eHealth week

11 - 13 MAY 2015
RIGA, LATVIA

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# BORN IN THE DIGITAL AGE

Raul Martins

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# Agenda

- Portugal Data (overview)
- HIMSS Portugal Assessment
- Personal Experience as CIO
- How to Deal With…
- Challenges on Future

# PORTUGAL DATA (OVERVIEW)

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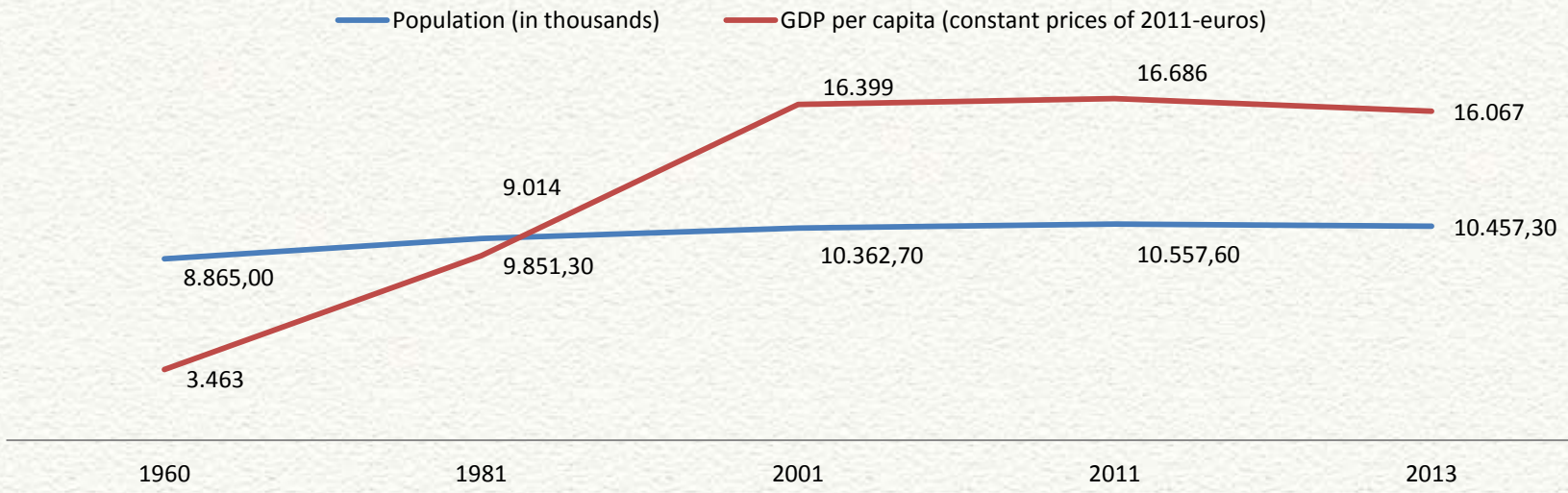
# Population and GDP

| | 1960 | 1981 | 2001 | 2011 | 2013 |
|---|---|---|---|---|---|
| Population (in thousands) | 8.865,00 | 9.851,30 | 10.362,70 | 10.557,60 | 10.457,30 |
| Seniors by each 100 young people | - | 45,4 | 101,6 | 125,8 | 133,5 |
| GDP per capita (constant prices of 2011-euros) | 3.463 | 9.014 | 16.399 | 16.686 | 16.067 |
| GDP (euros) | 30.695.063 | 88.800.603 | 169.933.772 | 176.167.281 | 168.017.439 |




*Source: PorData*

# Count of Professionals

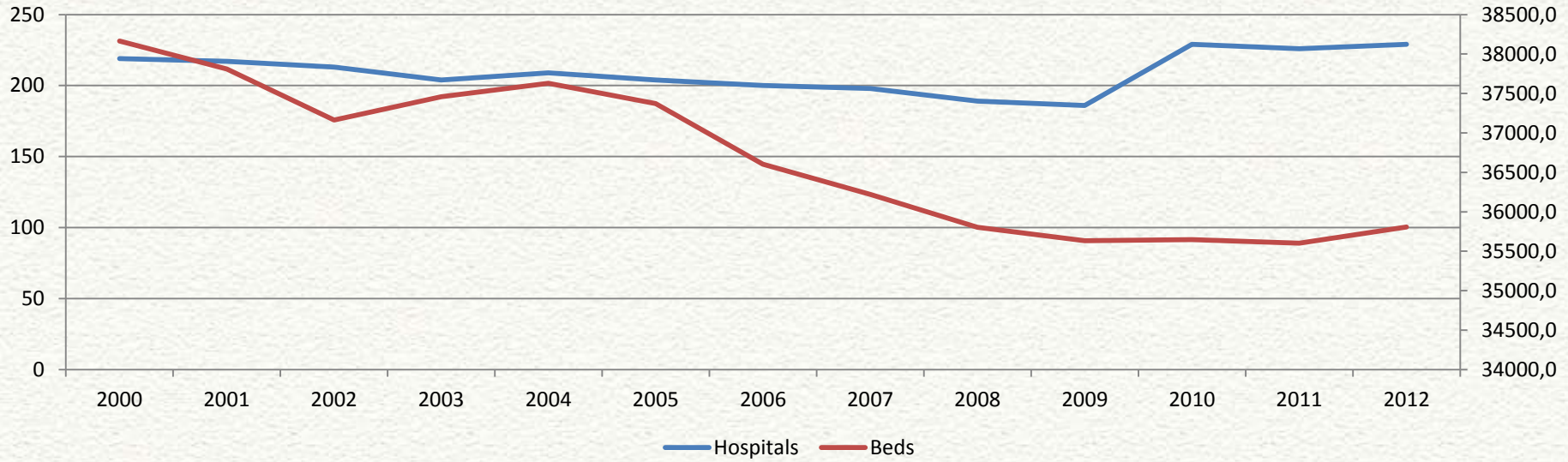
| Geographic Location | Professionals by Geographic Location<br>Reference period of data: 2012<br>Total | Physicians | Nurses | Auxiliary Staff | Diagnostic and Therapeutic Technicians | Others |
|---|---|---|---|---|---|---|
| **Total:** | **121,116** | **21,417** | **37,495** | **26,735** | **8,322** | **27,147** |
| **Continent** | 113,914 | 20,642 | 35,321 | 24,802 | 7,913 | 25,236 |
| **Açores Islands** | 3,418 | 387 | 1,021 | 939 | 190 | 881 |
| **Madeira Islands** | 3,784 | 388 | 1,153 | 994 | 219 | 1,030 |

*Source: INE (*Statistics Portugal*)*

# Hospitals and Beds

## (evolution from 2000-2012)

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hospitals | 219 | 217 | 213 | 204 | 209 | 204 | 200 | 198 | 189 | 186 | 229 | 226 | 229 |
| Beds | 38,165 | 37,809 | 37,162 | 37,459 | 37,628 | 37,372 | 36,605 | 36,220 | 35,803 | 35,635 | 35,646 | 35,601 | 35,806 |

