eHealth week

11 - 13 MAY 2015
RIGA, LATVIA

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INTEROPERABILITY IN ACTION:
INFORMATION + INTEGRATION = INNOVATION ?

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Agenda   *12:30 – 2:15 pm*

Introduction – Motivation
> Anne Moen, *President EFMI*, Catherine Chronaki, *Secretary General, HL7 Foundation*

Welcome
> Charles Jaffe, *Chief Executive Officer HL7 International*

Healthcare Analytics: Hospital-led Innovation in Action
> John Hoyt, *Executive Vice President HIMSS*

Industry-led innovation I: Beyond implantable devices
> Matic Meglic, *Strategy Director Medtronic Hospital Solutions*

Industry-led Innovation II: IBM Watson, Analytics, and mHealth
> John Crawford and Matej Adam, *Healthcare Industry Leaders, IBM*

eHealth Standards and the Innovator's Dilemma
> Catherine Chronaki, *Secretary General HL7 Foundation*

Government-led Innovation: Innovation Centers in Portugal
> Henrique Martins, *President SPMS*

Continuous Professional Health Education and Innovation
> Anne Moen, *President EFMI*

Discussion

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INTRODUCTION – MOTIVATION

Catherine Chronaki, *Secretary General, HL7 Foundation*
Anne Moen, *President European Federation for Medical Informatics*

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- Are Health Informatics and HIE in flux when meeting situated, context dependent clinical practice(s) in different cultures ?

- Call to revisit standards' use in action and elaborate way forward in terms of practical value and opportunities for innovation

- Complexity – multiple stakeholders and perspectives

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WELCOME

Charles Jaffe, *Chief Executive Officer HL7 International*

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SOME GOOD EXAMPLES OF HIE FROM HIMSS STAGE 7 CLIENTS

John Hoyt,   EVP HIMSS Analytics

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Quick Review of the 8 Stages

US EMR Adoption Model[SM]

Stage	Cumulative Capabilities	2011 Q2	2014 Q3
Stage 7	Complete EMR, Data Analytics to Improve Care	1.1%	3.4%
Stage 6	Physician documentation (templates), full CDSS, Closed loop medication administration	4.0%	16.5%
Stage 5	Full R-PACS	6.1%	29.5%
Stage 4	CPOE, Clinical Decision Support (clinical protocols)	12.3%	14.5%
Stage 3	Clinical documentation, CDSS (error checking)	46.3%	23.9%
Stage 2	CDR, Controlled Medical Vocabulary, CDS, basic HIE capable	13.7%	5.3%
Stage 1	Ancillaries - Lab, Rad, Pharmacy - All Installed	6.6%	2.5%
Stage 0	All Three Ancillaries Not Installed	10.0%	4.4%

N = 5439   N = 5449

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Stage 7 Organizations Must Excel in Many Things … HIE Is One of Them

- The Stage 7 validation visit begins with a client presentation covering these five subject areas:
  - Architecture & Use Statistics
  - System Governance
  - Analytics Program
  - **H**ealth **I**nformation **E**xchange
  - Disaster Recovery & Business Continuity

For HIE We Want to See

- What exchange are you doing now?
- What do you have in your plans?
- What are you doing through a public channel?
- What are you doing privately?

- We expect to see leadership and <u>value</u> derived from HIE
  – Show us the leadership
  – Explain the value

Some Good Examples from Stage 7 Validations

- **Marina Salud, Denia Spain**
  - A regional EMPI = **E**lectronic **M**aster **P**atient **I**ndex from multiple sources
  - Regional medication data base allowing for interaction checking on all medication orders
  - Government supported regional surgery waiting list integration reducing waiting time
  - Syndromic surveillance for Ebola, Legionella, etc.
  - Regional repository of all diagnostic imaging

UKE in Eppendorf, Germany

- Acting as the central hub for 15 Hospitals with TeleRadiology, TeleCardiology, TeleStroke, TelePathology and TeleTumor-Boards
  - Enables 24x7 radiology for smaller local hospitals
  - Generated €400.000 to UKE last year
- Currently building connections with local physicians for exchange of discharge letters
  - Currently re-designing the telemedicine connection process
- Challenges in Germany: privacy laws and application of standards

