Deusto
eVida

Deusto
Universidad de Deusto
University of Deusto

eVida 4.0

Health and Well-being

Smart and Connected

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The Power of Connected Health

Welcome to the group of connected healthcare eVida 4.0, where smarter, faster, more accurate interactions between people, devices, data, analytics, and applications are transforming the way healthcare is delivered.

Population Health

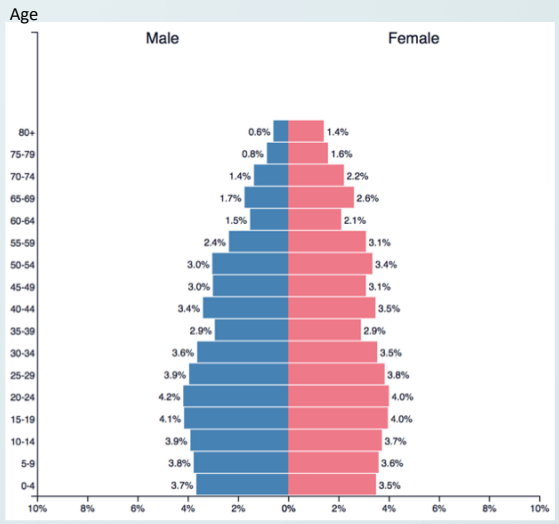
Aging

Talent

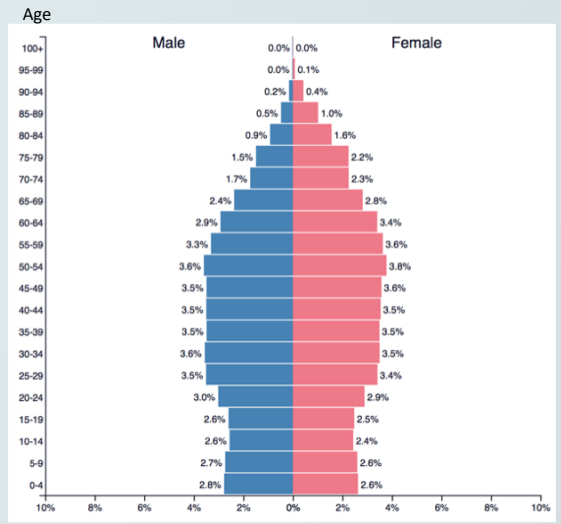
Diseases

Healthcare Satisfaction

Increased life expectancy will bring the number of people aged 65+ worldwide to over 604 million, or 10.8 percent of the total global population.That number is anticipated to be even higher In Western Europe (nearly 21 percent) and Japan (28 percent).



Europe pyramid population in 1980

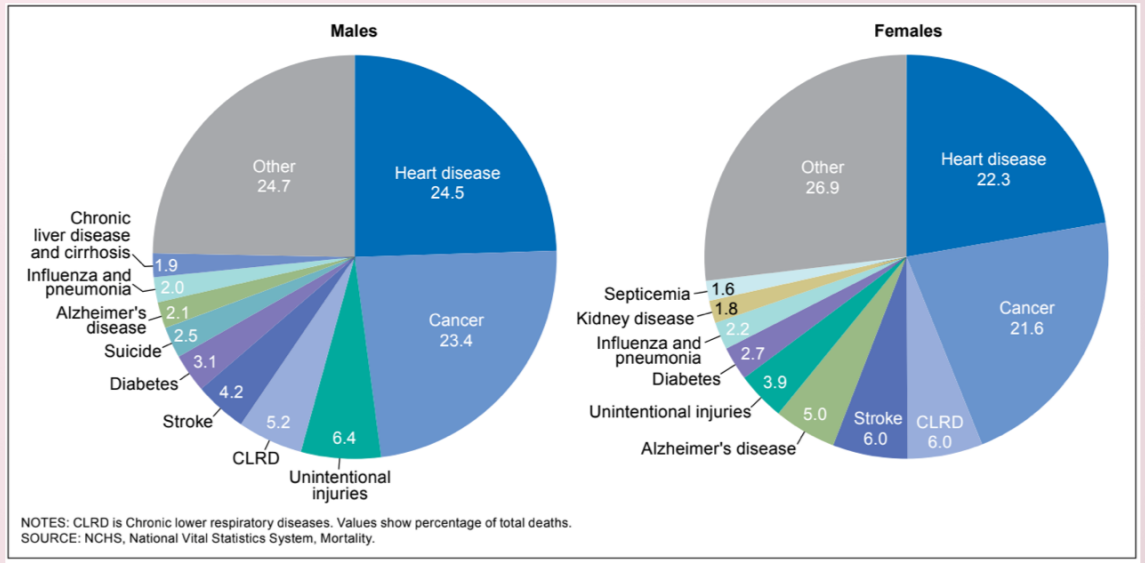


Europe pyramid population in 2015

Source: United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 1995/2015 Revision.

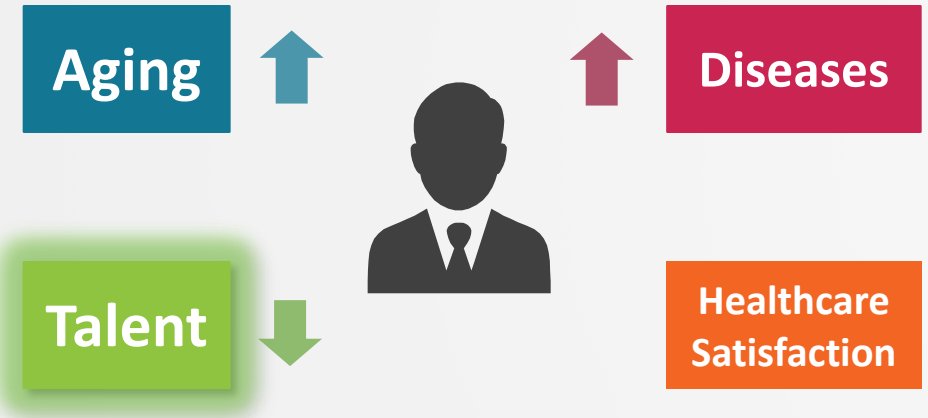
Population Health

The high incidence of **chronic disease** consumes a disproportionate amount of health resources.
In the United States, an estimated 75 percent of healthcare dollars are spent on chronic disease care, and two out of every three Medicare patients suffer from at least two chronic diseases.

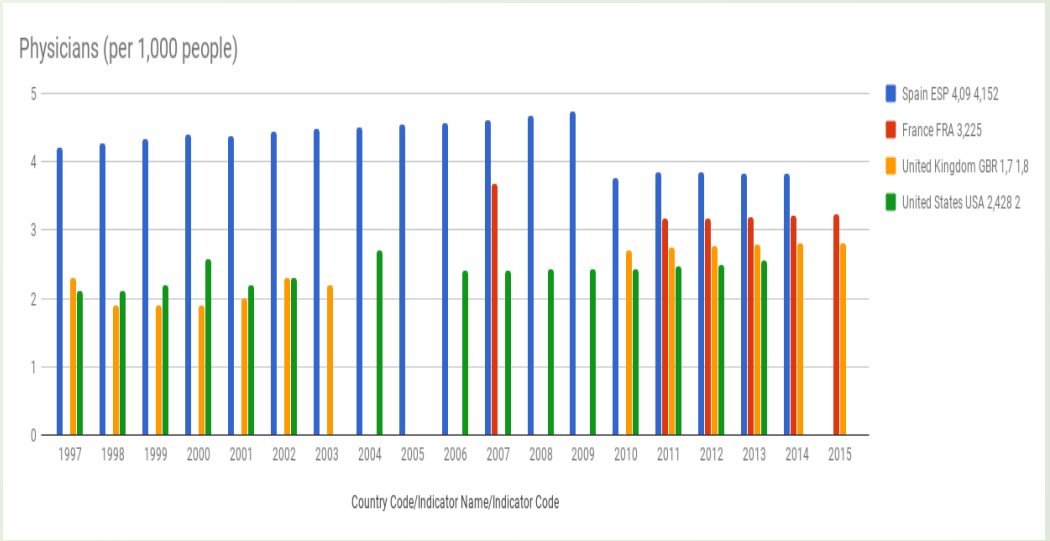


Percent distribution of the 10 leading causes of death, by sex: United States 2014

