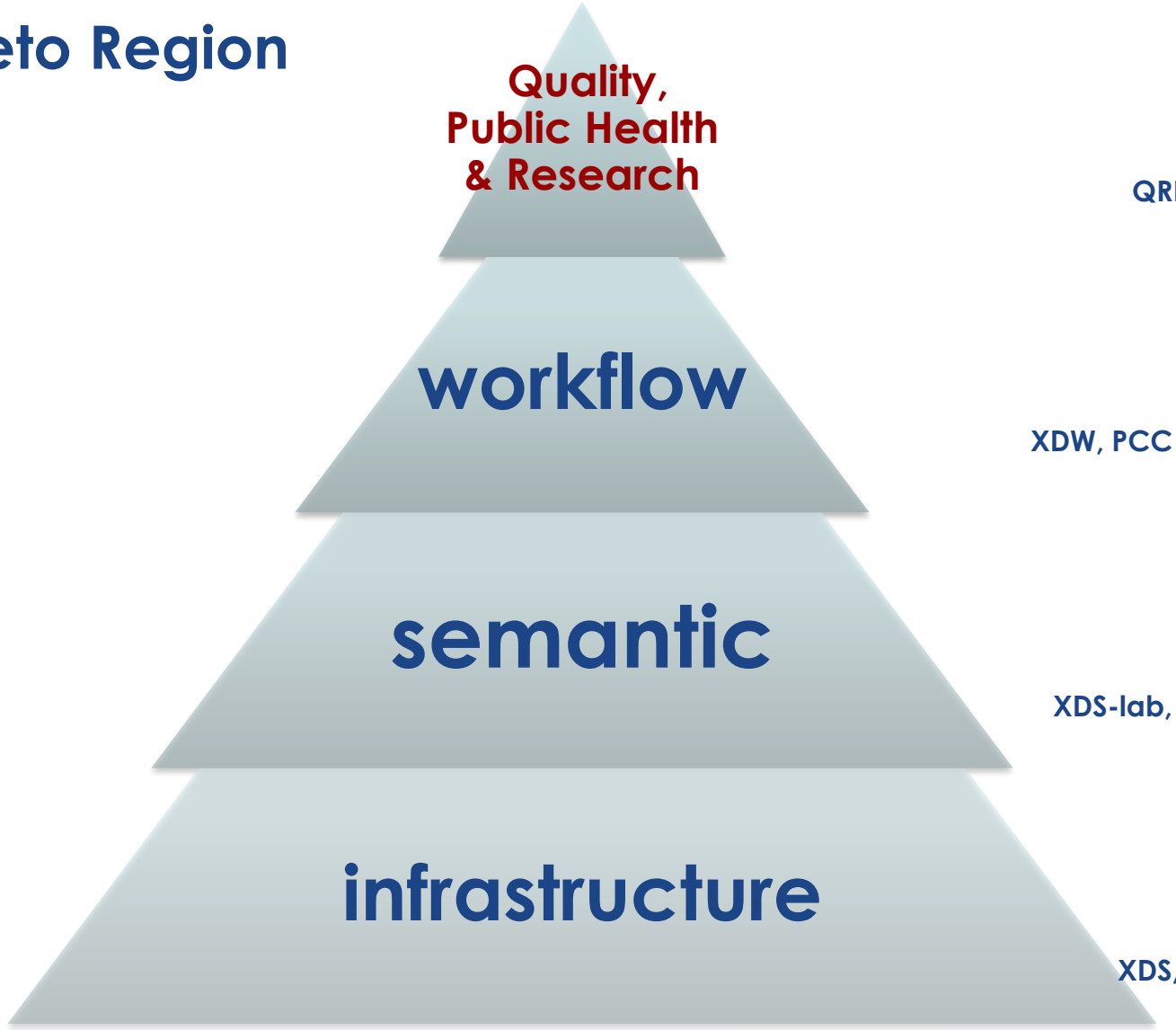
RESEARCH

study and scientific research in clinical, biomedical and epidemiological area

GOVERNANCE

healthcare planning, quality check and evaluation

HIE Veneto Region



QRPH profiles

XDW, PCC WD profiles

XDS-lab, PCC profiles

XDS, XUA, BPPC

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How to use HIE system as QRPH source

Integrating the Healthcare Enterprise

IHE

IHE Quality, Research and Public Health (QRPH)
White Paper

Using IHE profiles for Healthcare - Secondary Data Access

Published
Revision 1.1

Date: November 9, 2016
Author: QRPH Technical Committee
Email: qrph@ihe.net

Please verify you have the most recent version of this document. See here for Published versions and here for Public Comment versions.

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HIE system: not only healthcare...

Trusted Third Party
(Regione Veneto)

Research and gov purpose

iam PUBLIC HEALTH
iampublichealth.org

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Some example of big data in Arsenàl.IT

Big Data purposes in Arsenàl.IT

- ✓ Project management/monitoring (e.g. for Arsenàl.IT to monitor the development of the project and for our LHA partners to see if they reach the annual technical objectives)
- ✓ Health services management (e.g. for LHA manager people to provide availability of specialist visits/exams according to real requests)
- ✓ Quality purposes (e.g. to monitor if GPs are prescribing according to guidelines or Regional/National regulations)
- ✓ Public health surveillance, disease control (e.g. chronic diseases related to environment data)
- ✓ Research
- ✓ Predictive and personalized medicine & Advanced Support Systems

Features:

✓ Real-time data collection
✓ Completeness and precision of information
✓ Different levels of granularity (Regional/LHA/doctor/patient data)
✓ Possibility to manage access to dashboards according to user's role and identity

Purpose 1: Project management (I)

