



The Global Language of Business

# **SMARTER AND SAFER HOSPITALS**

## **When Innovative Technologies Embrace GS1 Standards for Staff well-being and Patient Safety**

**GS1 HEALTHCARE WEBINAR - 20 January 2022**

**Dr. Alberto Sanna**, Director of Research Center for Advanced Technology in Health and Well-Being, San Raffaele Hospital

**Dr. Adriano Fusco**, Director of Digital Healthcare Department, Antares Vision Group



# Competition Law Caution



Participants on GS1 activities must always remember the purpose is to enhance the ability of all industry members to compete more efficiently and effectively to provide better value to the consumer or end user. Because GS1 activity almost always involves the cooperation of competitors, great care must be taken to assure compliance with anti-trust laws.

This means:

- Participation must be voluntary, and failure to participate shall not be used to penalise any company.
- There shall be no discussion of prices, allocation of customers or products, boycotts, refusals to deal, or market share.
- If any participant believes the group is drifting toward impermissible discussion, the topic shall be tabled until the opinion of counsel can be obtained.
- For more details: please see <https://www.gs1.org/standards/development/how-we-develop-standards/gs1-anti-trust-caution>

# Welcome to our GS1 Healthcare webinar



*Thank you to our guests speakers:*

Dr. Alberto Sanna, San Raffaele Hospital and Dr. Adriano Fusco, Antares Vision Group

*Some housekeeping for today*

- Please make sure that you identify yourself properly (use the rename function)
- You are automatically on mute and your video is off;
- For any quick message or reaction : please use the “Raise hand” function;
- For all Q&A: use the Q&A function, questions will be monitored and addressed as much as we can;
- Through the session, we’ll conduct some polls: please participate: your opinion matters!

# Welcome to our GS1 Healthcare webinar



*After the webinar:*

- Within a week, the recording will be posted here:  
[http://www.gs1.org/healthcare/hpac\\_webinars](http://www.gs1.org/healthcare/hpac_webinars)
- All previous webinars are posted there also; please feel free to use this resource library and share the link

# GS1 Healthcare Webinars



Create a forum for the global clinical providers to share experiences on using GS1 Standards in healthcare. The final goal: improve patient safety, cost efficiency and staff productivity through the implementation of GS1 standards with the support of innovative technologies .

**A forum for sharing and discussion**

**Identification of projects and case studies**

**A source of expertise and advice**

- The practical realities of implementation of GS1 Standards in the care giving environment in regards to the impact on clinical care and patient interaction
- Supporting the adoption of GS1 Standards in healthcare providers and retail pharmacies
- For publication, presentation and sharing
- To those involved in GS1 standards development, the wider healthcare stakeholder community and senior executives/decision-makers to gain their buy-in and support for implementation of GS1 Standards

# Specific GS1 Healthcare Activities



## Webinars

- Bimonthly webinars open to all stakeholders interested in learning about GS1 standards implementation in the care giving environment.
- [http://www.gs1.org/healthcare/hpac\\_webinars](http://www.gs1.org/healthcare/hpac_webinars)

## Awards

- At each F2F global GS1 Healthcare Conference
- Provider Implementation Best Case Study Award
- Provider Recognition Award
- The prize: travel & accommodation to attend the next GS1 Healthcare conference
- <http://www.gs1.org/healthcare/hpac>

The Global GS1 Healthcare conferences moved due to the pandemic in 2020 and 2021 to Virtual Events.

The next GS1 Healthcare conference will be a hybrid event and is scheduled from 15-17 November 2022. More information will be shared at a later stage.



**Dr. Adriano Fusco**

Director of Digital Healthcare Department,  
Antares Vision Group

**Smarter and Safer Hospitals:  
When innovative  
technologies embrace  
GS1 Standards for staff  
well-being and patient  
safety**

*GS1 standards adoption in the  
San Raffaele Hospital*



**Dr. Alberto Sanna**

Director of Research Center for Advanced  
Technology in Health and Well-Being,  
San Raffaele Hospital



# AGENDA



- ❖ THE SAN RAFFAELE HOSPITAL INNOVATIVE PROJECTS
- ❖ THE MEDICATION MANAGEMENT PLATFORM PROJECT
- ❖ TEST RESULTS
- ❖ CONCLUSIONS
- ❖ Q & A SESSION