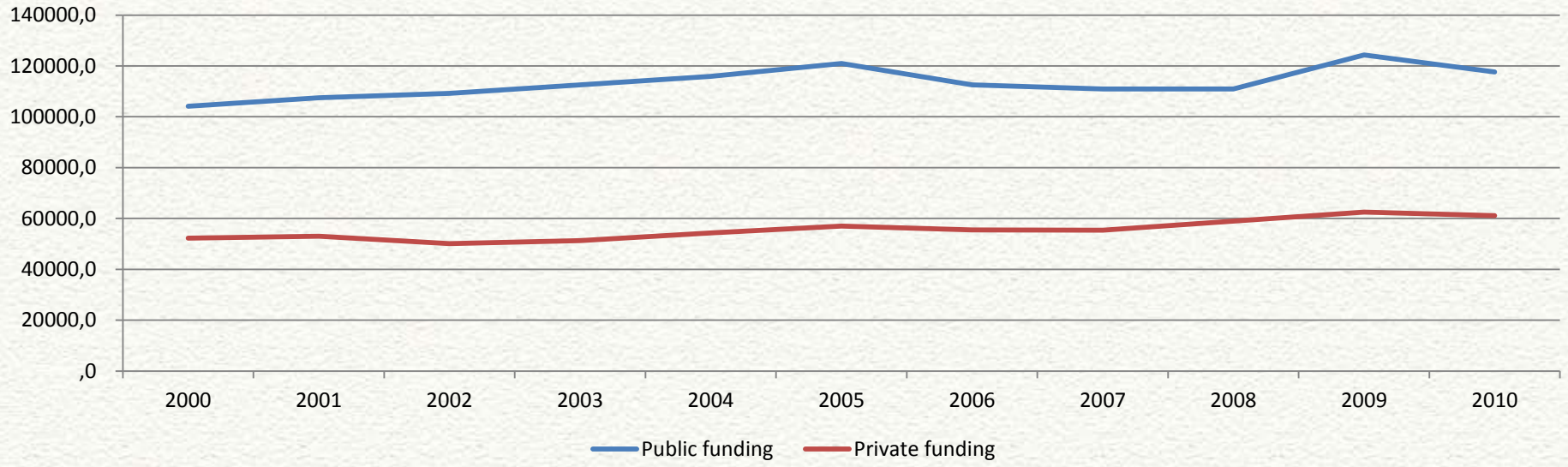



*Source: PorData*

# Funding

## (evolution from 2000-2012)

| (thousands of euros) | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Public funding | 104,171 | 107,531 | 109,211 | 112,572 | 115,932 | 120,973 | 112,572 | 110,892 | 110,892 | 124,333 | 117,612 |
| Private funding | 52,297 | 53,005 | 50,099 | 51,306 | 54,348 | 57,029 | 55,445 | 55,423 | 58,920 | 62,557 | 61,131 |

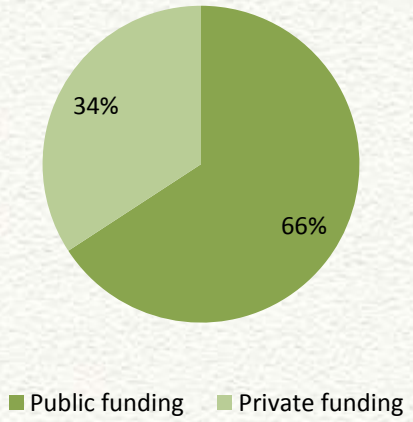



*Fuente: INE (Instituto Nacional de Estatistica)*

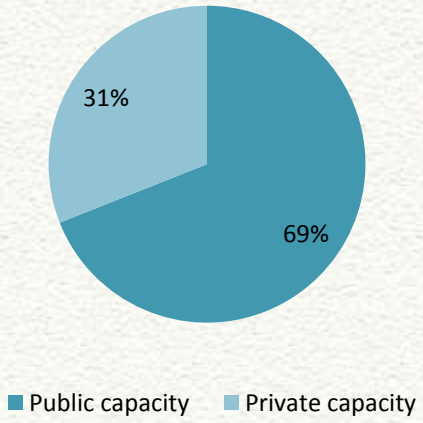
# Funding vs Bed Capacity

## (actual moment)

### Source of Funding




### Bed Capacity




The public system has a strong influence on the observable results

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# HIMSS PORTUGAL ASSESSMENT

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# Report Summary: The eHospitalCensus (Portugal)

## Objective eHealth market information to support business decisions

**year of situation: 2011**

**year of publication: 2012**

The eHospital Census is the most comprehensive European market research on the installed base of hospital IT applications, the supplier structure and market influencing factors. Reports offer detail on key metrics of the installed base such as supplier structure and age profile, and market development forecasts by acute hospital size (beds) and ownership at country level. Data is collected from hospital CIOs for more than 60 IT applications, IT infrastructure and budgets and technology standards.
The methodology has been distinguished as Good Practice case for eHealth benchmarking.

*Please note: This summary contains extracts from the full eHospital Census Report .*
*If you want to purchase the full report please contact dblazek@himssanalytics.eu.*

# Sample Definition

**Universe and Sample Composition by Target Segment**

| | Small | Medium | Large | Total |
|---|---|---|---|---|
| Universe | 78 | 32 | 16 | 126 |
| Sample 2011* | 18 | 15 | 4 | 37 |
| Unique Sample 2010/2011 | 18 | 15 | 4 | 37 |
| % of Universe | 23,1% | 46,9% | 25,0% | 29,4% |

*Source: HIMSS Europe Hospital database, July 2012*

* The 2011 sample contains hospitals interviewed in Q1 and Q2 2012

**Universe**

The universe includes all acute hospitals - general and specialised - in the country under review split by size and ownership.

| | | |
|---|---|---|
| Segmentation by Size: | Small<br>Medium<br>Large | 1 to 199 beds<br>200 to 499 beds<br>500+ beds |
| Segmentation by Ownership: | Public<br>Private | excl. Military & police hospitals<br>of which:<br>not-for-profit: 37% (Universe), 41% (Sample)<br>for-profit: 63% (Universe), 59% (Sample) |

# Benchmarking Parameters

| | Small | Medium | Large | Total* |
|---|---|---|---|---|
| **Capital Availability** | | | | |
| Hospital Budget per Bed (€) | 192.921 | 251.817 | 226.089 | 231.170 |
| IT Budget as a % of Hospital Budget | 1,7% | 1,7% | 1,8% | 1,7% |
| **Clinical Service Level** | | | | |
| FTE per Bed | 3,59 | 4,31 | 4,10 | 4,10 |
| Physicians per Bed | 1,04 | 0,78 | 0,86 | 0,86 |
| **Clinical IT Availability** | | | | |
| Workstations per Bed | 2,18 | 2,43 | 2,34 | 2,35 |
| Workstations per Hospital FTE | 0,61 | 0,56 | 0,57 | 0,57 |
| Mobile Devices on WLAN per Bed | 0,12 | 0,18 | 0,17 | 0,16 |
| **Clinical IT Support Level** | | | | |
| Workstations Supported per IT FTE | 57 | 95 | 120 | 92 |
| Beds per IT FTE | 26 | 39 | 51 | 39 |
| Hospital FTE per IT Department FTE | 94 | 169 | 210 | 161 |
| **EMRAM** | | | | |
| Mean EMRAM Score | 2,763 | 4,753 | 5,134 | 3,437 |
| Median EMRAM Score | 2,605 | 5,036 | 5,134 | 5,016 |

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# Installed Capacity

| | Small | Medium | Small | Total |
|---|---|---|---|---|
| ***Administrative Systems*** | | | | |
| Supply Chain Management | | | | |
| *Enterprise Resource Planning* | 53,7% | 70,9% | 72,5% | 60,4% |
| *Facility and Equipment Management* | 70,4% | 97,5% | 97,5% | 80,7% |
| *Materials Management* | 77,5% | 99,7% | 74,8% | 82,8% |
| *Human Resources* | | | | |
| *Payroll* | 99,4% | 99,4% | 99,4% | 99,4% |
| *Personnel Management* | 93,3% | 98,8% | 98,8% | 95,4% |
| *Time and Attendance* | 89,8% | 94,3% | 100,0% | 92,4% |
| *General Financials & Controlling* | | | | |
| *Accounts Payable* | 95,5% | 100,0% | 100,0% | 97,6% |
| *Business Intelligence* | 54,6% | 72,1% | 98,3% | 64,6% |
| *Data Warehousing/Mining - Clinical* | 87,4% | 65,5% | 73,7% | 80,1% |
| *General Ledger* | 89,3% | 100,0% | 100,0% | 93,6% |
| *Outcomes and Quality Management* | 43,3% | 39,0% | 73,1% | 46,0% |
| *Revenue Cycle Management* | | | | |
| *ADT/Registration* | 94,1% | 99,7% | 99,7% | 96,2% |
| *Bed Management* | 74,6% | 100,0% | 100,0% | 85,5% |
| *Enterprise Master Person Index (EMPI)* | 93,9% | 99,5% | 99,5% | 96,0% |
| *Patient Billing* | 99,5% | 99,5% | 99,5% | 99,5% |
| *Patient Scheduling* | 92,8% | 98,2% | 98,2% | 94,8% |