Fascicolo Sanitario Elettronico regionale

Documenti disponibili nel Fascicolo

198.100.377

Cittadini che hanno attivato il Fascicolo

476.661

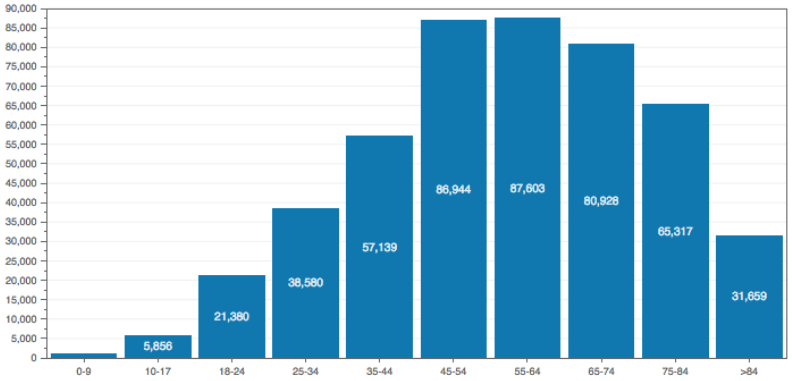
Cittadini che utilizzano l'app Sanità km zero

67.397

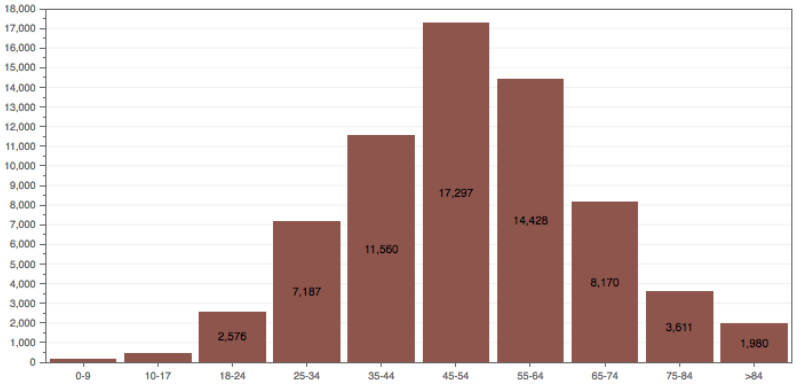
MMG attivati alla raccolta del consenso

20.68 %

Patients with signed consent

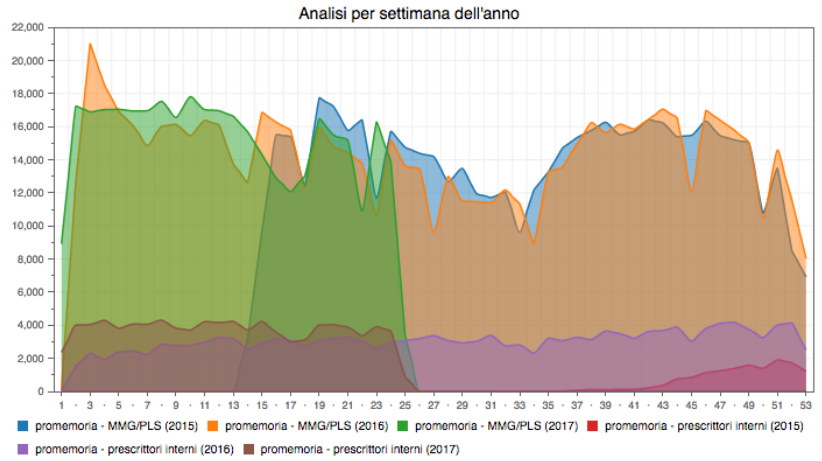


Patients with app access



Purpose 1: Project management (II)