Some Good Examples from Stage 7 Validations

- **Carolinas Health System**, in U.S.A
  - A **P**ersonal **H**ealth **R**ecord that is like "an ATM"
    - Accepts data from multiple providers and multiple vendors

- **North East Georgia Health System Clinic** Stage 7
  - A **P**ersonal **H**ealth **R**ecord that is like "an ATM"
    - Accepts data from multiple providers and multiple vendors
  - AND it is their downtime back up system if their data center is unavailable

Some Good Examples from Stage 7 Validations

- **Florida Adventist Health System**
  - 44 hospitals from Northern U.S. to South Florida share demographic information to support one EMPI
  - Each hospital may have GPs and Specialists who use their own information system and contribute demographic data for the entire system

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INDUSTRY-LED INNOVATION I:
BEYOND IMPLANTABLE DEVICES

Matic Meglic, *Strategy Director Medtronic Hospital Solutions*

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Medtronic's three key strategic priorities

Therapy Innovation

Introducing and delivering meaningful therapies and procedures
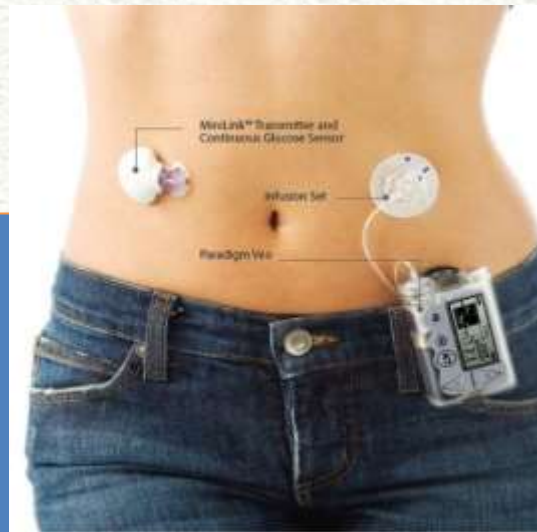
Globalization

Addressing the inequities in healthcare access globally

Economic Value

Helping lead the creation of value-based healthcare solutions

Med device industry:
From *flying blind* to *self-driving*

Forgettables

Momont's Ambulance Drone

Medical devices:
on the brink of major change

- Mature consolidated industry but the world is not flat anymore.

- Heavy regulation is under increased pressure (patient hacking)

- Consumer devices entering the space

- Vertical (and cross-industry) integration

- Data mgmt platforms (ecosystem) fight for dominance

- Data aggregation, data mgmt and BI becoming commodities; value = contextual knowledge (power shift - remember gmail?)

Information + integration is instrumental

- I+I for device tech innovation (bidirectional)
  http://www.youtube.com/watch?v=uBh2LxTW0s0#t=3m10s

Integrated care, Optimise, Value based

Outcomes & Savings, Risk sharing

**INDUSTRY-LED INNOVATION II:
IBM WATSON, ANALYTICS, AND MHEALTH**

Matej Adam and John Crawford, *Healthcare Industry Leaders, IBM*

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Mobility : The world of IoT

The IoT is expected to connect 30-50B devices by 2020 in millions of different ecosystems

"…purchasing 10-20 different services from 10-20 different vendors using 10-20 different apps with 10-20 different user interfaces. If that's the way IoT goes, it will be a long tough slog to Nirvana." *Bob Harden, Principal, The Harden Group*