# ABOUT SAN RAFFAELE HOSPITAL



Gruppo  
San Donato

San Raffaele Smart<sup>er</sup> and Health<sup>ier</sup> City in Milano  
*A Living Lab for Open Innovation in Health & Well-Being*



I.R.C.C.S. Ospedale  
San Raffaele

Gruppo San Donato

# RESEARCH CENTER ADVANCED TECHNOLOGIES IN HEALTH & WELL-BEING. RESEARCH PROGRAM



Smart<sup>er</sup> & Healthier City



Smart<sup>er</sup> & Healthier Life



Smart<sup>er</sup> & Safer Hospital



# RESEARCH PROGRAM IN HEALTHCARE 4.0



Research Center Advanced Technologies in Health & Well-Being

*Research Program*

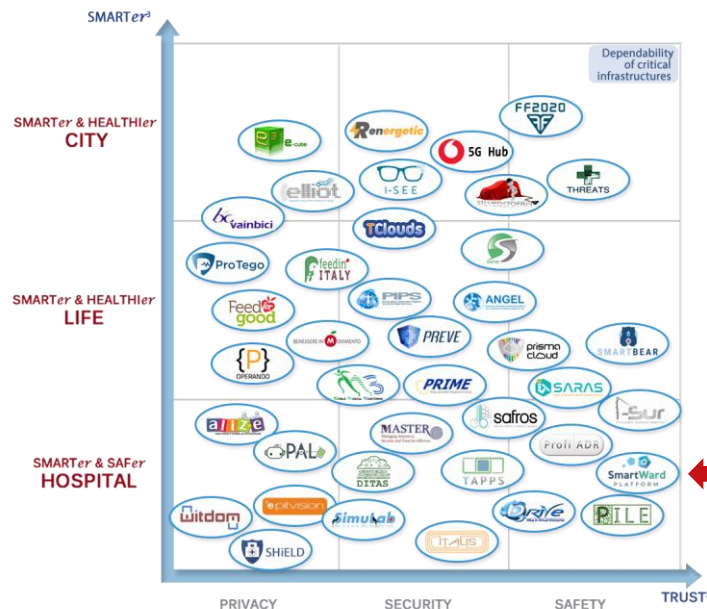
Smart *er* & Health*ier* City



Smart *er* & Health*ier* Life



Smart *er* & Saf*er* Hospital



# POLL 1: Knowing you more



**What category does your organisation belong to?**

- ☐ Hospital
- ☐ Retail pharmacy
- ☐ Manufacturer
- ☐ Solution provider
- ☐ University
- ☐ Wholesaler/ distributor
- ☐ Logistic provider
- ☐ Sectoral association
- ☐ GS1 Member Organisation
- ☐ GS1 Global Office

# POLL 1: Knowing you more



**In which area  
have you applied digital  
transformation/healthcare 4.0  
for your company/hospital?**

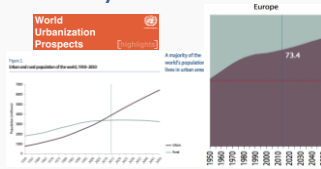
- ☐ Logistics and supply chain management
- ☐ Health information systems (ERP/EHR/EMR...)
- ☐ Automation in drugs dispensing
- ☐ Robotics for patient assistance and operational theaters
- ☐ Telecare
- ☐ Scanning at bedside for medication administration
- ☐ Personalized and Preventive medicine

# PERSONALISED, PREVENTIVE AND PREDICTIVE MEDICINE... IN SOCIO-TECHNOLOGICAL ECOSYSTEMS



## SOCIO-DEMOGRAPHIC TRENDS

- ✓ **Ageing of Population**
  - Health
  - Societal structure
  - Workforce
  - Welfare
  - Silver economy
- ✓ **Lifestyles, at all ages**
  - Diet & Physical Activity, a public health priority
  - Kids Overweight & Obesity
- ✓ **Urbanisation**
- ✓ ...



## TECHNOLOGICAL TRENDS

- ✓ **Digital Connectivity (5G) & Cloud Computing**
- ✓ **Electronics Miniaturization**  
(IoT, Environmental and Wearable Sensors)
- ✓ **Ultra High Definition digital content**
- ✓ **Natural Language Interfaces (HCI-HRI)**
- ✓ **Big Data and Artificial Intelligence**
- ✓ **Robotics** (Social, Process, Surgical, Rehabilitative, Exoscheletic, Nanobotics...)
- ✓ **Smart Urban Infrastructures and buildings**
- ✓ ...