Ricette specialistiche prescritte dall'Azienda

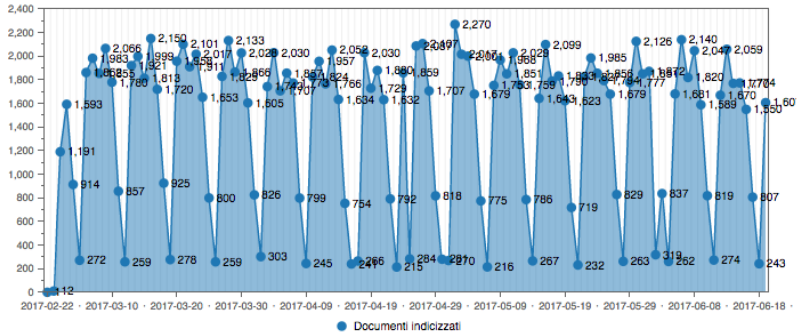


Indicatore F2.1: Referti di Chimica Clinica e Referti di Microbiologia

Valore dell'indicatore stimato sugli ultimi 7 giorni

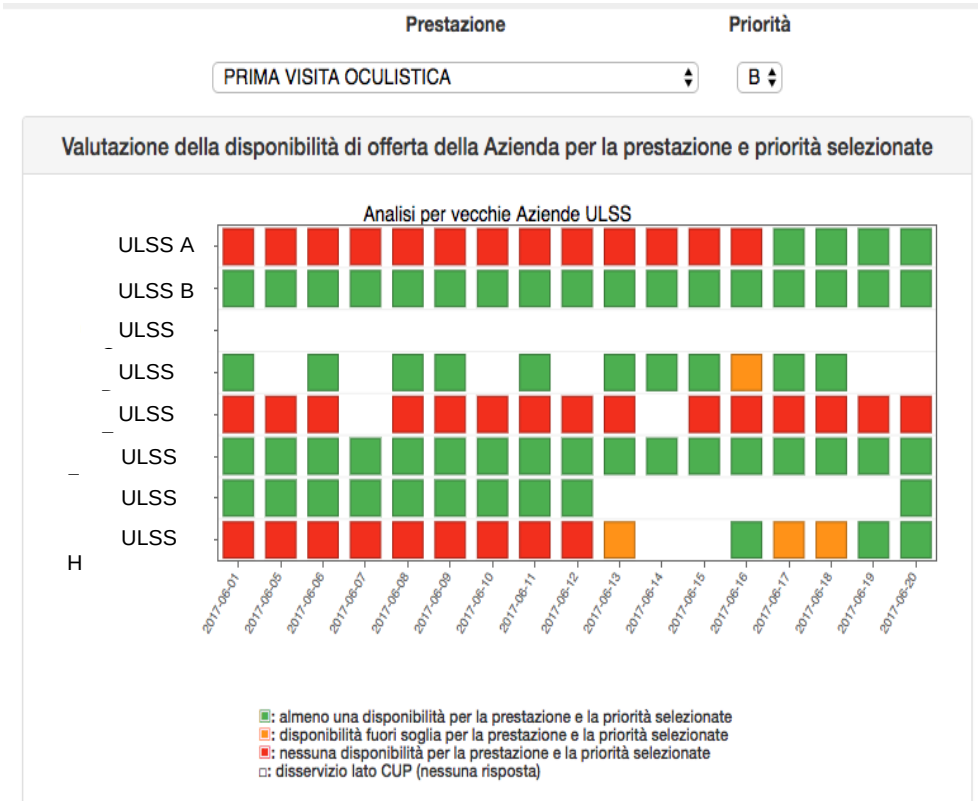
Stima doc. indicizzati (numeratore)	Doc. firmati (denominatore)	Stima indicatore (%)
39240	44125	88.93

Andamento temporale per data di creazione (numeratore)

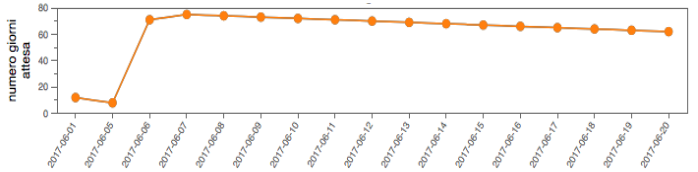


Purpose 2: Governance (I)