# Installed Capacity

| | Small | Medium | Small | Total |
|---|---|---|---|---|
| ***Clinical Information Systems*** | | | | |
| ***Health Information Management (HIM)*** | | | | |
| *Ambulatory IS/Outpatient Management System* | 92,6% | 98,0% | 98,0% | 94,6% |
| *Dictation* | 74,1% | 95,8% | 76,9% | 80,0% |
| *Dictation with Speech Recognition* | 23,2% | 69,7% | 78,4% | 42,1% |
| *Encoder* | 94,7% | 100,0% | 100,0% | 96,8% |
| *Document Management* | 49,5% | 59,5% | 74,3% | 55,2% |
| ***Information Sharing*** | | | | |
| *Telemedicine* | 46,1% | 55,3% | 92,2% | 54,3% |
| ***Laboratory*** | | | | |
| *Laboratory Information System* | 39,6% | 100,0% | 100,0% | 63,2% |
| *Laboratory - Anatomical Pathology* | 33,7% | 74,1% | 100,0% | 52,5% |
| *Laboratory - Microbiology* | 40,6% | 100,0% | 78,2% | 61,5% |
| *Laboratory - Molecular Diagnostics* | 17,4% | 20,9% | 26,1% | 19,4% |
| *Laboratory - Outreach Services* | 25,4% | 54,9% | 22,9% | 32,6% |
| ***Pharmacy*** | | | | |
| *Pharmacy Management System* | 92,1% | 97,5% | 97,5% | 94,2% |

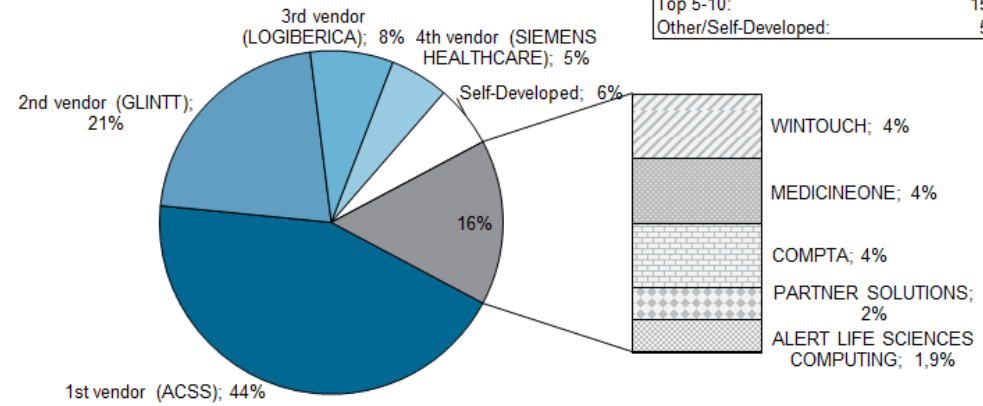
# Installed Capacity

| Clinical Information Systems | | | | |
|---|---|---|---|---|
| **Electronic Medical Record / Electronic Patient Record** | | | | |
| Chronic Disease Management System (CDMS) | 16,1% | 32,2% | 24,1% | 21,2% |
| Clinical Decision Support (CDSS) | 22,9% | 27,4% | 25,7% | 24,4% |
| Clinical Workflow Management System | 65,0% | 39,0% | 24,4% | 53,3% |
| Computerized Practitioner Order Entry (CPOE) | 23,3% | 55,9% | 78,6% | 38,6% |
| Electronic Patient Record/Clinical Data Repository | 90,9% | 95,4% | 100,0% | 93,5% |
| ePrescribing | 41,0% | 49,2% | 79,1% | 47,9% |
| Order Entry (Includes Order Communications) | 86,9% | 91,3% | 97,8% | 89,4% |
| Physician Documentation | 87,2% | 97,7% | 100,0% | 92,1% |
| Physician Portal | 0,0% | 20,9% | 0,0% | 5,3% |
| **Nursing** | | | | |
| Electronic Medication Administration Record | 73,6% | 95,1% | 100,0% | 82,6% |
| Intensive Care | 10,2% | 61,3% | 69,0% | 30,7% |
| Nursing Documentation | 91,5% | 100,0% | 100,0% | 95,9% |
| Obstetrical Systems (Labor and Delivery) | 30,8% | 73,9% | 92,4% | 49,6% |
| **Emergency Department / Operating Room** | | | | |
| Anaesthesia Information Management System | 37,8% | 45,3% | 72,9% | 44,2% |
| Emergency Department Information System | 88,2% | 99,2% | 99,2% | 92,4% |
| Operating Room | 85,3% | 68,2% | 76,8% | 79,9% |
| **Radiology & PACS** | | | | |
| Radiology Information System | 82,3% | 98,7% | 98,7% | 88,5% |
| Imaging Data Center | 77,2% | 99,3% | 99,3% | 85,6% |
| Radiology PACS | 86,5% | 100,0% | 100,0% | 93,1% |
| **Cardiology & PACS** | | | | |
| Cardiology Information System | 11,1% | 33,3% | 74,9% | 24,8% |
| Cardiology PACS | 10,9% | 32,6% | 73,4% | 24,3% |

# IT Vendors – Market Share

| | Small | Medium | Large | Public | Private | Total |
|---|---|---|---|---|---|---|
| ACSS | 26,7% | 64,3% | 75,0% | 78,9% | 7,1% | 43,8% |
| GLINTT | 33,3% | 7,1% | 0,0% | 0,0% | 42,9% | 21,5% |
| LOGIBERICA | 13,3% | 0,0% | 0,0% | 0,0% | 14,3% | 7,8% |
| SIEMENS HEALTHCARE | 0,0% | 7,1% | 25,0% | 5,3% | 7,1% | 5,5% |
| WINTOUCH | 6,7% | 0,0% | 0,0% | 0,0% | 7,1% | 3,9% |
| MEDICINEONE | 6,7% | 0,0% | 0,0% | 0,0% | 7,1% | 3,9% |
| COMPTA | 6,7% | 0,0% | 0,0% | 0,0% | 7,1% | 3,9% |
| PARTNER SOLUTIONS | 0,0% | 7,1% | 0,0% | 5,3% | 0,0% | 1,9% |
| ALERT LIFE SCIENCES COMPUTING | 0,0% | 7,1% | 0,0% | 5,3% | 0,0% | 1,9% |
| SELF-DEVELOPED | 6,7% | 7,1% | 0,0% | 5,3% | 7,1% | 5,8% |
| Others | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% | 0,0% |
| **N** (valid) | 15 | 14 | 4 | 19 | 14 | 33 |
| *control sum:* | *100,0%* | *100,0%* | *100,0%* | *100,0%* | *100,0%* | *100%* |

**Vendor Market Shares (% of Installations)**




| Market Concentration Ratios | |
|---|---|
| C4 (Top 4 vendors): | 78,6% |
| Top 5-10: | 15,6% |
| Other/Self-Developed: | 5,8% |

# Care Documentation

**Actual Use of the Physician Documentation System, % of Institutions***

| | Small | Medium | Large | Public | Private | Total |
|---|---|---|---|---|---|---|
| 1-25% | 0% | 0% | 0% | 0% | 0% | 0,0% |
| 26-25% | 0% | 0% | 25% | 5% | 0% | 3,6% |
| 51-75% | 13% | 7% | 0% | 5% | 14% | 9,7% |
| 76-100% | 87% | 93% | 75% | 89% | 86% | 86,7% |
| **N** (valid) | 15 | 14 | 4 | 19 | 14 | 33 |
| *control sum* | *100,0%* | *100,0%* | *100,0%* | *100,0%* | *100,0%* | *100,0%* |