Influx of information pushed and retrieved from mobile devices

- Demographics
- Patient status
- Diagnosis
- Workflows
- Orders
- Care plans

Consumer vs Provider Focus

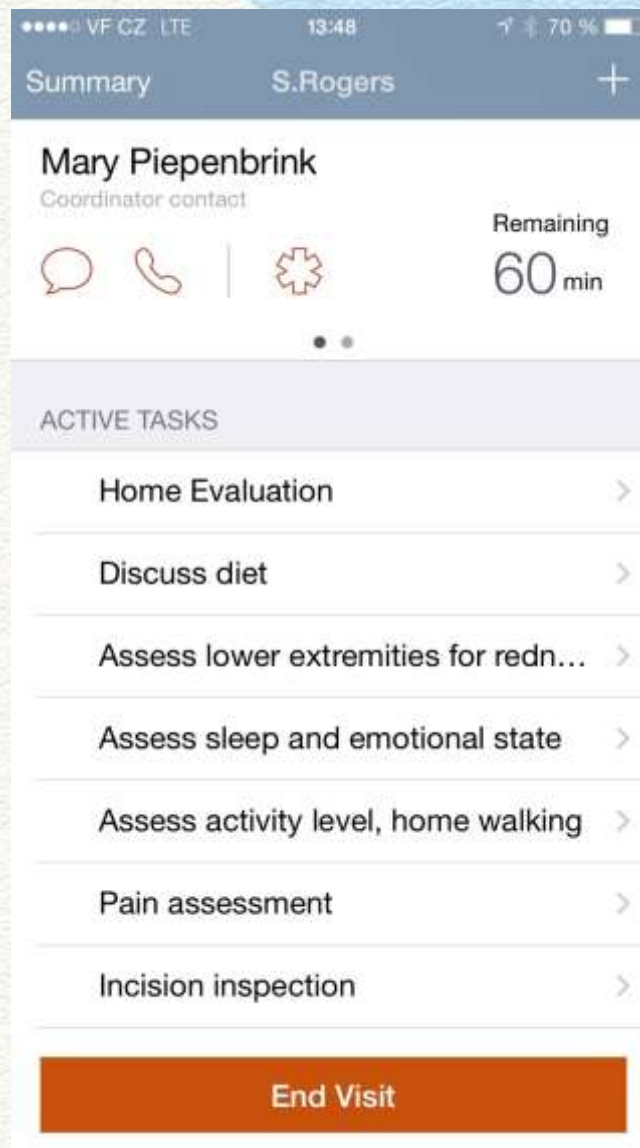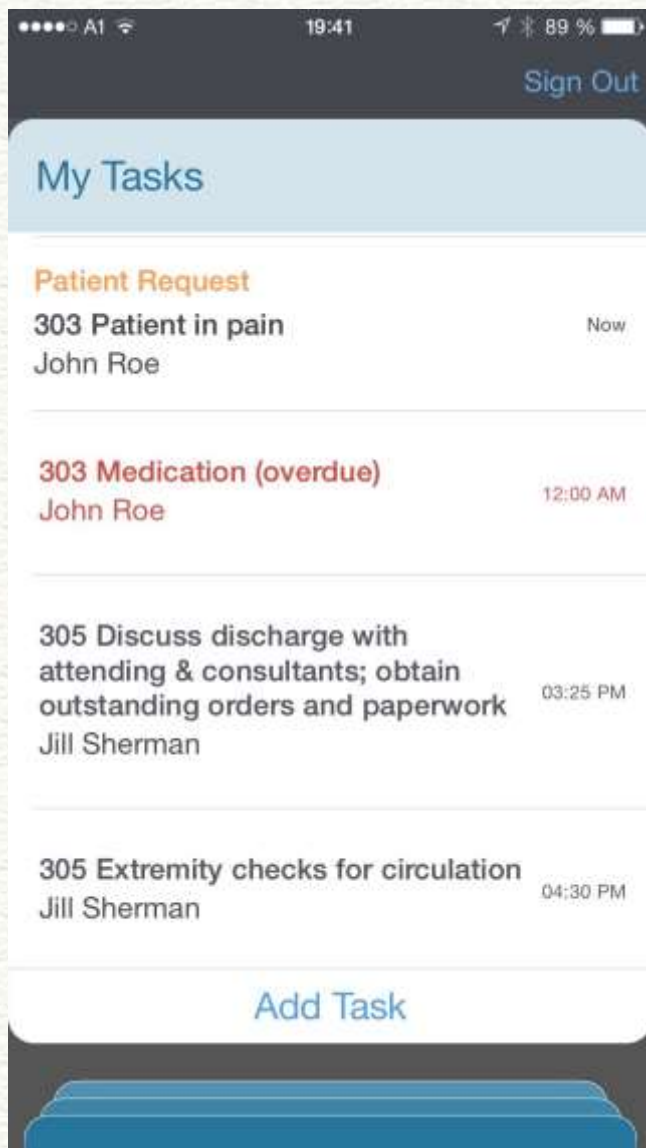# Influx of information pushed and retrieved from mobile devices

- IHE, CDA, CCD, Continua?