Population Health

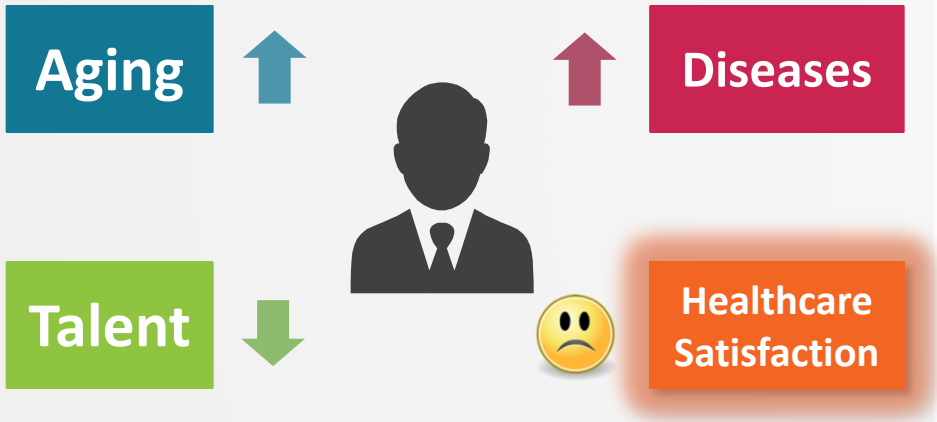


Countries all over the world struggle to match the demand for trained medical professionals, mainly physicians and nurses.

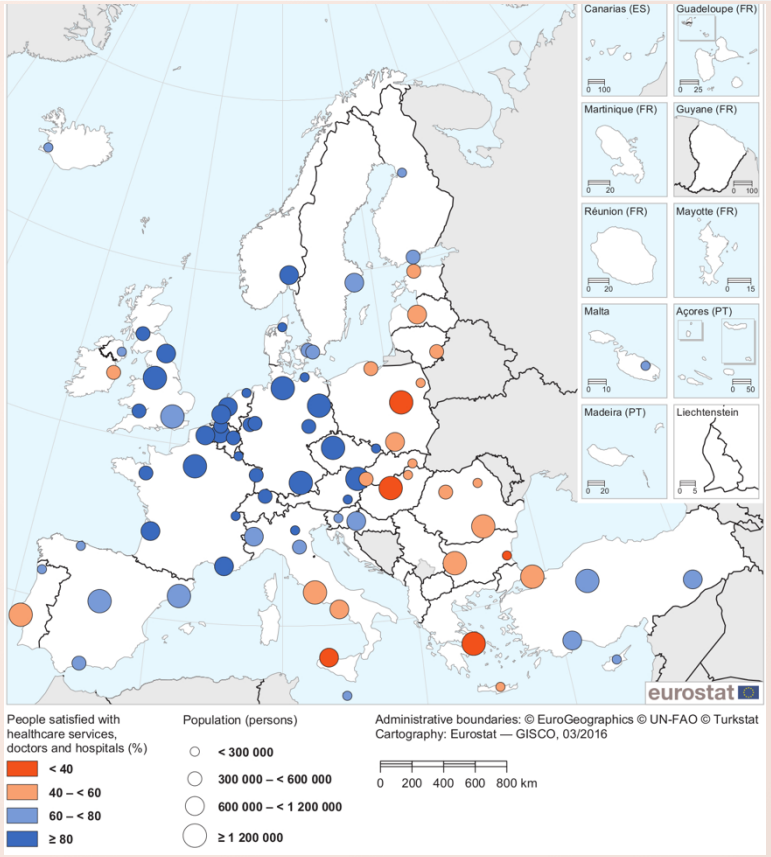


Source: World Health organization global workforce statistics, OECD, supplemented by country data

Population Health



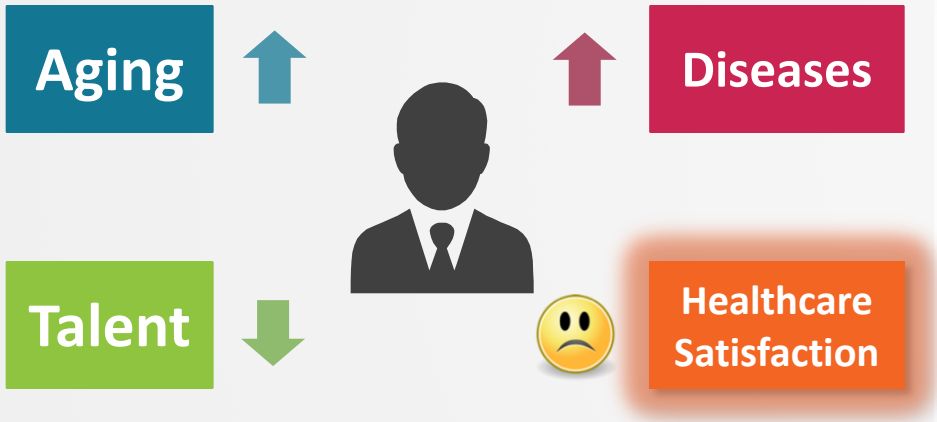
A considerable portion of the population is not satisfied with its healthcare services, doctors and hospitals, for instance: Portugal, Italy, Greece, Poland and Ukrain, etc …, (as shown by the light-blue and orange shading in the map below)



Proportion of people who are satisfied with healthcare services, doctors and hospitals in their city in Europe in 2014

Source: Eurostat (urb_percep) and (urb_cpop1)

Population Health



Low-, middle- and high-income Americans show similar satisfaction (around 65%).[1] Hospital facilities and services as well as treatment efficiency are the major concerns that need to be inhanced while decreasing the costs, in order to heighten the level of healthcare satisfaction of the population

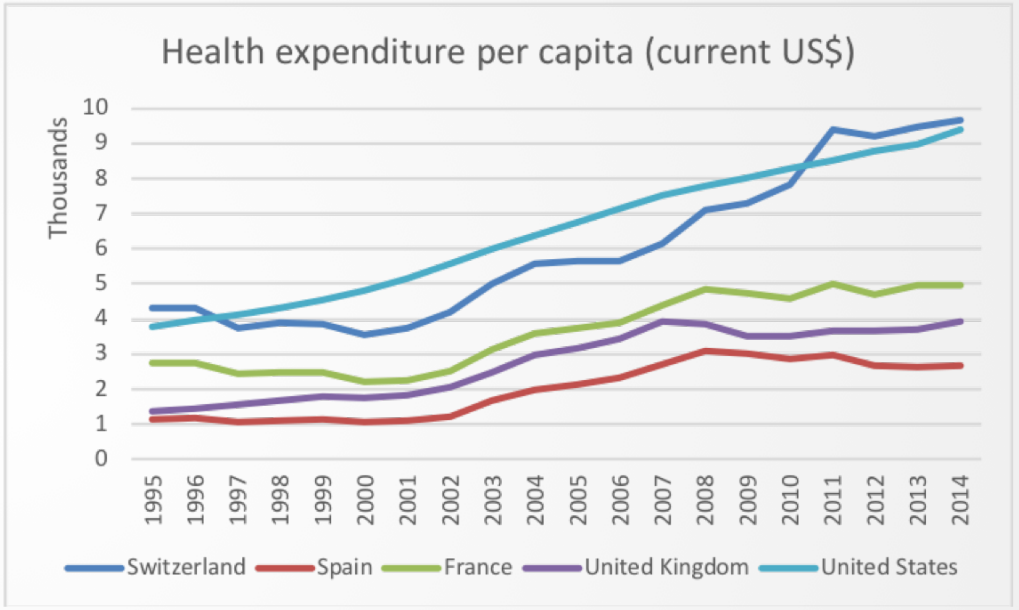
Annual income	% Satisfied
Less than $36,000	64
$36,000-$89,999	63
$90,000 or more	67
Age	
18-29	67
30-49	59
50-64	61
65+	77
Race	
White	63
Black	72
Hispanic	69
Asian	70