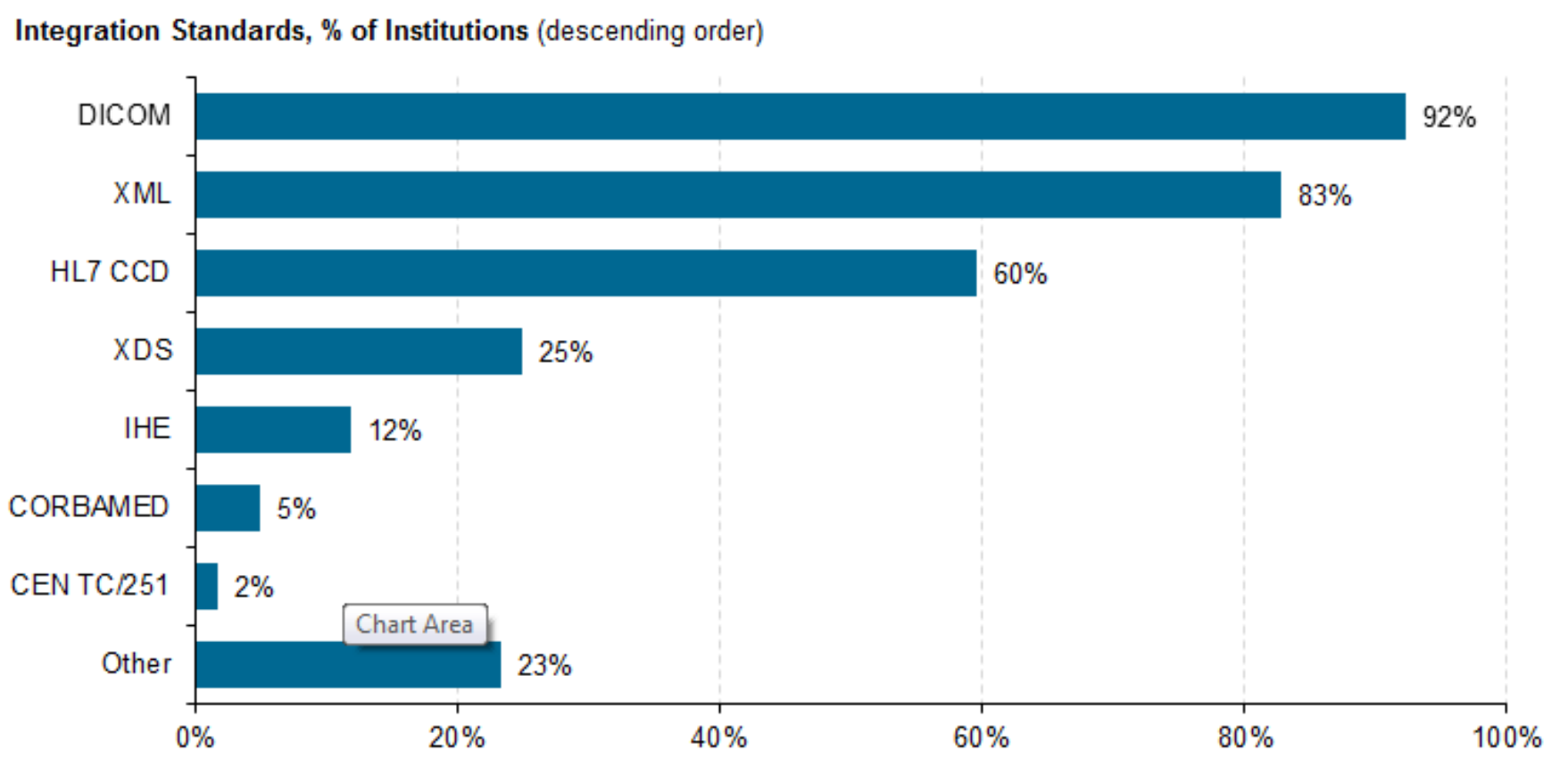
**Answers based on question: "What percent of physicians use the physician documentation system?"*

**Documentation Captured by Structured Templates, % of Institutions***

| | Small | Medium | Large | Public | Private | Total |
|---|---|---|---|---|---|---|
| 1-25% | 7% | 0% | 25% | 5% | 7% | 7,5% |
| 26-25% | 0% | 7% | 50% | 16% | 0% | 9,1% |
| 51-75% | 47% | 43% | 0% | 26% | 57% | 38,9% |
| 76-100% | 47% | 50% | 25% | 53% | 36% | 44,4% |
| **N** (valid) | 15 | 14 | 4 | 19 | 14 | 33 |
| *control sum* | *100,0%* | *100,0%* | *100,0%* | *100,0%* | *100,0%* | *100,0%* |

**Answers based on question: "What percent of physician documentation is captured by structured templates that generate discrete data?"*

# Integration Standards



# Medication Administration

**Use of Barcoding or RFID, % of Institutions**

| | Small | Medium | Large | Public | Private | Total |
|---|---|---|---|---|---|---|
| Barcoding | 78% | 93% | 100% | 95% | 76% | 84,6% |
| RFID | 6% | 47% | 75% | 50% | 6% | 24,8% |
| Barcoding or RFID (at least one of both) | 78% | 93% | 100% | 95% | 76% | 84,6% |
| **N (valid)** | 18 | 15 | 4 | 20 | 17 | 37 |

**Use of Barcoding/RFID for Medication Administration, % of Institutions**

| | Small | Medium | Large | Public | Private | Total |
|---|---|---|---|---|---|---|
| Yes, of which | 50% | 60% | 75% | 50% | 65% | 55,7% |
| ...tag patient | 22% | 78% | 33% | 60% | 36% | 37,7% |
| ...tag medication | 0% | 0% | 0% | 0% | 0% | 0,0% |
| ...tag nurse | 11% | 78% | 33% | 60% | 27% | 30,9% |
| ...tag all three (patient, medication, nurse) | 0% | 0% | 0% | 0% | 0% | 0,0% |
| No | 50% | 40% | 25% | 50% | 35% | 44,3% |
| **N** (valid) | 18 | 15 | 4 | 20 | 17 | 37 |

| Stage | Small | Medium | Large | Total* | Short Description |
|---|---|---|---|---|---|
| Stage 7 | 0,0% | 0,0% | 0,0% | 0,0% | Complete EMR; CCD transactions to share data; Data warehousing feeding outcomes reports, quality assurance, and business intelligence; Data continuity with ED, ambulatory, OP |
| Stage 6** | 0,0% | 0,0% | 0,0% | 0,0% | Physician documentation interaction with full CDSS (structured templates related to clinical protocols trigger variance & compliance alerts), AND Closed loop medication administration |
| Stage 5** | 5,6% | 40,0% | 75,0% | 23,1% | Full complement of R-PACS displaces all film-based images |
| Stage 4 | 0,0% | 13,3% | 0,0% | 3,4% | CPOE in at least one clinical service area and/or for medication (i.e. ePrescribing); may have Clinical Decision Support based on clinical protocols |
| Stage 3 | 16,7% | 26,7% | 25,0% | 20,3% | Nursing/clinical documentation (flow sheets); may have Clinical Decision Support for error checking during order entry and/or PACS available outside Radiology |
| Stage 2 | 5,6% | 13,3% | 0,0% | 6,8% | Clinical Data Repository (CDR) / Electronic Patient Record; may have Controlled Medical Vocabulary, Clinical Decision Support (CDS) for rudimentary conflict checking, Document Imaging and health information exchange (HIE) capability |
| Stage 1 | 0,0% | 6,7% | 0,0% | 1,7% | Ancillaries – Lab, Radiology, Pharmacy – All Installed OR processing LIS, RIS, PHIS data output online from external service providers |
| Stage 0 | 72,2% | 0,0% | 0,0% | 44,7% | All Three Ancillaries (LIS, RIS, PHIS) Not Installed OR Not processing Lab, Radiology, Pharmacy data output online from external service providers |
| N (valid) | 18 | 15 | 4 | 37 | Institutions with valid EMRAM Score (based on 2011 sample) |
| *control sum* | *100,0%* | *100,0%* | *100,0%* | *100,0%* | |

* Total is weighted by hospital size (# of beds)

** Some stage 5 hospitals listed in this report are candidates for stage 6. But the pocedure for stage 6 validation did not take place before this report was created.