# HEALTHCARE 4.0

SOCIAL, SERVICE AND PROCESS ROBOTICS & IOT



Smart *er* & Healthier City



Smart *er* & Healthier Life



Smart *er* & Healthier Hospital



- ❖ Healthcare Process Re-engineering
- ❖ Social & Cognitive
- ❖ Surgical
- ❖ Rehabilitative
- ❖ Exoschelectric
- ❖ Dro(ne)botics
- ❖ Nanobotics
- ❖ Assistive
- ❖ Architectural

**R  
O  
B  
O  
T  
I  
C  
S**

# MARKET PREDICTION INTERNET OF MEDICAL THINGS FROM 41 BILLION USD WORTH IN 2017 TO 158.07 BILLION USD BY 2022



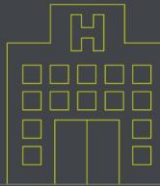
**Deloitte.**



Deloitte Centre for  
Health Solutions

## Health care is facing numerous challenges

Global healthcare spending is expected to grow from  
**\$7.1 trillion in 2015 to \$8.7 trillion by 2020**



The percentage of people aged  
**65 and over**  
is expected to **double by 2050**

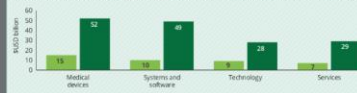


### The benefits of the IoMT



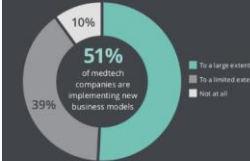
## Significant IoMT market growth predicted

The overall IoMT market is expected to grow from \$41 billion in 2017 to \$158 billion by 2022



## Is medtech ready for the IoMT?

...our survey of 237 respondents working in medtech companies developing connected medical devices revealed that:



**71%**  
believe that health care providers and clinicians are not ready to utilize data generated from connected medical devices.

**67%**  
believe that the regulatory framework will not catch up with what is possible today for another 5 years.



Medtech is transforming from an  
innovative product supplier...

**31%**  
are implementing new  
funding models for data as a  
service to a large extent.

**39%**  
are adopting a value-based  
approach to pricing to a  
large extent.

**43%**  
are using Real World  
Evidence to drive business  
decisions to a large extent.

...to an insightful partner  
for patients and health care, rewarded  
for improving health care performance

The above percentages are taken from our survey of 237 respondents from connected medical.



# VODAFONE 5G TRIAL IN MILAN

## 5G AS AN ENABLING INFRASTRUCTURE FOR DIGITAL TRANSFORMATION



### CORRIERE DELLA SERA

## La svolta di Internet superveloce «Milano sarà capitale europea del 5G»

Il Ceo: è un'infrastruttura che cambierà tutti i business, dall'educazione alle smart cities

di Nicola Saldutti

**MILANO** Il ceno che ad Aldo Bizio, amministratore delegato di Vodafone Italia, piacciono i numeri. E quando racconta della rivoluzione del 5G, un mondo nel quale gli oggetti parleranno tra di loro, gli umani parleranno con gli oggetti, e gli oggetti acquisiranno intelligenza, e lo fa con un numero: «Lei lo sa che un pace-maker ha 100 mila linee di codice, per far andare lo Shuttle ne servivano solo 650 mila. E Android ne ha circa 12 milioni...». Sembrano soltanto cifre, invece raccontano di una grande possibilità che l'Italia può giocare in questa rivoluzione. «Siamo una delle più grandi fabbriche di talenti al mondo. Il sistema universitario ha raggiunto in qualche caso livelli di eccellenza. La quarta rivoluzione industriale rimescola le carte, ha un effetto importante sulla dematerializzazione e per un Paese come l'Italia, senza risorse naturali e un'economia di servizi, è un'occasione storica».

**Non sta esagerando con l'ottimismo...**  
«Churchill diceva che gli ottimisti sono dei neofisici informati male, ma in questo caso»