- Shared Electronic Health Records?

- FDA mobile apps regulation?

    "if a mobile app is intended for use in performing a medical function (i.e., for diagnosis of disease) it is a medical device, regardless of the platform on which it is run."

Consumer vs
Provider Focus

Need for standardization will grow with

- Maturity
- Standardized apps vs bespoke developments
- Security demands
- Going beyond platform boundaries and lock-in
- National / regional government mHealth agendas
- Patient empowerment and self care
- Wearables

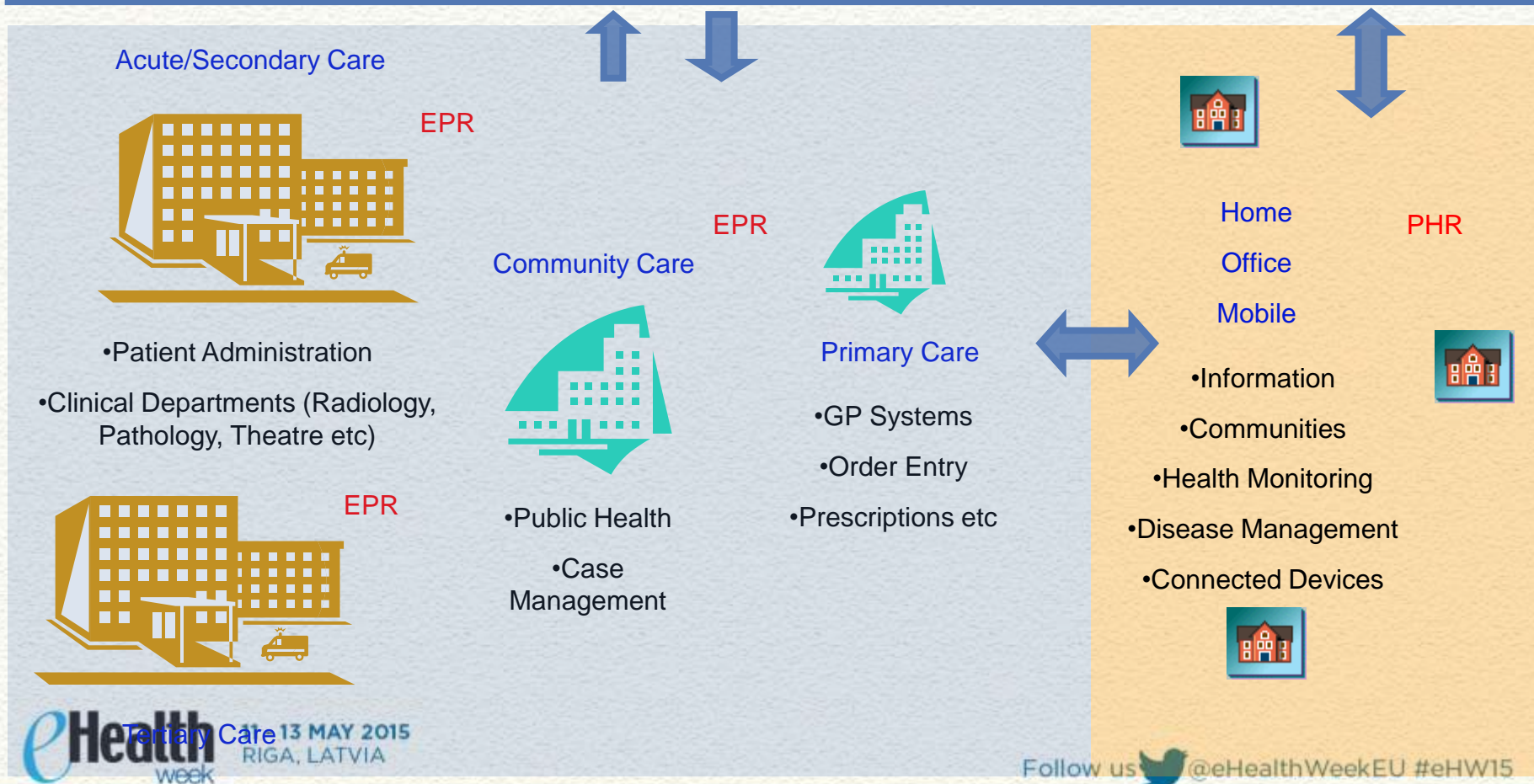# Standards for exchange and representation of health records