Satisfaction With the U.S. Healthcare System, by Key Demographic Groups in 2016

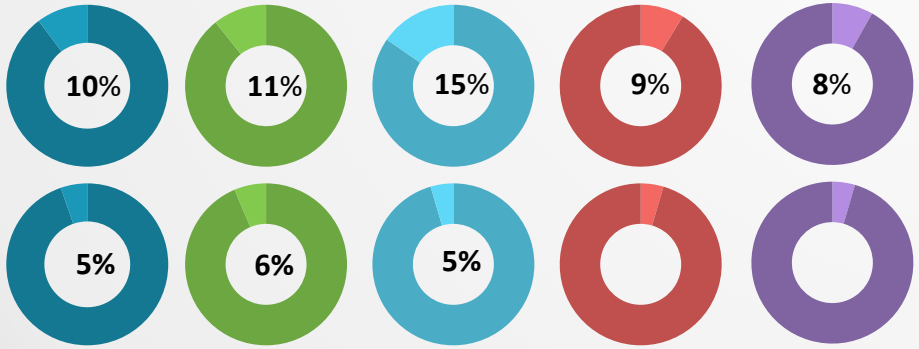
http://news.gallup.com/poll/195605/americans-satisfaction-healthcare-system-edges-down.aspx

Healthcare
cost

	Switzerland	France	USA	Spain	UK
In 2014	9673 $	4958 $	9402 $	2658 $	3935 $
In 1995	4308 $	2744 $	3788 $	1129 $	1364 $



Health expenditure per capita in 2014 (current US$)



Percentage of health expenditure VS national GDP in 2014

An increasing trend of health expenditure all over the world …

Chronic diseases and their major risk factors place huge economic demands on our nation. For example, from 1987 through 2001, increases in obesity prevalence alone accounted for 12% of the growth in health spending in USA. Without concerted interventions, these and other costs can be expected to increase in the years ahead

World Health Organization Global Health Expenditure database

Healthcare

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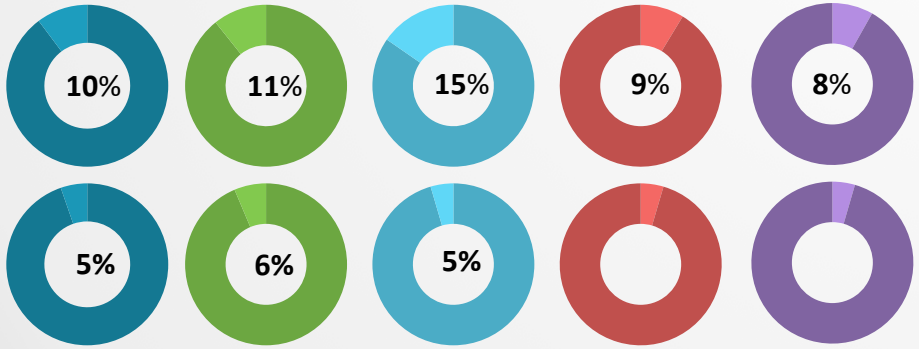
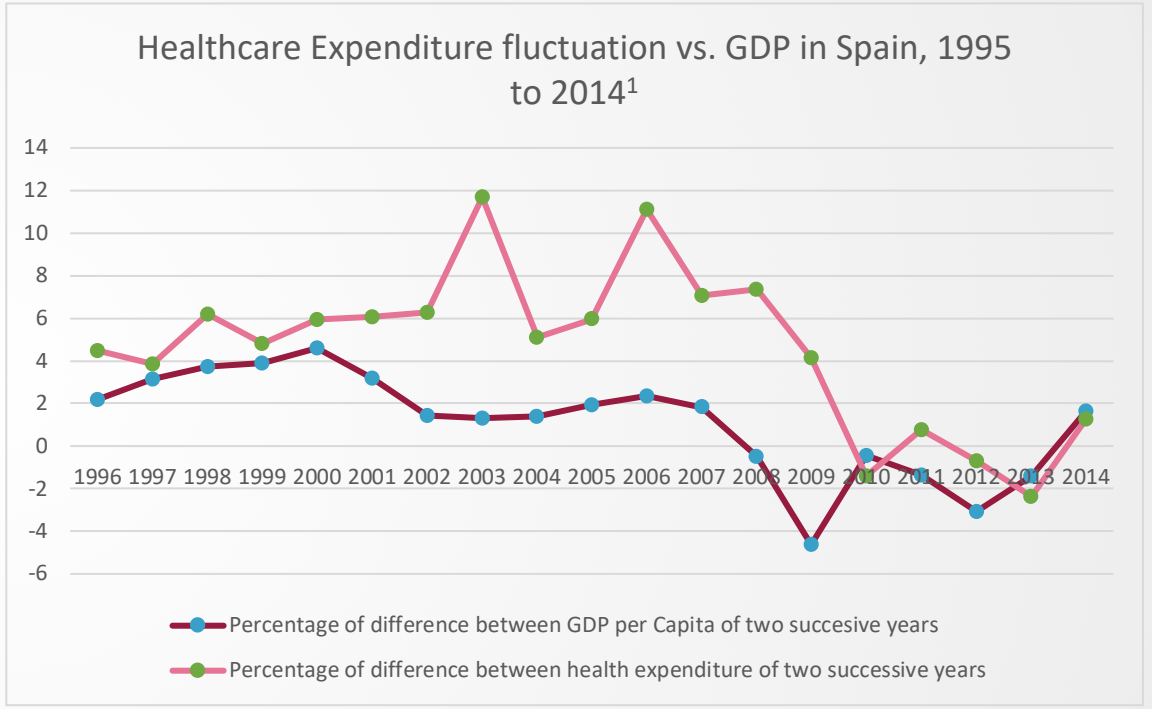


Percentage of health expenditure VS national GDP in 2014



But most importantly, healthcare expenditure has exceeded in the last decade the GDP of all the countries. The graph above shows that in Spain for instance in 2006, healthcare cost has increased by 11% compared to the previous year, whereas GDP has remained almost the same. Hence, it is important to increase healthcare quality while keeping it affordable to the population.

1: World Health Organization Global Health Expenditure database

Smart and connected health (USA)

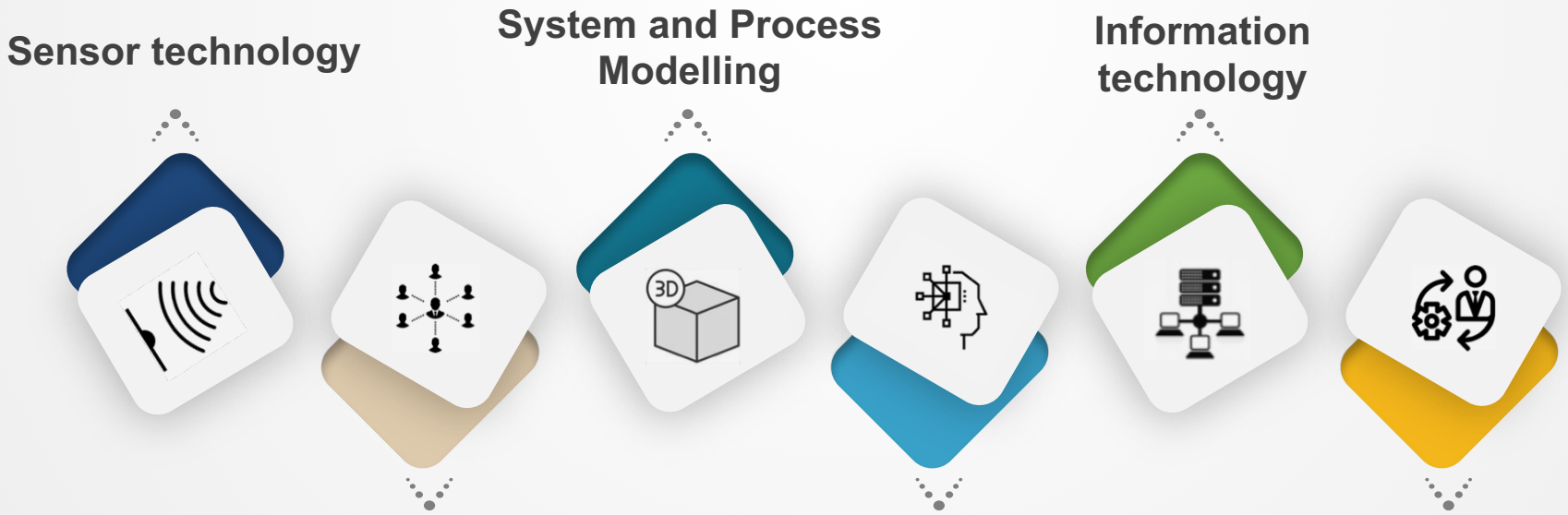
Smart and Connected Health is a jointly-funded program between the National Science Foundation and National Institutes of Health that encourages existing and new research communities to focus on breakthrough ideas for the development of healthcare facilities using connected devices and wearables. our nation. For