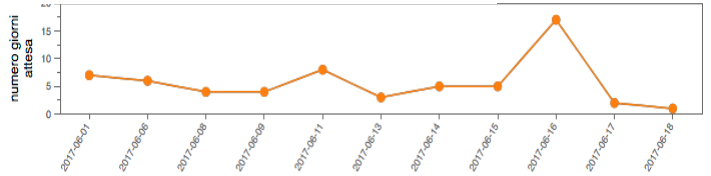
Waiting lists monitoring



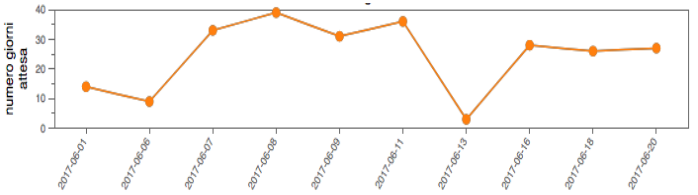
Urgente (soglia 1gg): media 61,76



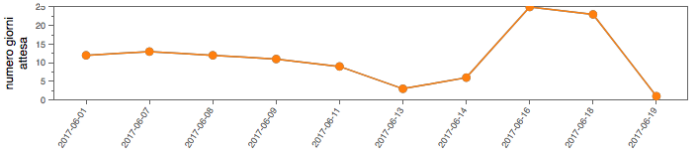
Breve (soglia 10gg): media 5,64



Differita (soglia 30gg): media 24,6

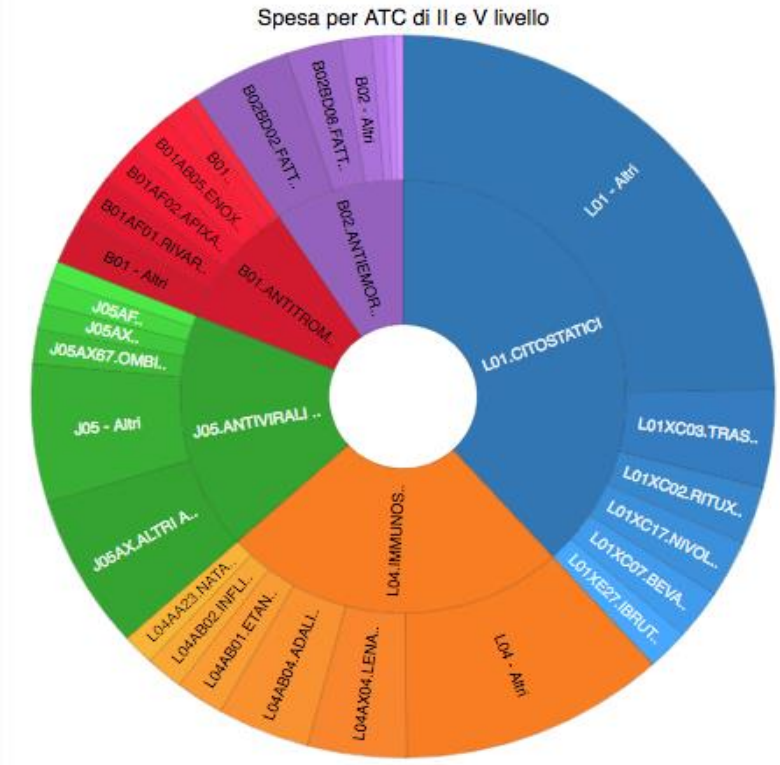


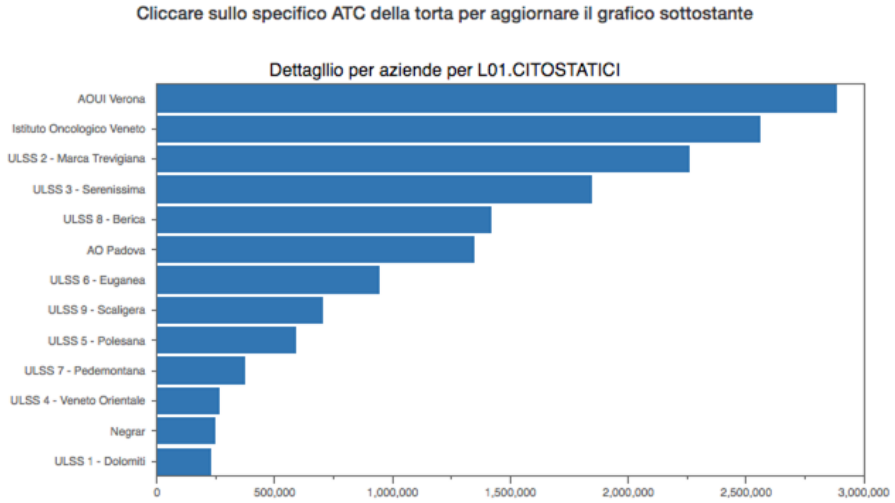
Programmata (soglia 180gg): media 11,5



Purpose 2: Governance (II)

Drug expenditure monitoring





Esporta la tabella 8 del report

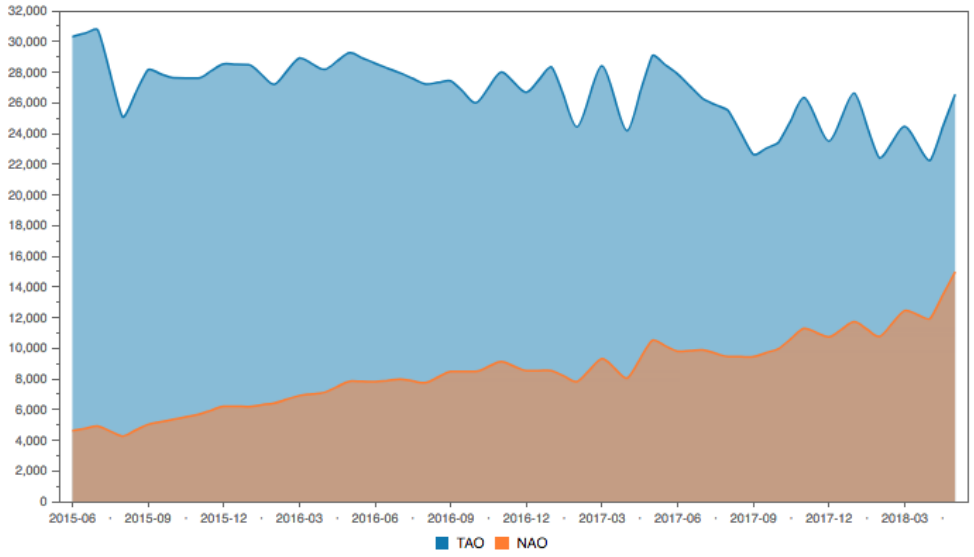
Esporta la tabella 9 del report

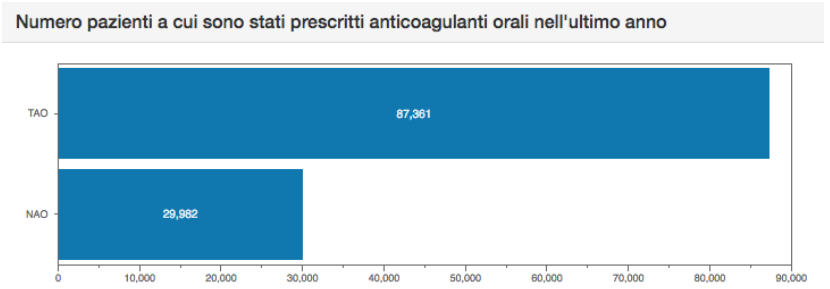
Esporta la tabella 10 del report

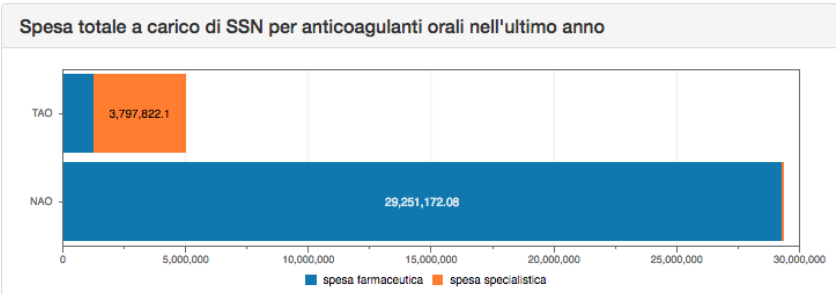
Purpose 3: Public Health (I)