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# PERSONAL EXPERIENCE AS CIO

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# LUZ SAÚDE - Presence in Portugal

# Hospital Beatriz Ângelo

- Public hospital, is part of national health system and is managed under an agreement of public-private partnership.
- 424 beds
- 44 consultation rooms and 23 examination rooms
- 8 operating rooms y 6 delivery rooms
- Daily Hospital (medical and surgical), includes Oncology, Hemodialysis, Psychiatry
- General, Obstetrics / Gynecology and Pediatrics Emergency Department


# Hospital Beatriz Ângelo (Specialties)

## Médical

- Cardiology
- Dermatology
- Infecciology
- Endocrinology
- Gastroenterology
- Imunoalergology
- Internal Medicine
- Nephrology
- Neurology
- Oncology
- Pediatrics
- Pulmonology
- Psychiatry – Children, adolescents and adults
- Rheumatology

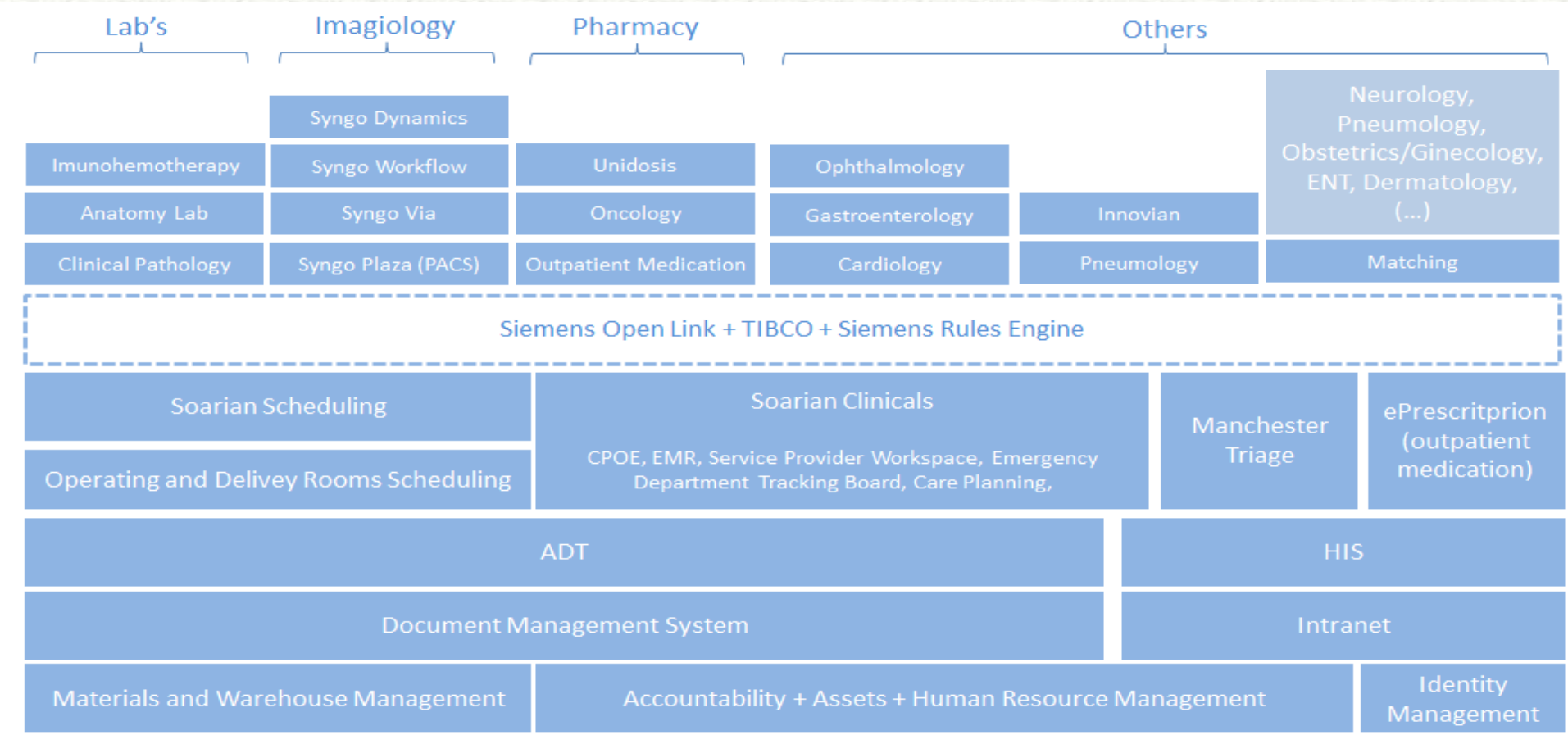
## Surgical

- Vascular Surgery
- General Surgery
- Plastic Surgery
- Obstetrics/Gynecology
- Ophthalmology
- Orthopedics
- ENT
- Urology

## Ancillary Servvices

- Anatomy Lab
- Anesthesiology
- Imunohemotherapy
- Rehabilitation
- Nuclear Medicine
- Clinical Pathology Lab
- Radiology

# Operational Systems - Architecture



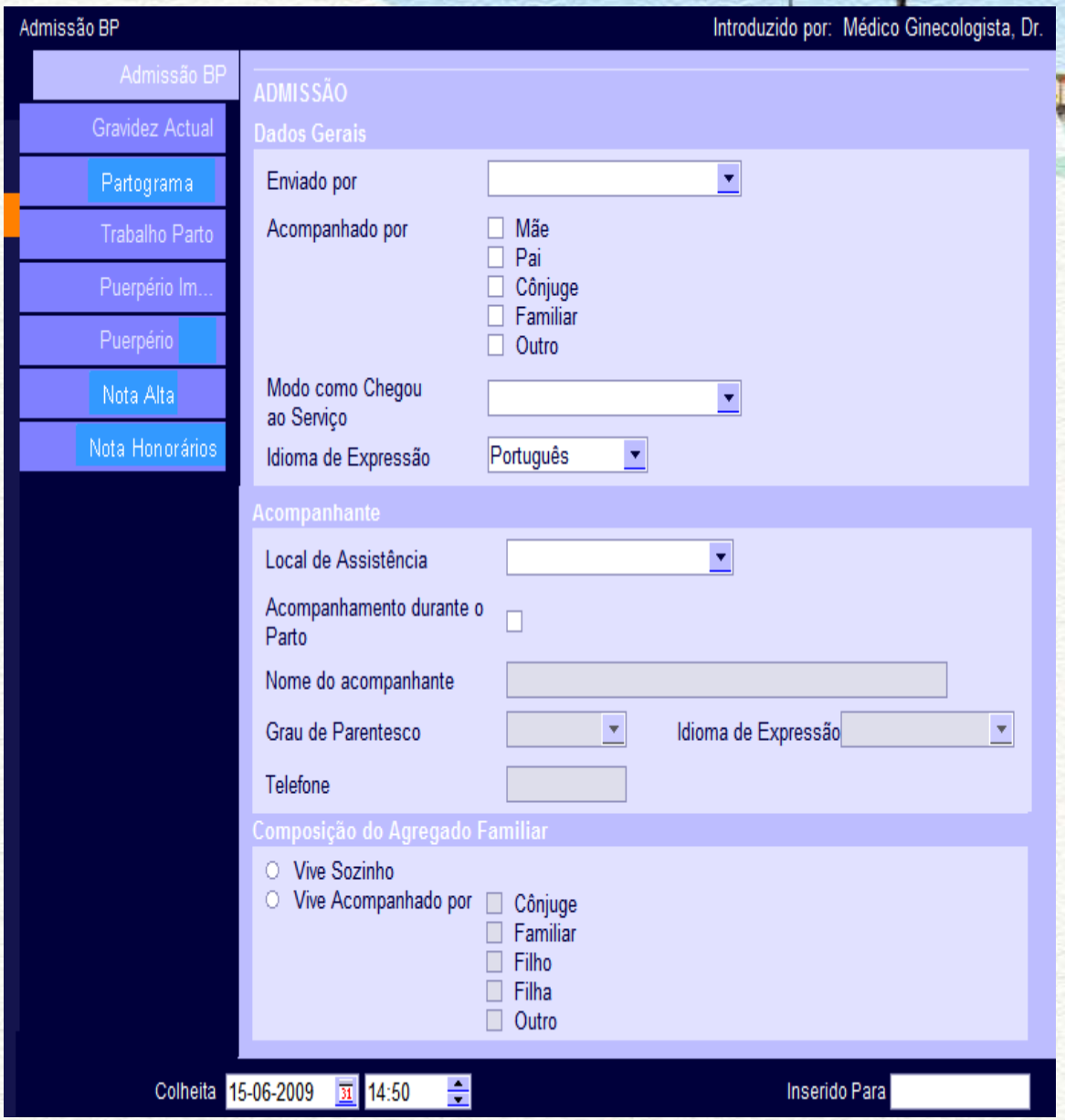
# Hospital Beatriz Ângelo (Users Statistics)

## Active Users

| Users | Total |
|---|---|
| Physicians | 1343 |
| Nurses | 815 |
| Technicians | 248 |
| Others | 160 |