NSF

National Science Foundation

NIH

National Institutes of Health



Health 4.0 (Europe)

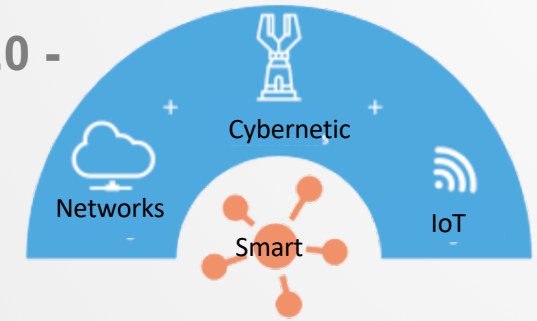
As in industry, health must adopt the technology to tackle health issues.
Industry has witnessed four evolutions already:

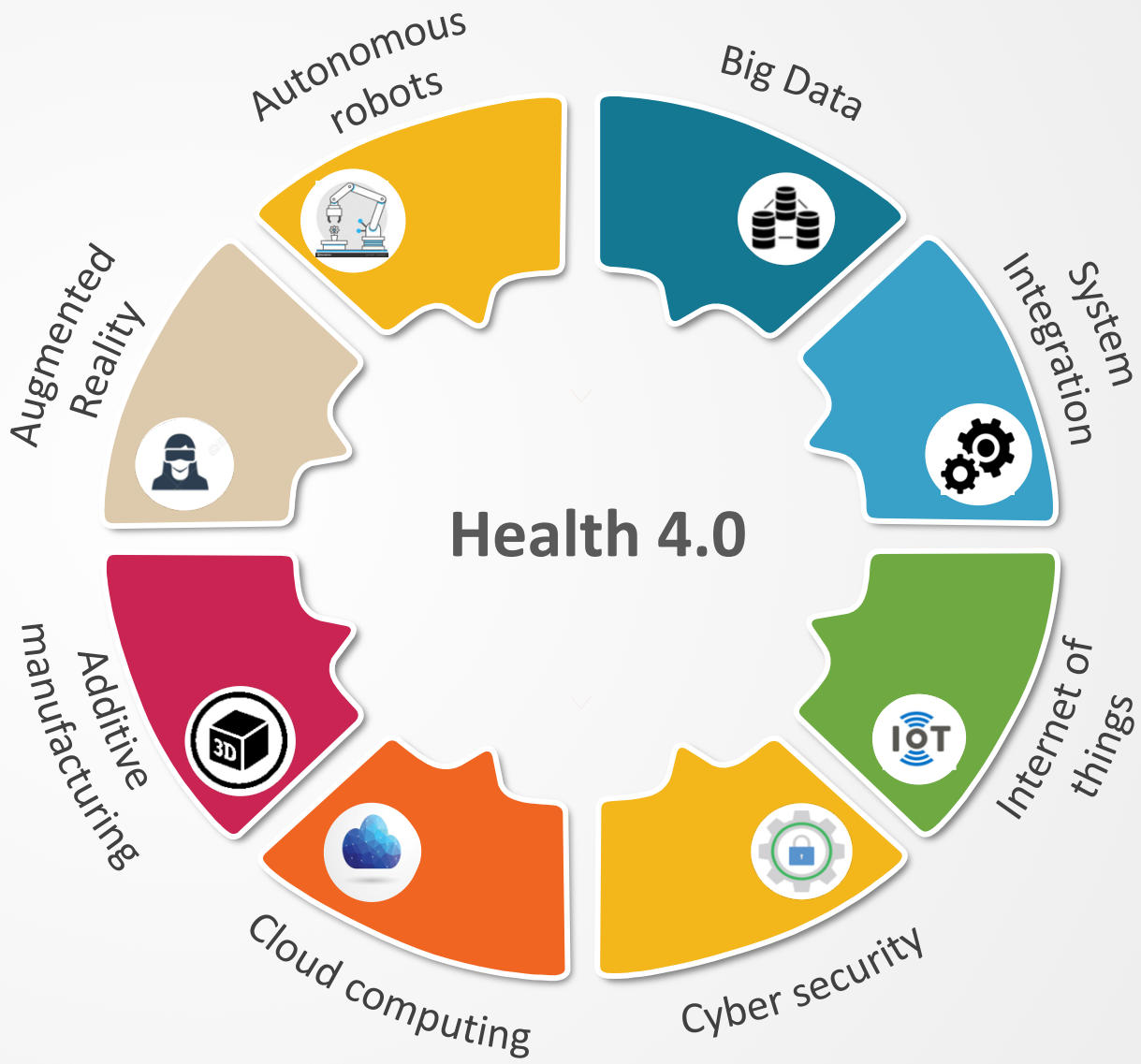
Industry 1.0 - Mechanical
1750 to 1840

Industry 2.0 - Electrical
1850 to 1920

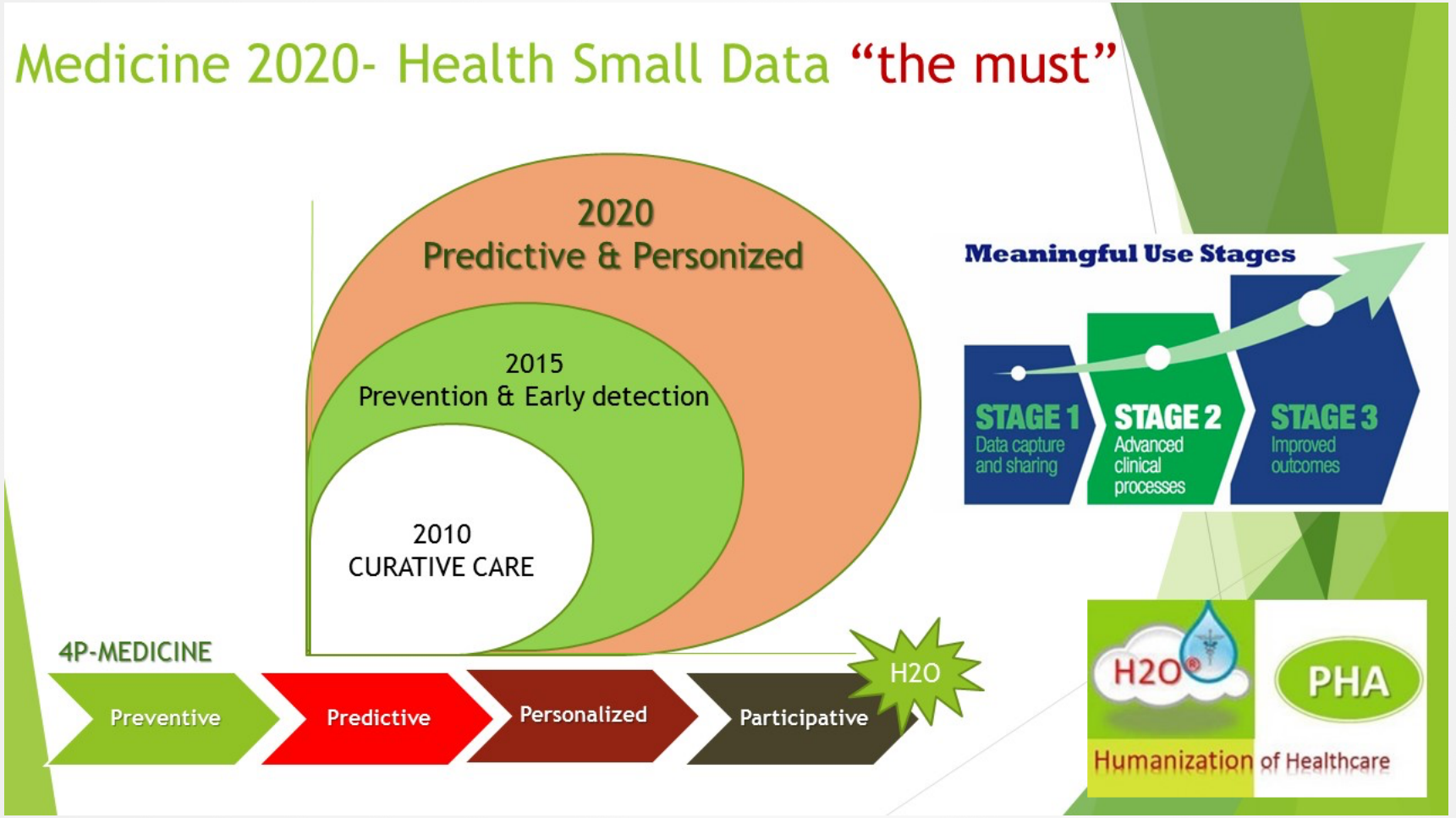
Industry 3.0 - Electronical
1920 to 2006