Vodafone 5G

IL 5G A MILANO

IL BANDO ACTION FOR 5G

EVENTI

iscritti al bando

Benvenuti nel futuro

Vodafone 5G

NOKIA

Endorser

Qualcomm

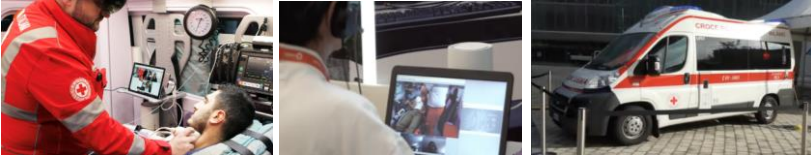
ISTITUTO ITALIANO DI TECNOLOGIA

I.R.C.C.S. Ospedale San Raffaele



# RESEARCH CENTER ADVANCED TECHNOLOGIES IN HEALTH & WELL-BEING

5G HEALTHCARE VODAFONE CONFERENCE AND EXPERIENCE DAY, OCT. 8 2019



**NOKIA**

ENDORSER



I.R.C.C.S. Ospedale  
San Raffaele



**QUALCOMM**

**iit** ISTITUTO  
ITALIANO DI  
TECNOLOGIA

I.R.C.C.S. Ospedale  
San Raffaele  
Gruppo San Donato



The Global Language of Business

© GS1 2022

# AI FOR SMARTER & SAFER HOSPITAL TO ORCHESTRATE PROCESSES

PATIENT SAFETY, QUALITY OF CARE, OUTCOMES, EFFICIENCY, COSTS



Medical



Procedure



**Outcome**

Med-IoT  
Med-AI



Process Robotics  
Process AI



**Better  
Outcome**

Discovery  
of Medical  
Knowledge



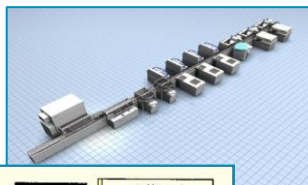
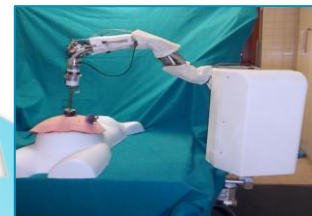
Discovery of  
Process  
Knowledge