Unlocking the Power
of Health Information.

New sources of data available to healthcare systems

National eHealth Infrastructure (Unique Identifier, Summary Care Record, Disease Registries, Image Archives etc)

Acute/Secondary Care

EPR

EPR

Community Care

Primary Care

Home

Office

Mobile

PHR

EPR

- Patient Administration
- Clinical Departments (Radiology, Pathology, Theatre etc)

- Public Health
- Case Management

- GP Systems
- Order Entry
- Prescriptions etc

- Information
- Communities
- Health Monitoring
- Disease Management
- Connected Devices

EPR

Tertiary Care

Increasing value – advanced analytics

Finding transformational insights depends on developing new, more advanced analytical competencies

Analytic Technique	Critical Business Question	
Stochastic Optimization	How can we achieve the best outcome including the effects of variability?	**Advanced Analytics**
Optimization	How can we achieve the best outcome?	*Prescriptive and Predictive*
Predictive modeling	What will happen next if …?	*Support new business models and opportunities*
Forecasting	What if these trends continue?	
Simulation	What could happen…. ?	
Alerts	What actions are needed?	**Operational Analytics**
Query/drill down	What exactly is the problem?	*Support ongoing business operations*
Ad hoc reporting	How many, how often, where?	*Meet compliance requirements*
Standard Reporting	What happened?	

Strategic Value

Degree of Complexity

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The evolution of analytics for health management

- Exchange of data to support continuity of care
  - epSOS, Trillium Bridge
- Representation of a more complete health history
- Population Health Management – risk stratification
  - Claims / reimbursements as model input
  - Clinical data across multiple providers
  - Patient reported data
- Interpreting unstructured data
  - NLP - Watson Content Analytics
  - Curating personal data - IBM Watson Health Cloud

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eHealth standards and the Innovator's Dilemma

Catherine Chronaki, HL7 Foundation

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eHealth Standards and the Innovator's Dilemma

- **Disruptive vs incremental innovation:**
  - Making healthcare simpler, accessible, affordable
  - Improving performance

- **Innovator's dilemma for eHealth standards**
  - As analytics, health apps, and mobile health set out to disrupt the health care Information landscape, where do eHealth standards stand?
  - Does the innovator's dilemma apply to eHealth standards?
  - Where is HL7 heading?

The innovator's dilemma

- **Innovator's dilemma [Christensen1997]**
  - the logical, competent decisions of management that are critical to the success of their companies are also the reasons why they lose their positions of leadership.
  - Healthcare systems needs to transform unsustainably expensive services to ones that are of high quality, low cost and conveniently accessible.
- **Lesson from other industries on disruptive innovation:**
  - needs to develop autonomously
  - roots addressing simple problems of the least demanding customers.

  Because:
  - rarely initiated by leading companies in an industry
  - cannot meet the needs of industry leaders or their customers
 - profits unattractive from the dominant business model perspective

[Christensen, Clayton M. (1997). The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail (Management of Innovation and Change) (Kindle Locations 8-9). Harvard Business Review Press.]