Industry 4.0 -
2006 - Now





Medicine evolution[1]



1: http://catai.net/blog/2015/12/data-analytics-in-healthcare/

Medicine evolution[1]

Preventive

Preventive medicine's goal is to protect, promote, and maintain health and well-being and to prevent disease, disability, and death.

Personalized

Personalized medicine has the potential to tailor therapy with the best response and highest safety margin to ensure better patient care

Predictive

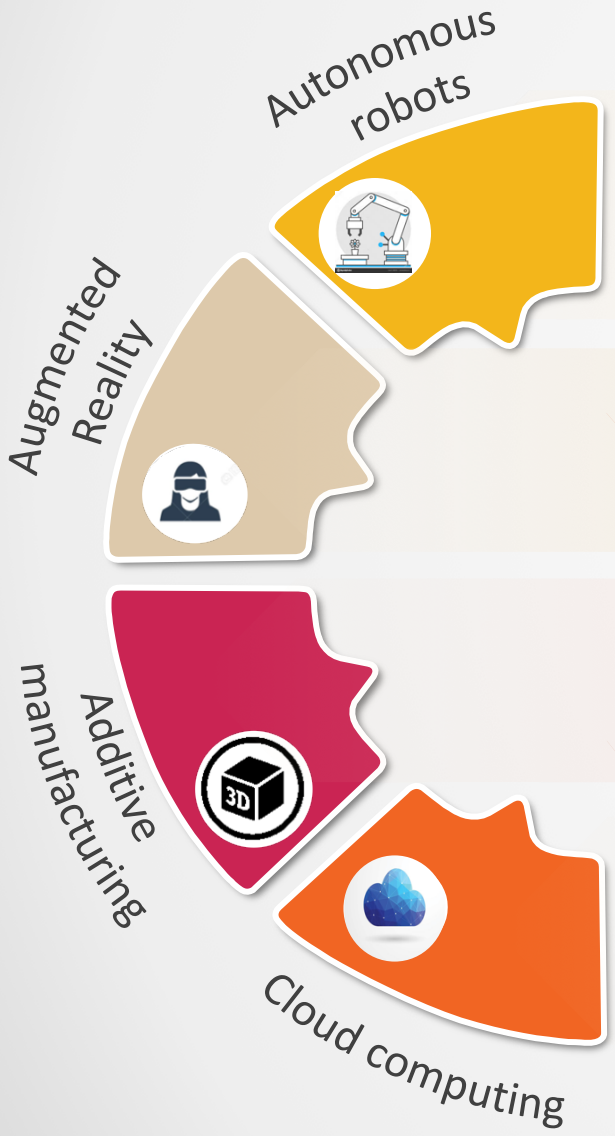
Predictive medicine uses genetic tests to determine a person's probability of developing a given disease

Participative

Both patients and care-givers participate in the improvement of the preventive medicine

1: http://catai.net/blog/2015/12/data-analytics-in-healthcare/

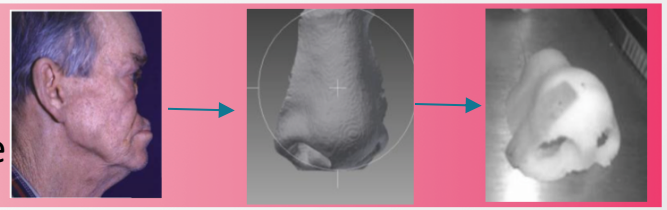
Some projects in Health 4.0



KUKA technology is a leader in the use of robots in medical technology. KUKA Medical Robotics team adapts their robot systems to many different applications in medicine.

One of the most popular platforms for working out medical AR solutions is **the Google Glass.** It is a wearable computer with an optical head-mounted display with which Rafael Grossmann carried out the first operation streamed live in 2013.

Bio-printing personalised scaffolds for nasal reconstruction
Surgical assessment of patient CT scan → Bioprinting of polymer framework and cells → Surgical implantation of personalised nose



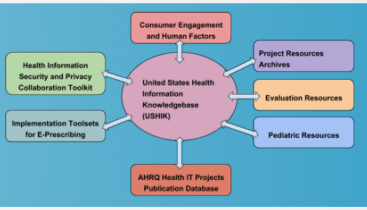
Today, there are already many and varied cloud service offerings for healthcare, covering a wide range of capabilities:

- **Centers for Disease Control and Prevention (CDC):** *http://www.cdc.gov/epiinfo/cloud.html*
- **IBM Explorys:** Health population management, analytics and data management. *http://www.ibm.com/watson/health/explorys/*

Some projects in Health 4.0

Health Catalyst (Late binding): Big data differs from classical relational DB in that it has no structure. Health Catalyst introduces an architecture that binds this unstructured data into useful information.

AHRQ's health information technology (IT) initiative: The integration of health IT into primary care includes a variety of electronic methods that are used to manage information about people's health and health care, for both individual patients and groups of patients.

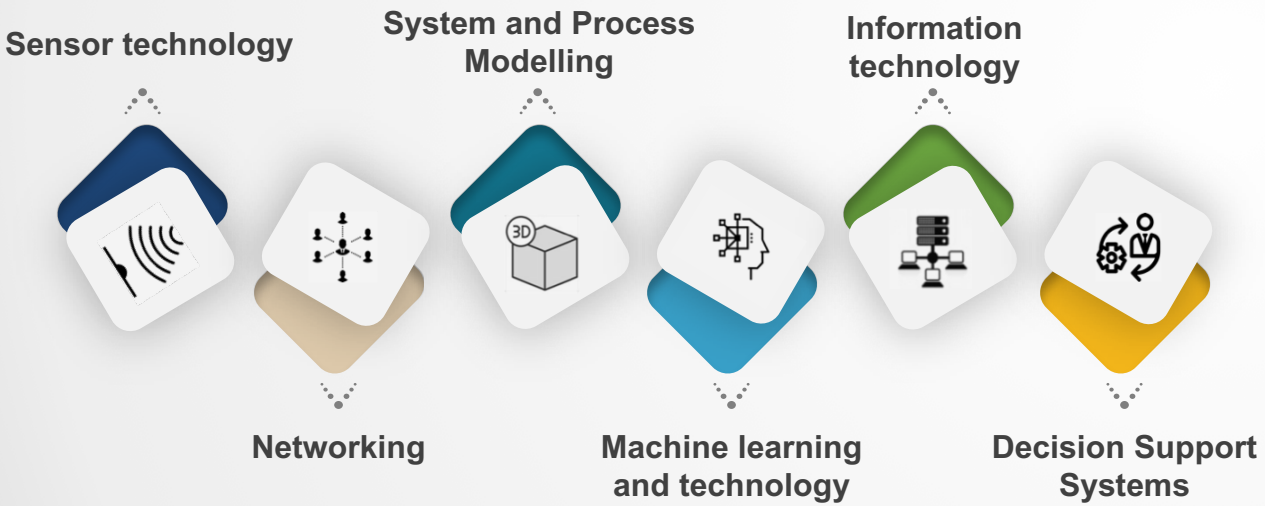


Medtronic (Enlite): Enlite is a intra-body sensor that couples with some other devices that together are able to continously monitor the glucose of patients with diabetes.