**Best Outcome**

# SMARTER & SAFER HOSPITAL

AI, ROBOTICS, MEDIOT, IOT TO SUPPORT PATIENT SAFETY, QUALITY OF CARE,  
AND PROCESS EFFICIENCY



**CLINICAL LAB  
ROBOTICS  
RE-ENGINEERING**

**SAFE & SECURE  
PHARMA MGMT**

**PRIVACY & SECURITY**

**COGNITIVE ROBOTICS**

**SURGICAL ROBOTICS**



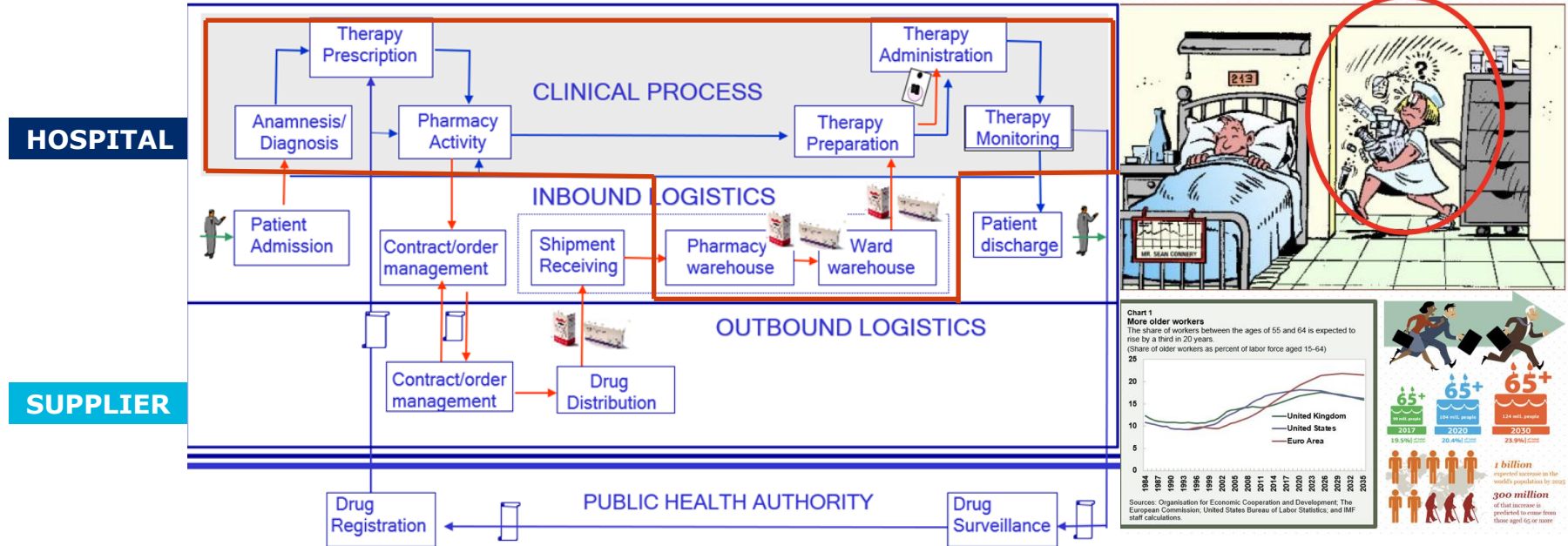
The Global Language of Business

© GS1 2022



# SMARTER & SAFER HOSPITAL

AI, ROBOTICS, MEDIOT (IOMT), TRACK & TRACE, QUALITY OF CARE & PROCESS EFFICIENCY





# THE MEDICATION MANAGEMENT PLATFORM PROJECT

Dr. Adriano Fusco





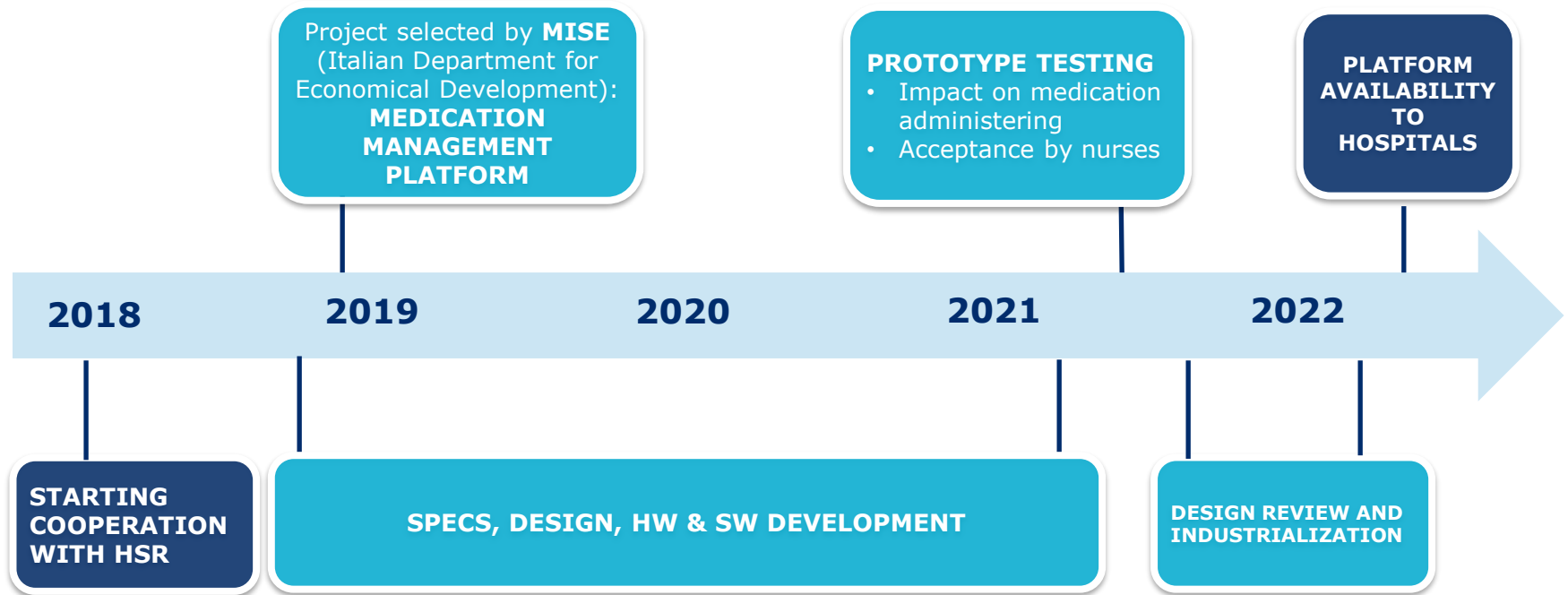
## **Deliver the best global solution for medication management:**

- ❖ Enable healthcare operators to focus on patient care rather than been forced to search, sort, pick, check drugs to administrate to patients
- ❖ Maintain End to End traceability of the overall medication process to eliminate dispensing errors, diversions, non compliances, inventory stockout and waste,..
- ❖ Create a zero-error, efficient, fully automated environment, 100% integrated with EHR and hospitals' IT infrastructure
- ❖ Deliver visibility and insights to hospital staff to make more informed, faster and actionable decisions, to finally achieve:

**THE RIGHT DOSE, TO THE RIGHT PATIENT,  
AT THE RIGHT TIME**



# THE MEDICATION MANAGEMENT PROJECT TIMELINE



# THE MEDICATION MANAGEMENT PLATFORM



## TRACKING AND AUTOMATION ACROSS THE HOSPITAL



# PLATFORM FUNCTIONALITIES AND COMPONENTS



MedicationManagement  
PLATFORM

## Automation - Traceability – Planning KPIs (Real time/historical)

### AUTOMATED SMART TROLLEY

- ❖ Loads automatically the drugs required for the round
- ❖ Manages and tracks the dispensing cycle
- ❖ Assisted motion



### AUTOMATED SMART CABINET

- ❖ Automatically loads the Trolleys
- ❖ Semi-automated loading of drugs from the central pharmacy
- ❖ Full stock control and management of the content
- ❖ Automatic drugs dispensing
- ❖ Controlled access to drugs

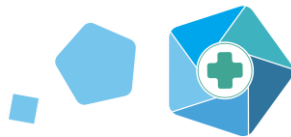
# MAIN BENEFITS



**TRACEABILITY**



**AUTOMATION**



**MedicationManagement**  
P L A T F O R M



**PROCESS SAFETY  
AND TRANSPARENCY**

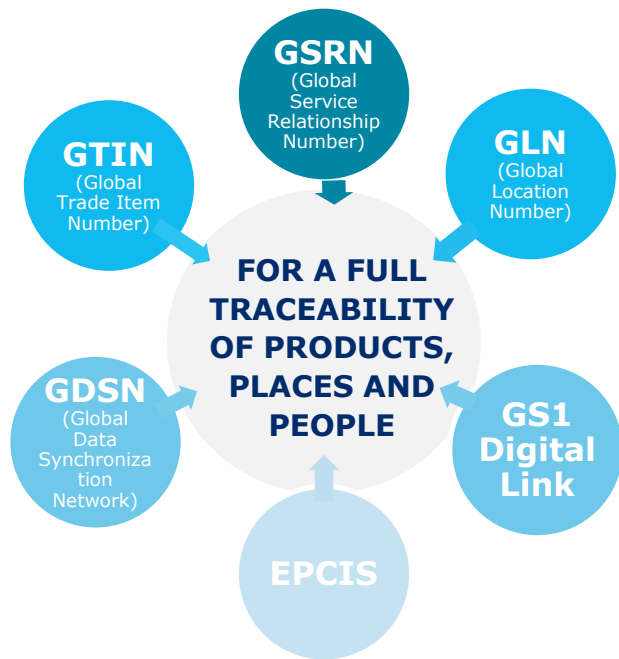


**OVERALL  
EFFICIENCY**



**ERGONOMY AND  
USABILITY**

# EXTENSIVE USE OF GS1 STANDARDS



- ❖ **Real time verification** at patient bedside that the drug is correct, not expired, not subject to recall
- ❖ **Perfect association** of drug administration to patient's EHR (who, when...)
- ❖ **Global synchronization** with suppliers
- ❖ **Optimization in stock management** (ie. Managing expiry date)
- ❖ **Perfect location of stocks** across the different points of storage within central pharmacy and the wards
- ❖ **Parent-child relationship and change of ownership management**



**What are the key factors for a successful implementation of GS1 standards?**

- ☐ Change management
- ☐ Secure the staff (nurses, surgeons, etc...)
- ☐ Find the relevant technology partner who will accompany you during the journey
- ☐ Define clear measurements of success
- ☐ Others



## **Why is the GS1 standards implementation so important within healthcare providers?**

- ☐ Increase patient safety
- ☐ Leverage supply chain data for clinical processes
- ☐ Improve patient-level costing
- ☐ Support interoperability
- ☐ Drive efficient, precise recalls
- ☐ Enable asset traceability
- ☐ Supply a key element of big data to applications