AVK – NOAC impact monitoring of the introduction of new drugs

From June 2015 at today
Number of patient with AVK/NOAC treatment



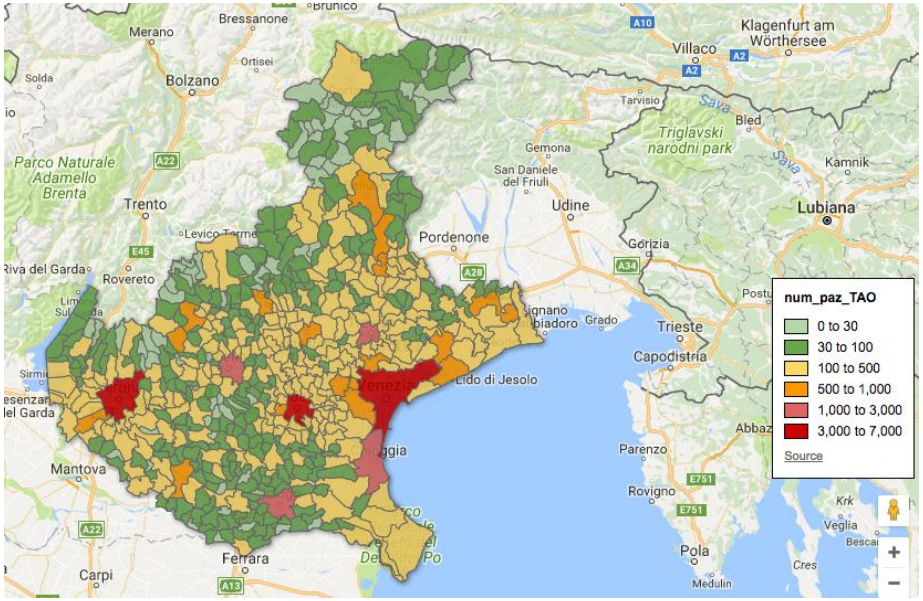




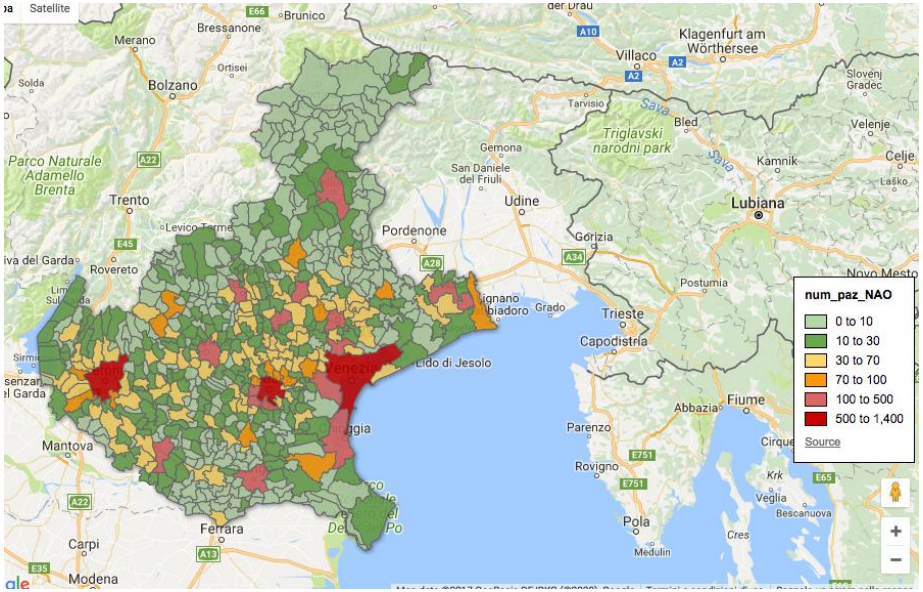
Purpose 3: Public Health (II)