Microsoft (Cybersecurity in Health Solutions): Microsoft presents cloud solutions that supports infrastructures that give IT access to health organizations without endangering the Hipaa compliance.

eVida 4.0 as a combination of:

Smart and connected health



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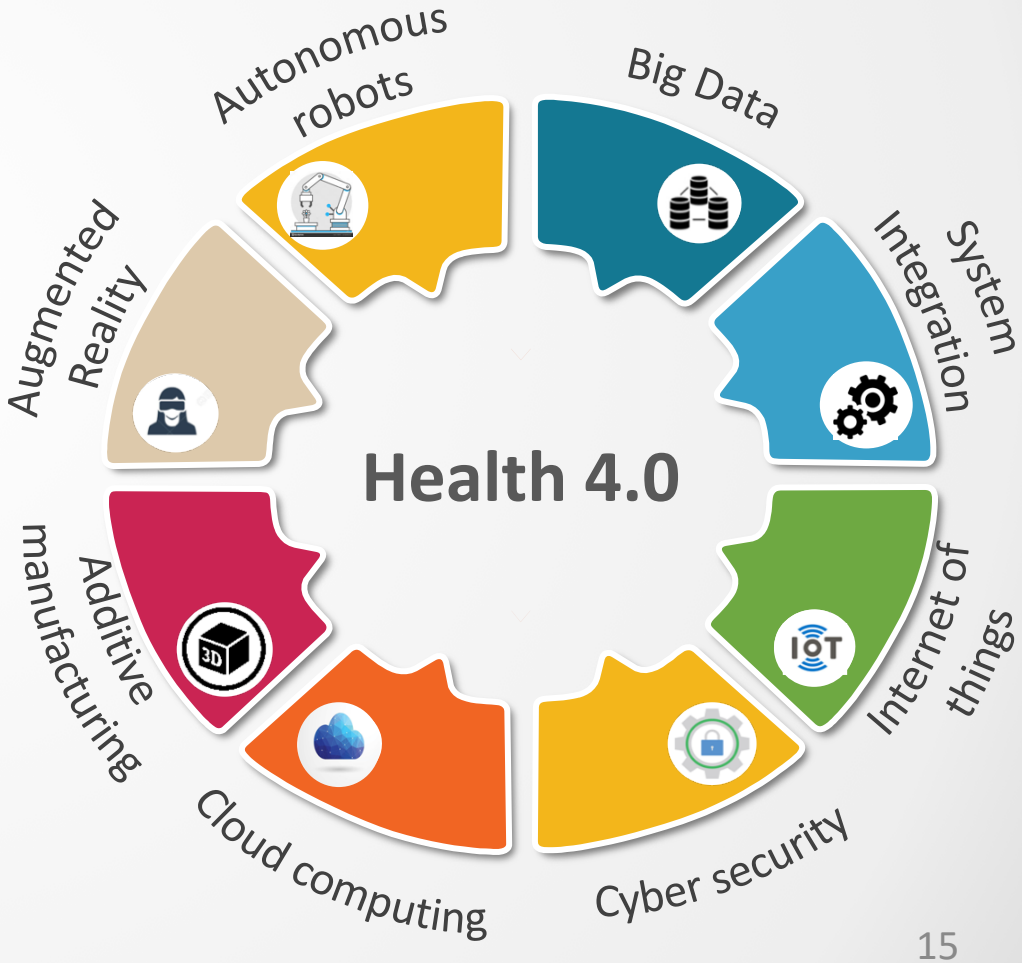
Health 4.0



eVida 4.0 Projects

Pressure Injury analysis with 4.0

Development of a Pressure injury assessment system using 3D imaging and Deep learning techniques. This project represents the main part of one of our PhD student thesis.

Main objectives of the project

- Pressure Injuries' Segmentation
- Quantitative Characteristics extraction
- Tissue types classification
- Healing prediction/prognosis
- Bacteria types detection

eVida 4.0 Projects

Pressure Injury analysis with 4.0

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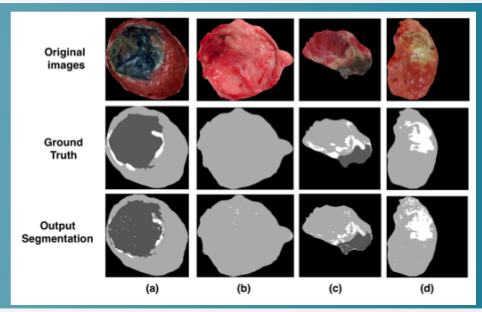
Deep learning techniques are applied on **a large set of sub-images** in order to achieve **high accuracy** results.



3D reconstruction and **Deep Learning** techniques are combined to enable a closer results to the reality.

The proposed system will enable the exchange of **real time data** acquired from **sensors and cameras** in order to follow the healing of the pressure injuries.

eVida 4.0 Projects

Pressure Injury analysis with 4.0

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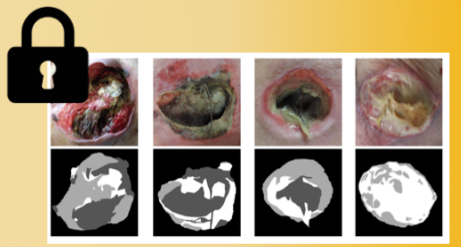
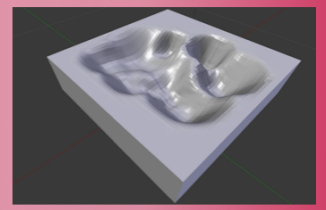
Cyber Security

The developed system will be **protected from the theft and damage to the hardware, software or information.**



Additive Manufacturing

3D printing of pressure injury models are being used to **validate** the proposed system.



Cloud computing

The results delivered by the system will be used by **patients and physicians thanks to cloud computing technology**