## Hospital Beatriz Angelo (Statistics)

This hospital has approximately 200 clinical registration forms in use in its EHR



## Hospital Beatriz Angelo (Statistics)

The top 30 most used HER clinical forms and total of records for the first 2 years of utilization

| EHR Form | Utilization (2 years) |
|---|---|
| Nurse Shift Notes | 1,144,046 |
| Inpatient Vital Signals | 947,862 |
| Triage | 396,830 |
| MEWS Sacle | 306,339 |
| ER - Adult Assesment | 252,225 |
| Inpatient Daily Physician Assessment | 251,374 |
| Morse Scale | 167,215 |
| Braden Scale | 151,256 |
| Inpatient Daily Nurse Assessment | 131,788 |
| Glasgow Scale | 121,986 |
| ER - Pediatrics | 114,114 |
| Barthel Index | 101,731 |
| Nurse Admission Notes | 87,153 |
| ICD9 Assessment | 79,302 |
| Consulting Observations | 62,522 |
| Nurse Discharge Note | 49,763 |
| IN-OUT Take | 48,883 |
| Discharge Note | 48,653 |
| Daily Hospital Note | 43,829 |
| Visual Analogue Scale | 43,225 |
| ER - Vital Signals | 42,075 |
| Orthopedic Consultation | 41,820 |
| Ophthalmology Consultation | 41,295 |
| Draft of Nurse Dischage | 38,997 |
| Pain Scale | 37,292 |
| Recovery Assessment | 36,471 |
| ENT Consultation | 36,468 |
| Nurse Consultation Observation | 35,580 |
| Preoperative Assessment | 35,395 |
| Av. Internamento | 33,982 |

# Integration Challenge - Context

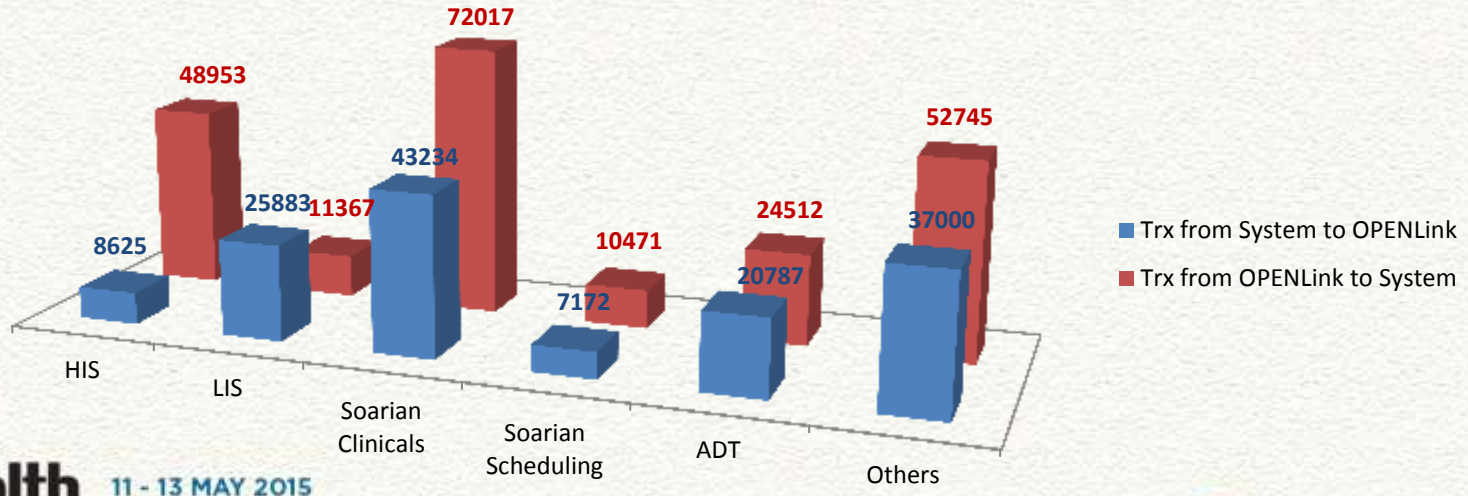
- Almost 70 HL7 end-to-end integration scenarios
  - Patient demographics
  - Admission, discharge and transfer
  - Order entry
  - Observation reporting
  - Scheduling and resource management
- Other integration and implementation scenarios: DICOM integration, SOA, Data to Data

# Integration Challenge – HL7 Statistics

- 17 systems using 33 interfaces
  - 112 HL7 event driven workflows
  - Daily :
    - up to 400.000 HL7 messages are delivered
    - > 1.000.000 of operations are processed

# Integration Challenge - OPENLink Daily Load

| | Trx from System to OPENLink | Trx from OPENLink to System | Total |
|---|---|---|---|
| HIS | 8625 | 48953 | 57578 |
| LIS | 25883 | 11367 | 37250 |
| Soarian Clinicals | 43234 | 72017 | 115251 |
| Soarian Scheduling | 7172 | 10471 | 17643 |
| ADT | 20787 | 24512 | 45299 |
| Others | 37000 | 52745 | 89745 |
| **Total:** | | | **362766** |



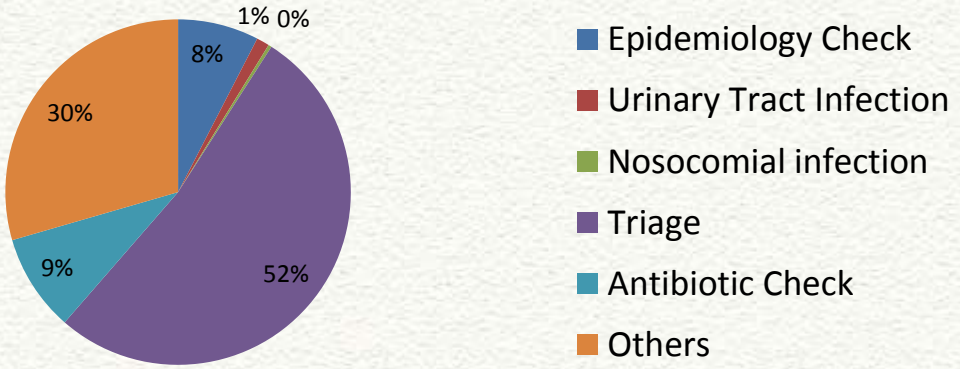
# Business Process Management Approach

daily 348 average of workflows cases

- Epidemiology Check
- Urinary Tract Infection
- Nosocomial infection
- Triage
- Antibiotic Check

**Workflows Cases in Soarian Clinicals**

(monthly average of workflows cases : 10.450)



# Implementation Results

- Full digital hospital
- Complete paper less hospital
- 100% adherence of users
- Fully integrated architecture
- Fully committed with high level of interoperability
- 70 HL7 integration scenarios as well as use of other standards of integration: DICOM, SOA
- 3-4 months of preparation
- After first day, all the facilities and specialties were opened within 6 weeks time frame