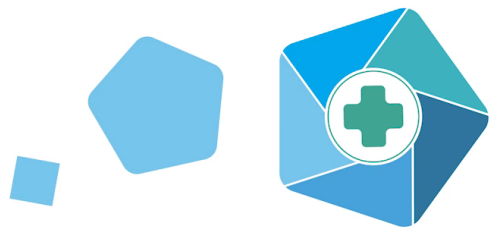


# TEST RESULTS

Dr. Alberto Sanna  
Dr. Adriano Fusco



# TESTING PHASE AT SAN RAFFAELE HOSPITAL



## Medication Management P L A T F O R M



**ANTARES VISION  
GROUP**



**I.R.C.C.S. Ospedale  
San Raffaele**  
Gruppo San Donato



Advanced Technology  
in Health and Well-Being

# CONTINUOUS EDUCATION AND TRAINING ON SITE



- Master's Degree in Nursing and Midwifery
- Course of design and management of innovation processes in healthcare
- 43 students (nurses)



# OBJECTIVES OF THE TESTS AT SAN RAFFAELE HOSPITAL



1. Evaluate the **usability of the new automated trolley**.
2. Compare **the user experience and performance** of the TRADITIONAL and AUTOMATED solutions



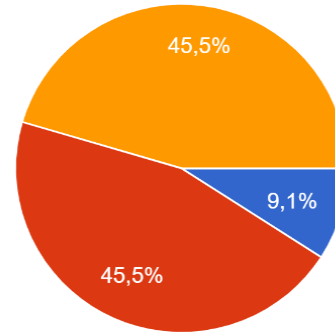
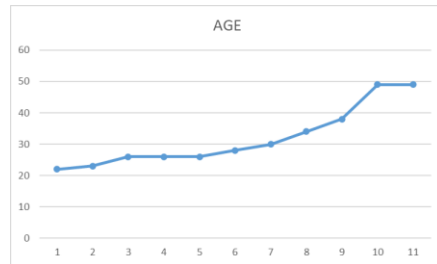
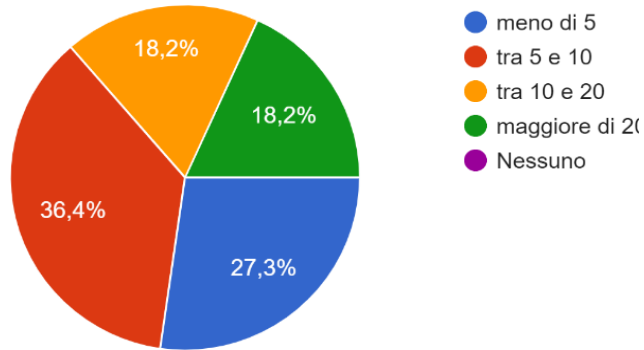
# TEST METHODOLOGY



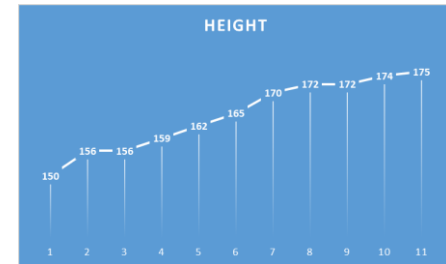
1. Creation of the test environment on a real ward (without real patient): we used a ward in the new ICEBERG building
2. Selection of a panel of nurses representing different clusters of experience, age, ergonomics...
3. Performing Usability tests:
  - Shadowing
  - Training on the use of the trolley
  - Task execution (a full cycle of medication dispensing to a set of 3 patients)
  - Execution of the same task with a traditional trolley
4. User experience evaluation



# THE PANEL OUTCOME (SURVEY CONDUCTED ON 11 NURSES\*)



- Principiante (Utilizzo base dello smartphone e del computer – utilizzo di mail, accesso a siti web ed utilizzo di applicazioni di base)ne 1
- Intermedio (Utilizzo di strumenti e applicazioni per il lavoro e altro – fogli di calcolo, presentazioni, strumenti di condivisione, etc....)
- Avanzato (Utilizzo avanzato di strumenti e applicazioni – home banking, noleggio e acquisto di beni tramite applicazioni...