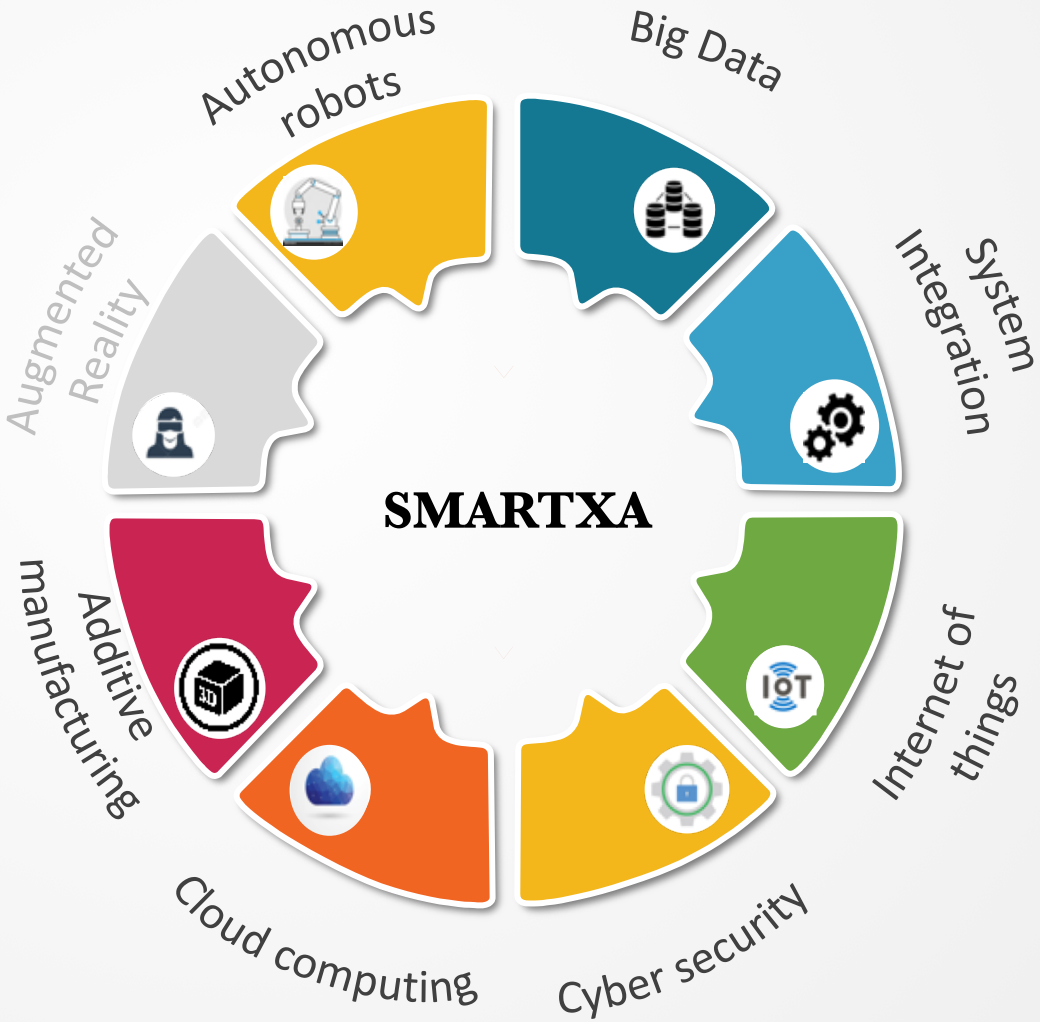
eVida 4.0 Projects

SMARTXA

Project oriented to treat people with multiple sclerosis. It offers the doctor the ability to reach the patient through a digital platform. It allows the patient to follow the rehabilitation programs designed by the doctor without been at the care center. It empowers the study by retrieving information about the treatment and results

Main objectives of the project

- Build a device to help with Sclerosis rehabilitation
- Place a complete system to create, analyze and manage data
- Improve the life quality of people with Sclerosis multiple



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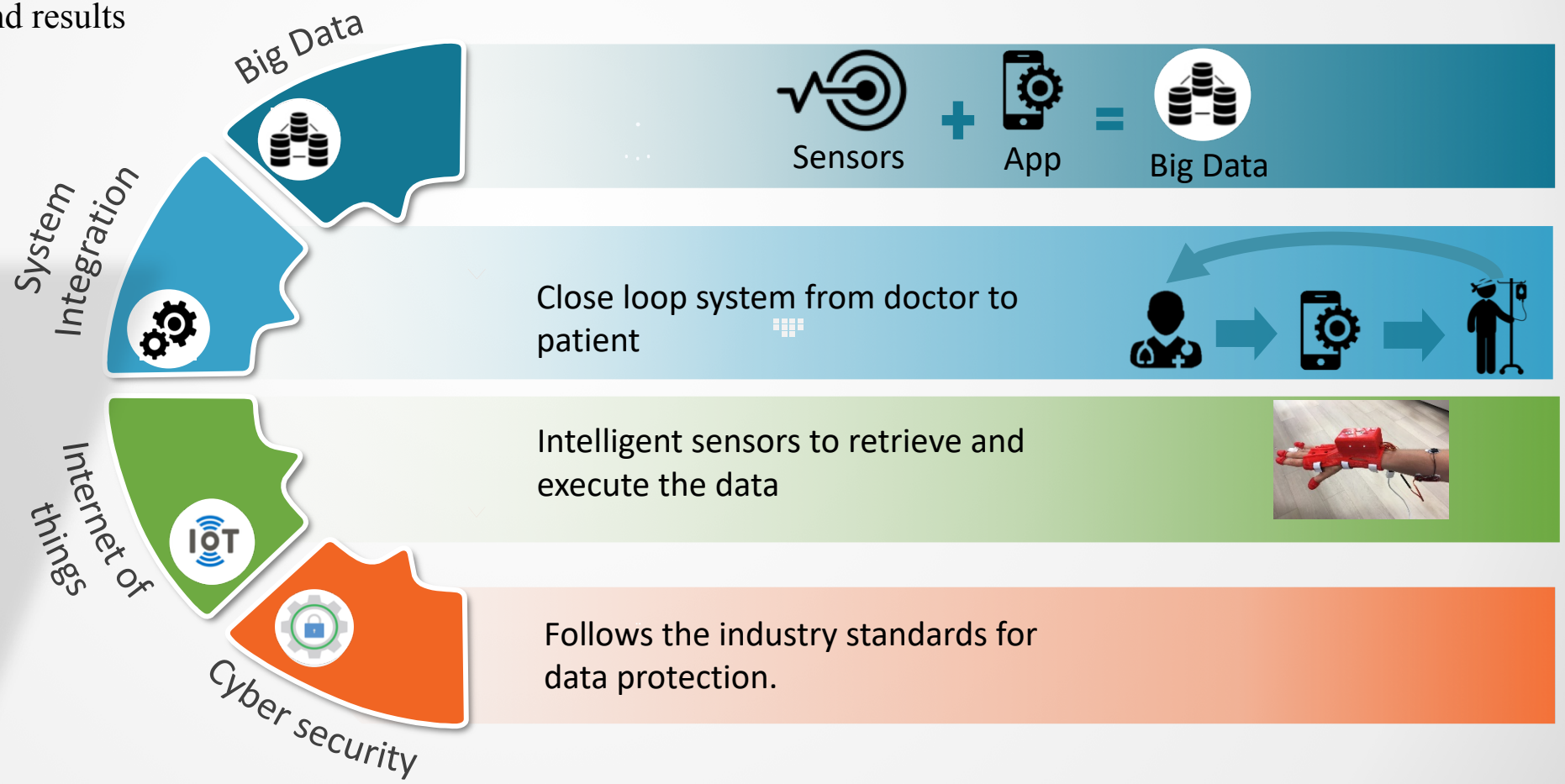

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eVida 4.0 Projects

eBihotza

This project was built to help people monitorize their heart, in order to decrease risks of having heart related health issues. It offers a whole environment that bridges the gaps between patient care and doctor feedback by means of a website and phone application .

In collaboration with:

Osakidetza biocruces
osasun ikerketa institutua
instituto de investigación sanitaria