# HOW TO DEAL WITH…

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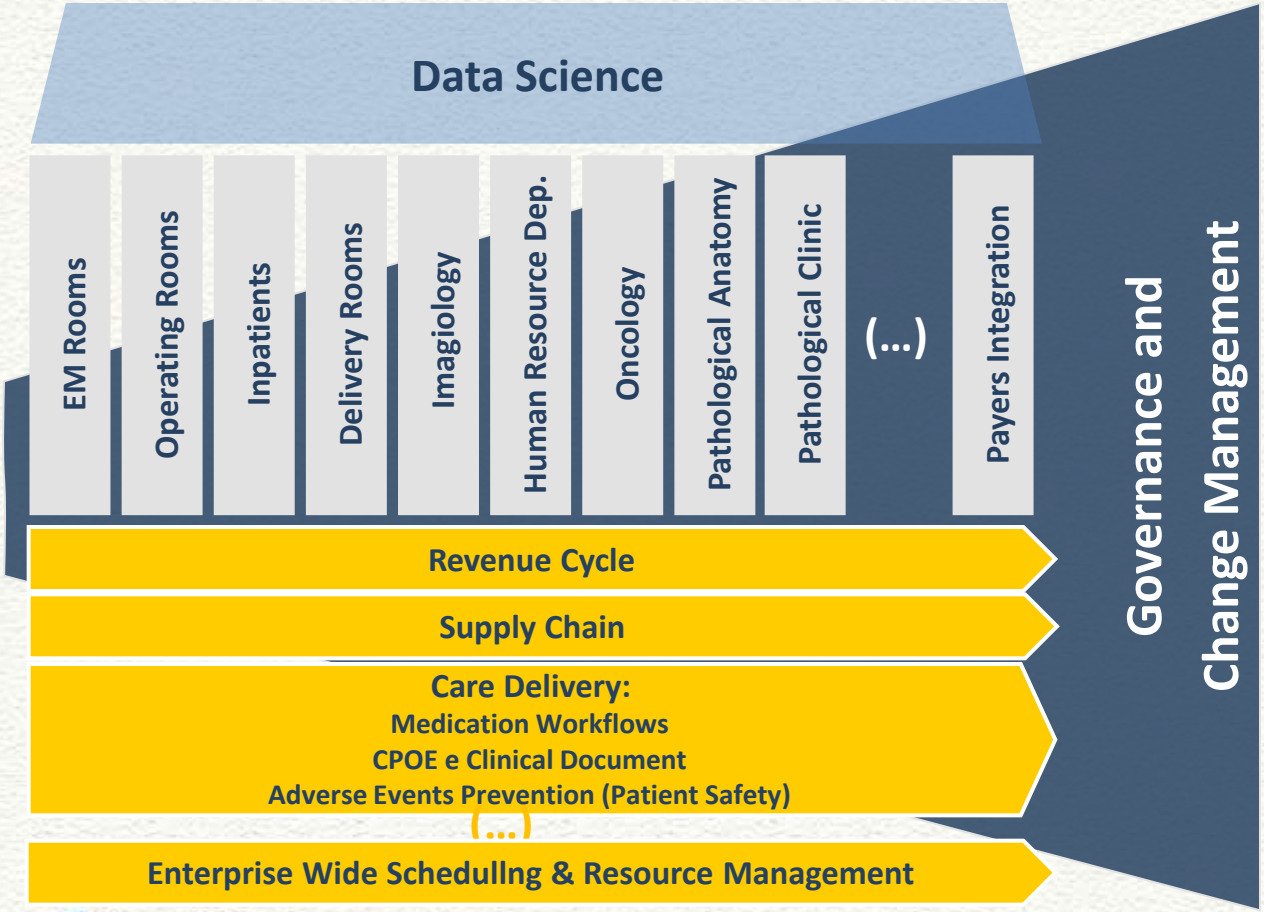
# How to Deal With...

- Create an empowered and innovative environment: find leaders, delegate on them (outside IT team) and govern the change

# Working Groups




- Creation of several working groups addressing most of the process engineering and IT requirements

# How to Deal With...

- Create an empowered and innovative environment: find leaders, delegate on them (outside IT team) and govern the change
- Do not be modest to eliminate paper

# Discipline of Enterprise Content Management



- Extensive use Intranet as a tool to facilitate communication
- Use and integrate the EHR with the document management system

# How to Deal With...

- Create an empowered and innovative environment: find leaders, delegate on them (outside IT team) and govern the change
- Do not be modest eliminating paper
- Focus in System Integration, Business Process Management and Good System Engineering Practices

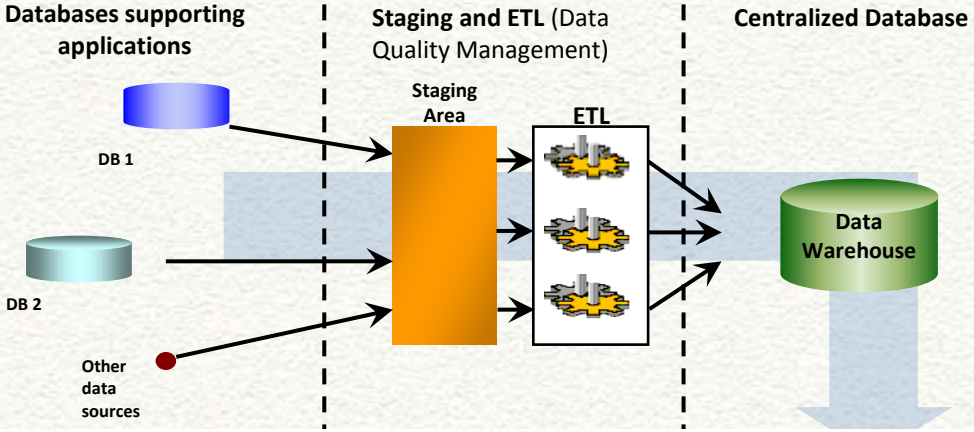
# Focus in System Integration, Business Process Management and Good System Engineering Practices

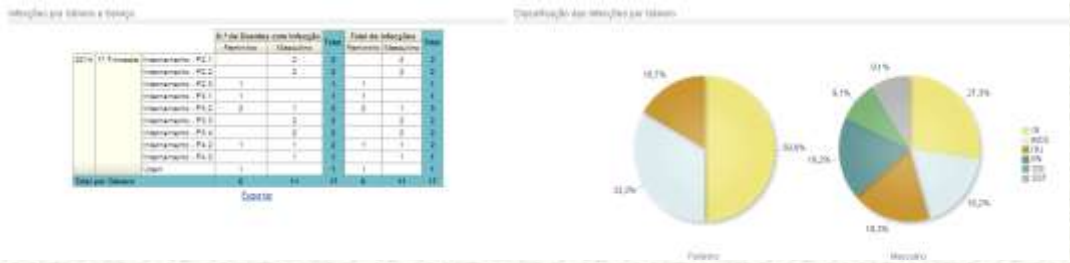
- Let the users feels a return in the use of the systems
  - Total departmental system integration
  - Same use at any point of the organization
  - Facilitates the communication between professionals (CPOE and ePrescription)
- Extensive use of UML (Unified Modeling Language) for the design of integration scenarios
  - 'Patient demographics'
  - 'Admission, discharge and transfer'
  - 'Order entry'
  - (...)
- Take advantage of standardization to create opportunities to automation
  - Promote the use of the technology of workflow engines
  - Accelerate the organization's operations to reduce time and the use of redundant resources
- Extensive use of BPMN (Business Process Modeling Notation)
  - Epidemiology Check
  - Urinary Tract Infection
  - Nosocomial infection
  - Triage
  - Antibiotic Check

# How to Deal With...

- Create an empowered and innovative environment: find leaders, delegate on them (outside IT team) and govern the change
- Do not be modest eliminating paper
- Focus in System Integration, Business Process Management and Good System Engineering Practices
- Use the recorded data to create new user experience

# Use the recorded data to create new user experience



- Use data science techniques to give more information to the users and management team
  - Real time data warehouse
  - 5,6 million transactions captured every
  - 3,5 TB of tidy data