\*Nielsen J., Landauer TK., "A mathematical model of the finding of usability problems." SIGCHI Conf. Hum. Factors Comput. Syst, 1993

# SYSTEM PERFORMANCE ASSESSMENT (SPA)



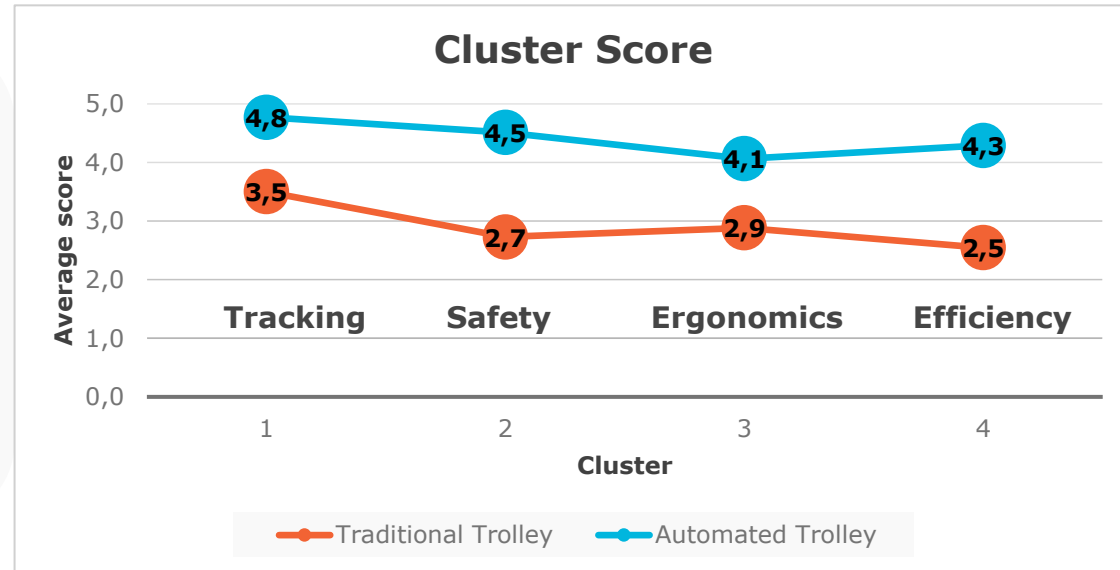
**Each nurse was asked to evaluate the medication dispensing with the automated and the traditional trolley in several aspects segmented in 4 main topics:**

- 1. Effectiveness in tracking** the operations and recording results to the patient EHR
- 2. Safety and reliability** of the operations
- 3. Ergonomics of use** for the operators
- 4. Overall efficiency** of the process

# QUALITATIVE ANALYSIS RESULTS



The automated solution obtained higher average scores (rank from 1 to 5) in each topic with **safety and efficiency scoring the largest gap.**



# OTHER ONGOING TESTS (AT ANTARES VISION LAB)



- ❖ Automatic refill of the trolley from the automated cabinet
- ❖ Autonomy
- ❖ Reliability tests (FMEA, MTBF, W&T...)
- ❖ Disaster recovery
- ❖ Planning capabilities
- ❖ Drugs management improvement (planning, inventory reduction, stock out, waste reduction, recall management...)



# MAIN TEST OUTCOMES



1

Although executed on a limited number of nurses, the test provided **a very clear picture of the four investigated areas** (tracking, safety, ergonomics, efficiency).

2

Regardless the very different background, age and confidence with IT, the great majority is in favor of the **new way of working** in all the investigated areas.

3

**Several interesting improvement suggestions** were pointed out both in hardware and software: we are currently evaluating them in order to introduce into the final product.

4

The vast majority of the panel considers the new automated system **a real breakthrough in medication management** and would be happy to adopt it immediately.



---

# CONCLUSIONS

# TAKEAWAY MESSAGES & NEXT STEPS



The pressure posed by the **Covid19 emergency** on the healthcare providers requires improvements both in the quality and efficiency of the services.



The platform we described has been conceived as a tool to **help the hospital staff** in several aspects of their day-to-day tasks.



The level of automation introduced is unprecedented and we expect setting **a new benchmark in efficiency, safety and ergonomics of these practices.**



We are now working on the next steps to **industrialize the new concept, make it available and affordable**, including new outbreking features.

**...STAY TUNED!**



# Q&A



# CONTACT INFORMATION



## **Dr. Alberto Sanna**

Director Research Center for Advanced Technology  
in Health and Well-Being

**San Raffaele Hospital**

E-mail [sanna.alberto@hsr.it](mailto:sanna.alberto@hsr.it)

Web <https://www.hsr.it/>



# CONTACT INFORMATION



## **Dr. Adriano Fusco**

Digital Healthcare Department, Director  
**Antares Vision Group**

E-mail [adriano.fusco@antaresvision.com](mailto:adriano.fusco@antaresvision.com)

Web [www.antaresvisiongroup.com](http://www.antaresvisiongroup.com)