Number of patient

AVK



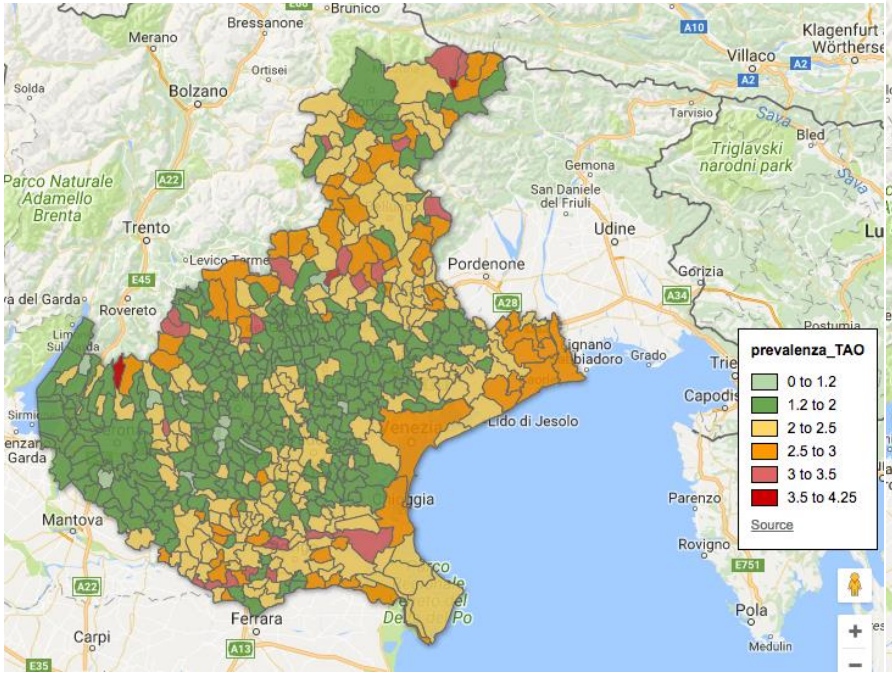
NOAC



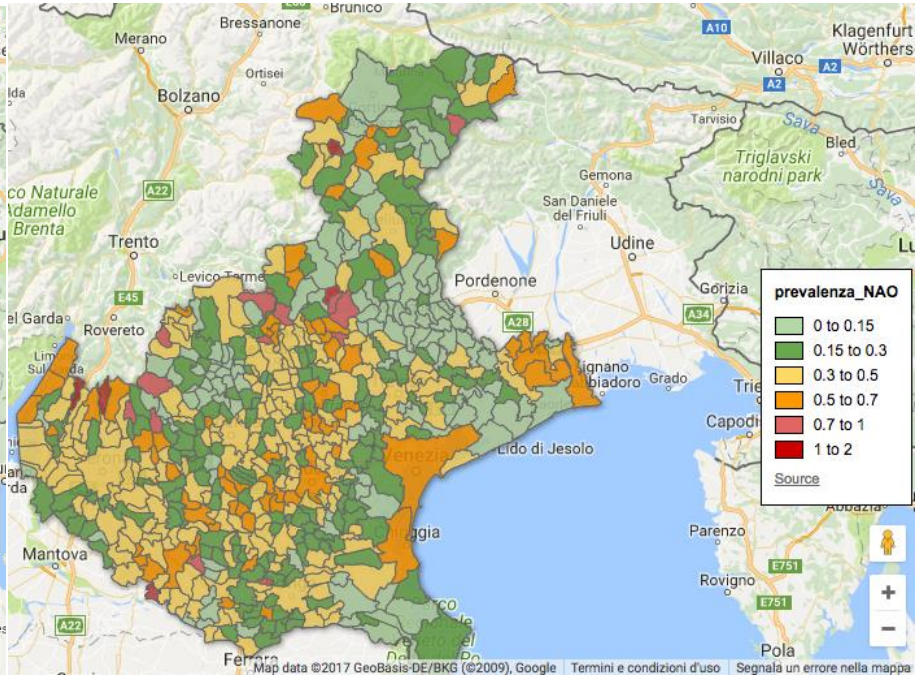
Purpose 3: Public Health (III)

Patient prevalence

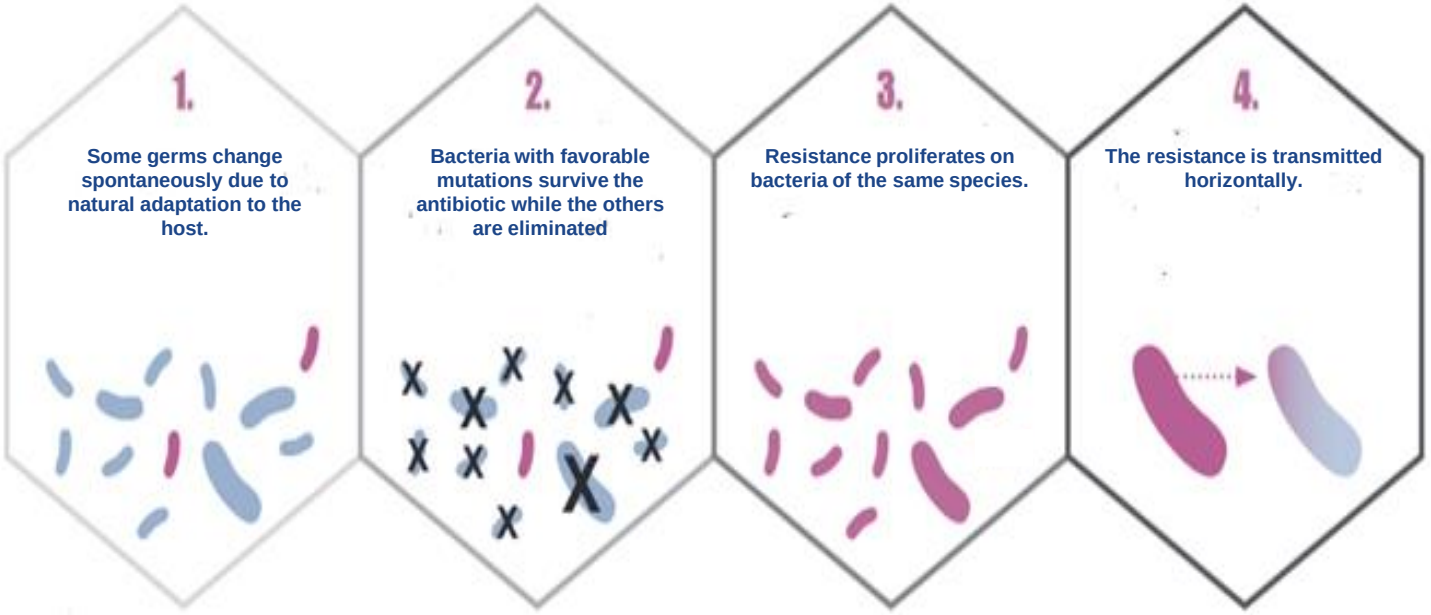
AVK



NOAC



Purpose 4: biosurvellance (I)



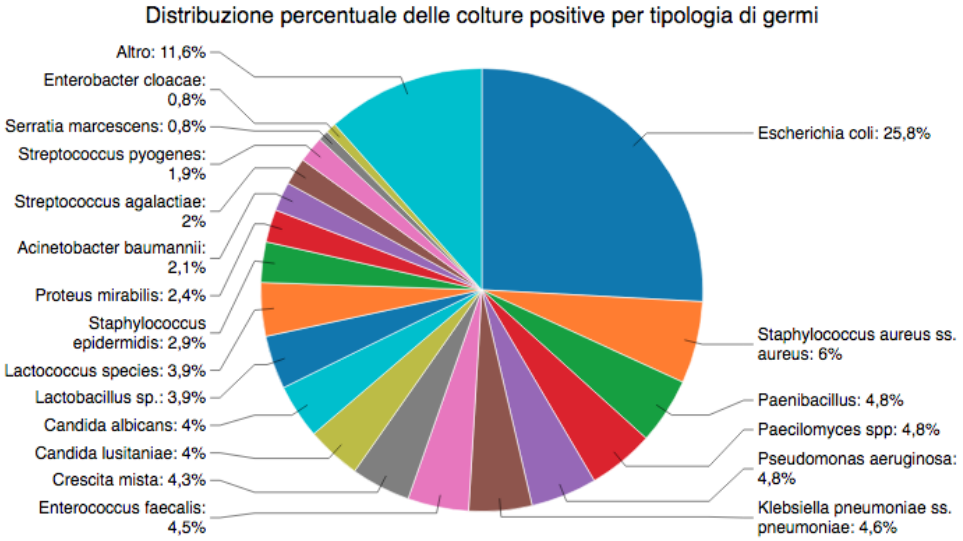
The general framework:

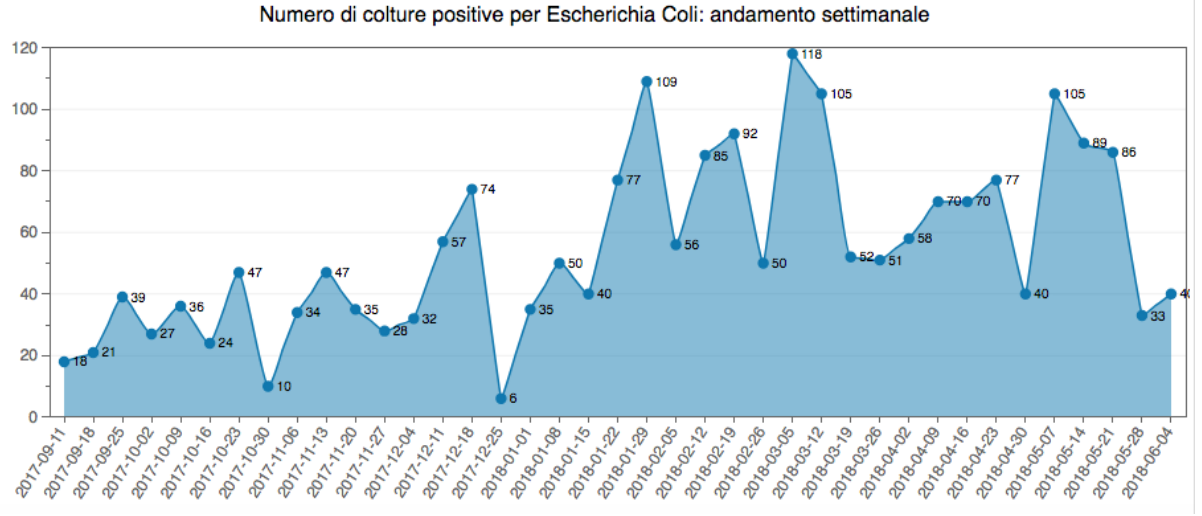
- The spread of increasingly resistant bacterial strains
- The ineffectiveness of antibiotics
- The absence of new generation antibiotics

- Difficulty in care
- 50,000 deaths each year in Europe and the USA
- Need for a regional and national monitoring plan of bacterial resistance
- Need for real-time monitoring of infections
- Focus on risk environments: hospitals and nursing homes, incentives for screening
- Prescribing appropriateness
- Patient compliance

Purpose 4: biosurvellance (II)

September 2017 - LHA example (Lab reports from EHR)





Why ML and AI in Healthcare?

1. To test the application of **ML and AI** to the enormous amounts of data made available by the HIE system and by the new digitization processes

2. Develop **ML models** with the possibility to link them to the HIE system as support services to the clinical world

3. Enable, through the application of **ML and AI**, the transformation from an initiative medicine to a predictive medicine

Purpose 5: Research & 4P Medicine - diabetes (I)

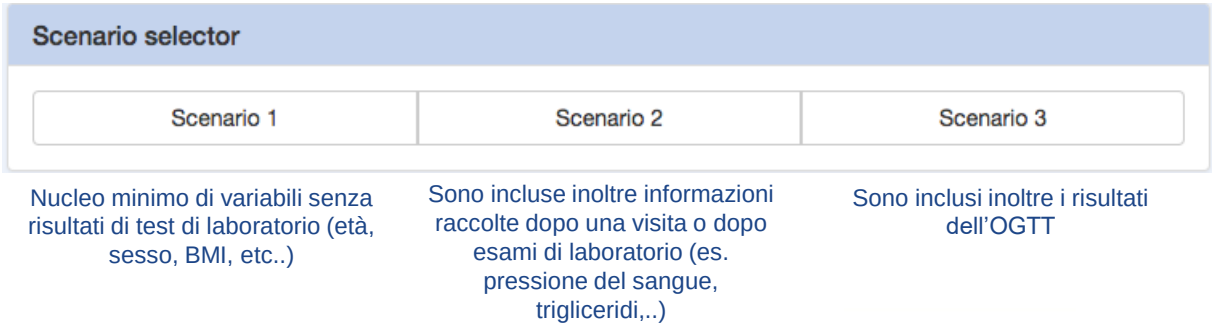
HAPT2D

High Accuracy of Prediction of Type 2 Diabetes

- **HAPT2D è un prediction tool per identificare pazienti a rischio per lo sviluppo del diabete.**
- **Esso non è un tool diagnostico. E' stato concepito per persone senza un'attuale diagnosi di diabete allo scopo di evidenziare il rischio per una persona di sviluppare il diabete di tipo 2 nei successivi 2 anni.**
- **Attualmente tale tool è designato per la popolazione Spagnola e Finlandese.**
- **Sito web in fase prototipale sviluppato da Arsenàl.IT in collaborazione con dei professori dell'Università di Padova.**