Main objectives of the project

- Build a device to help with Heart health monitorization
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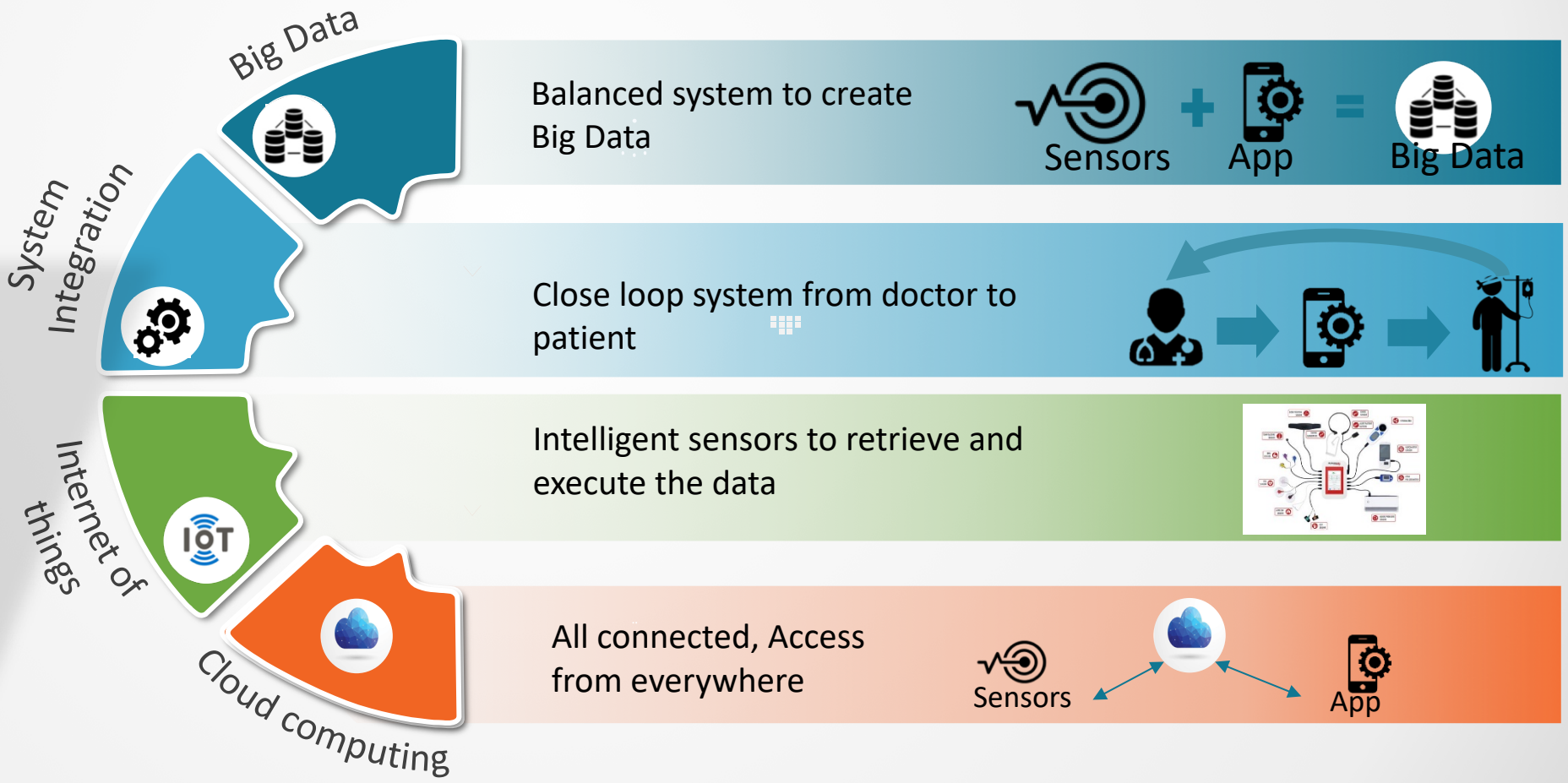
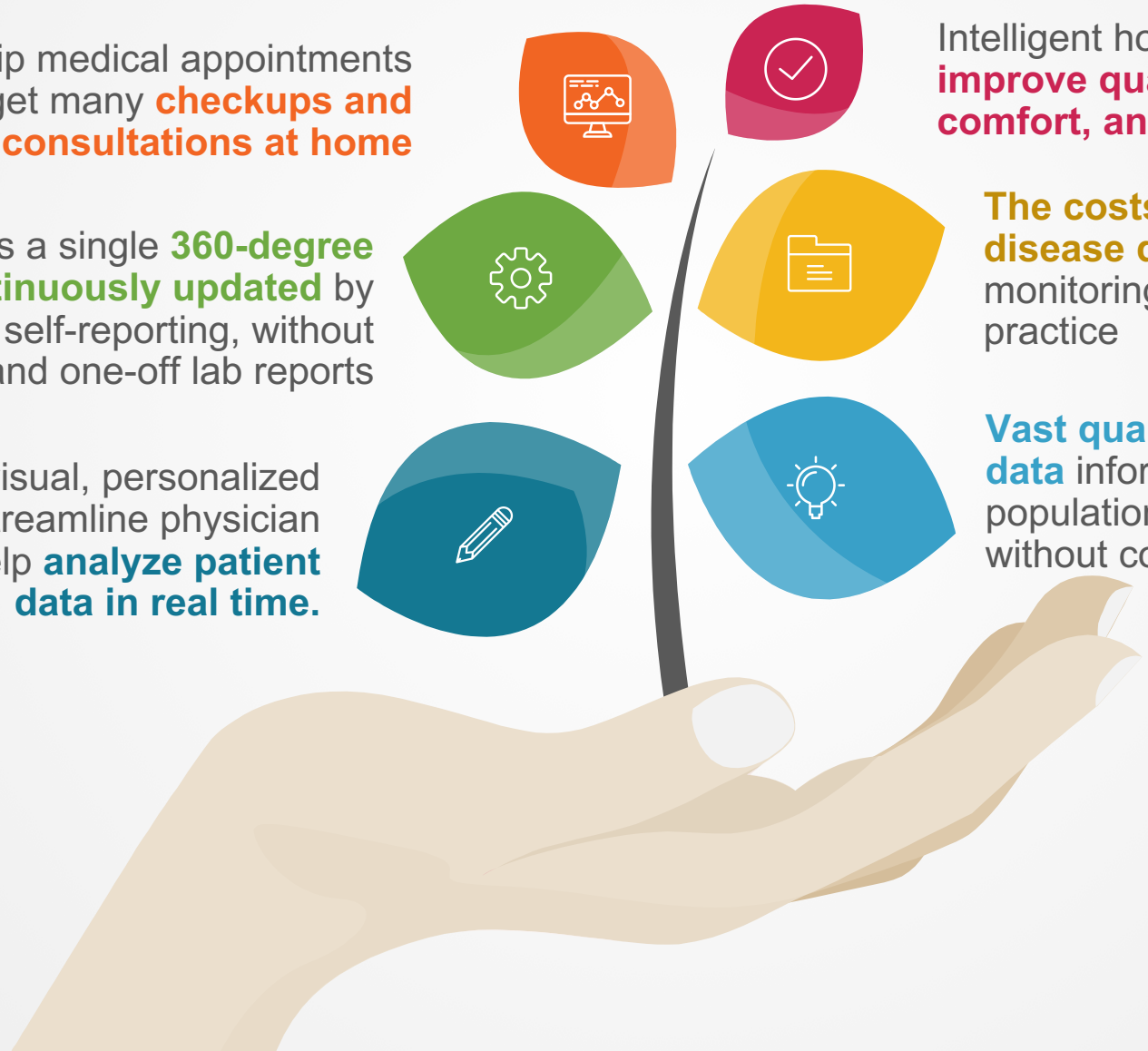


Imagine a world where …

People can skip medical appointments because they can get many **checkups and consultations at home**

Every patient has a single **360-degree medical record continuously updated** by care teams, devices, and self-reporting, without office visits and one-off lab reports

Highly visual, personalized dashboards streamline physician work flow and help **analyze patient data in real time.**



Intelligent hospitals track assets to **improve quality of care, safety, comfort, and efficiency**.

The costs and complications of chronic disease decrease as remote patient monitoring and virtual coaching become routine practice

Vast quantities of aggregated health data inform medical professionals, population health, and public policy, without compromising people's privacy

eVida 4.0 team


eVida-Spain


eVida-Spain


eVida-Spain


eVida-Spain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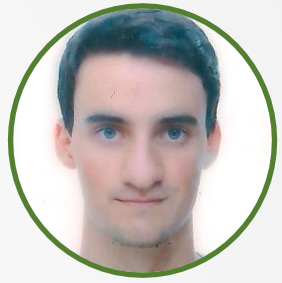
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eVida-USA


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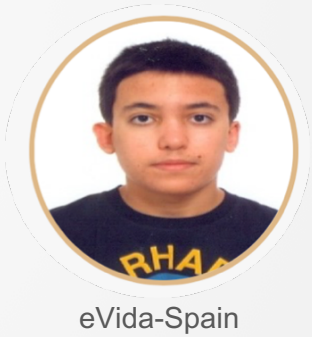
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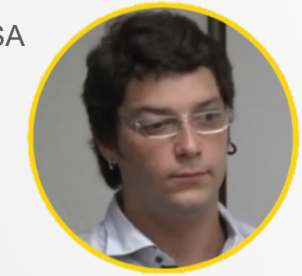
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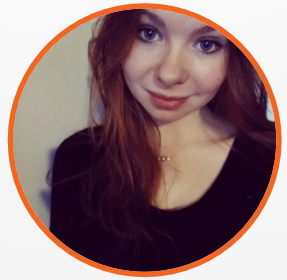
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"Coming together is a beginning, staying together is progress, and working together is success." – Henry Ford

Thank you