# CHALLENGES ON FUTURE

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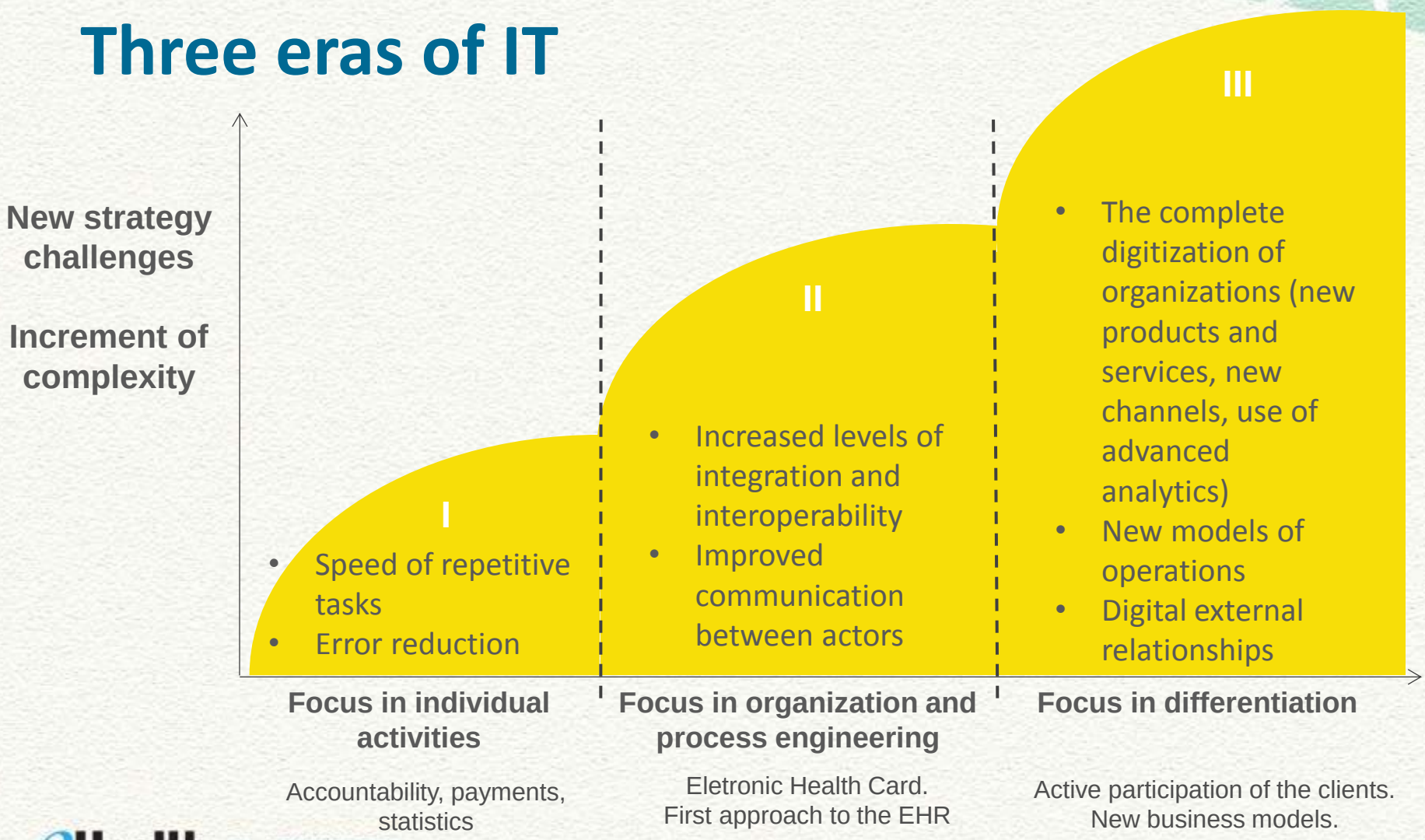
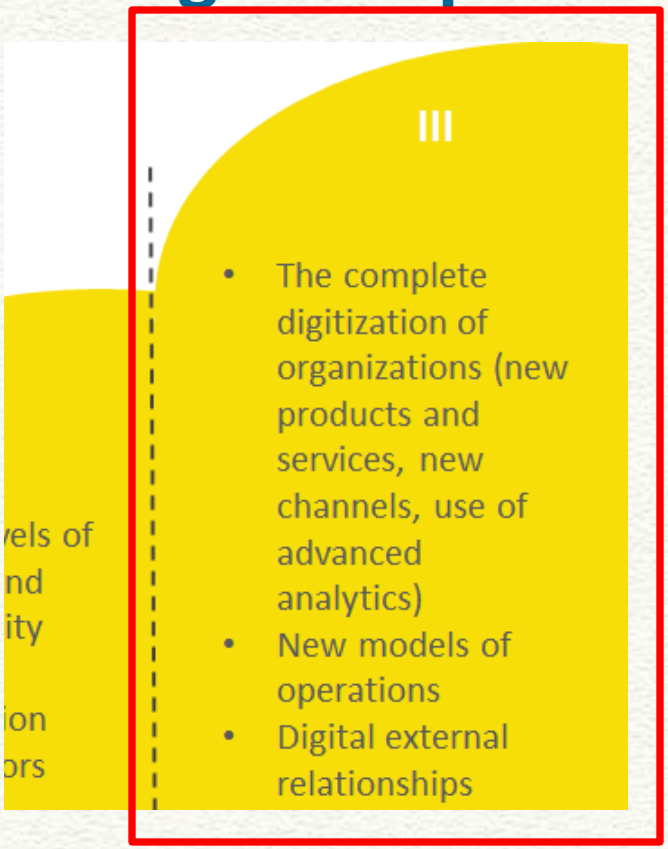
# Three eras of IT



# Digital Mastery

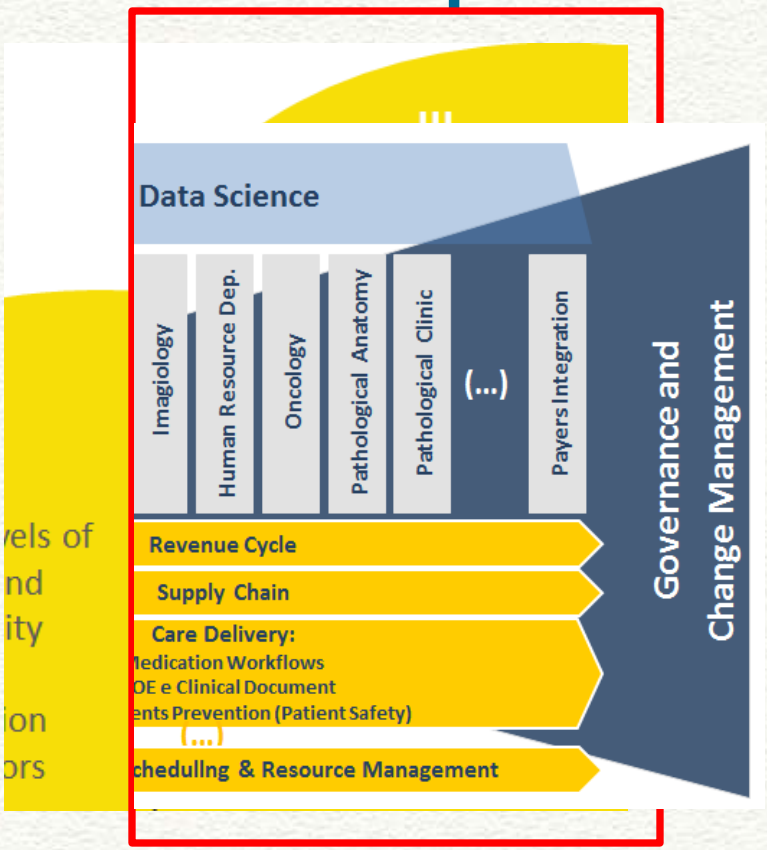
- Build digital capabilities by rethinking and improving:
  - business processes
  - customer engagement
  - business models

# The Digital Mastery Addresses the Use of New Digital Capabilities




- Mobility
- Social Media
- Advanced Analytics
- Embedded Devices
- Cloud

# The Digital Mastery Requires Strong Leadership




- Create a clear broad vision of the future
- Start some critical initiatives
- Engage employees to build out the vision over time
- Govern and stay involved

# Don’t Forget EMRAM

EMRAM allow us not just evaluate but also works as a “glue” to the unleashed initiatives in the scope of a mastery digital transformation

| European EMR Adoption Model [SM] | |
|---|---|
| **Stage** | **Cumulative Capabilities** |
| **Stage 7** | Complete EMR integrates all clinical areas (e.g. ICU, ED, Outpatient) displacing all (medical) paper records in the hospital; Continuity of Care standards to exchange data; Data Warehouse used as basis for clinical and business analytics |
| **Stage 6** | Clinical Documentation interacts with advanced Decision Support (based on discrete data elements) AND Closed Loop Medication Administration |
| **Stage 5** | Integrated Image Management Solution (e.g. PACS) displaces all film-based images throughout the hospital |
| **Stage 4** | Electronic Ordering provides Clinical Decision Support (based on rules engines) in at least one clinical service area and/or for medication |
| **Stage 3** | Clinical Documentation as well as Electronic Ordering of Physician and/or Nursing Care services; includes tracking of Medication Administration (eMAR) |
| **Stage 2** | Clinical Data Repository / Electronic Patient Record allows collection and normalization of data from disparate clinical sources throughout the hospital |
| **Stage 1** | Information Systems for major ancillary departments (Laboratory, Radiology, Pharmacy) are installed or data output from external service providers are processed electronically |
| **Stage 0** | Information Systems for major ancillary departments (Laboratory, Radiology, Pharmacy) are not installed or data output from external service providers cannot be processed electronically |

# THANK YOU


Raul Martins

CIO

raulvalemartins@gmail.com

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