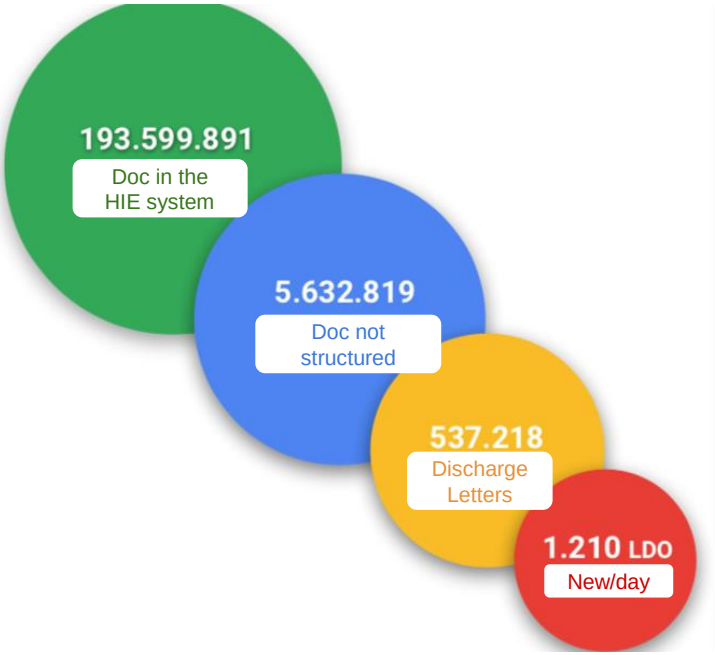
References:
Di Camillo B, Hakaste L, Sambo F, Gabriel R, Kravic J, Isomaa B, Tuomilehto J, Alonso M, Facchinetti A, Groop LC, Cobelli C, Tuomi T. "High accuracy of prediction of Type 2 diabetes with a model combining basic and advanced data depending on availability." Diabetes Care (*submitted*)

Acknowledgements:
FP7-MOSAIC project funded by the European Union under the 7th framework program (grant agreement FP7-600914).



Purpose 5: Research & 4P Medicine (II)

The Project



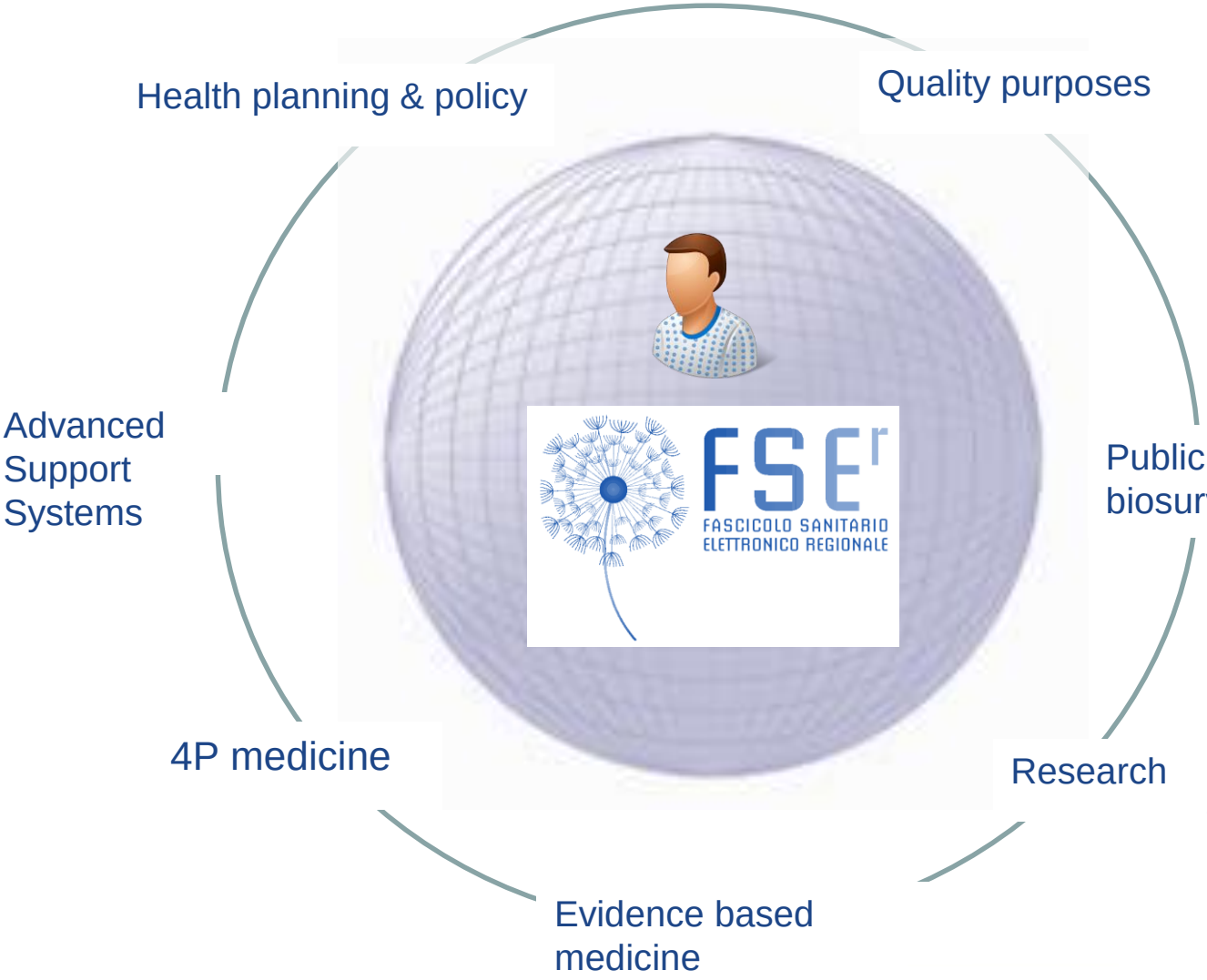
Goal

Test a ML application in the healthcare world and specifically to the NOT structured clinical documents present in the HIE system

In detail

Implementation of an automatic classification system of DLs using Machine Learning (ML) techniques, with automatic identification of the diagnosis present in the document.

The value of data



"The BIG in big data matters, but a lot less than many people think. The more pressing issue is being able to use and make sense of data"
Steve Lohr

Grazie per la vostra attenzione

Giulia Pellizzon - gpellizzon@consorzioarsenal.it

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