[Christensen, Clayton M.; Grossman M.D., Jerome H.; Hwang M.D., Jason (2008). The Innovator's Prescription: A Disruptive Solution for Health Care
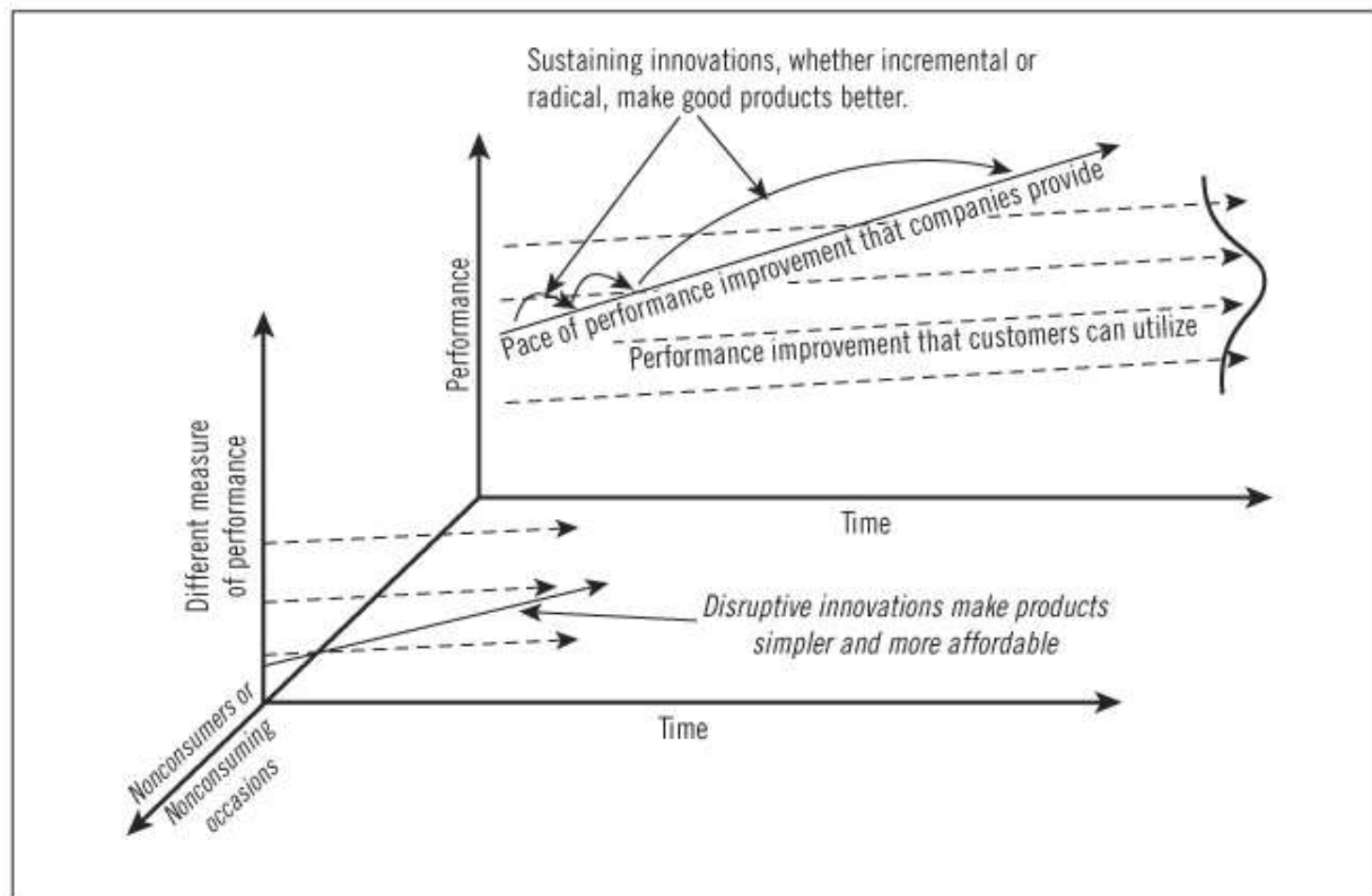
Elements of disruptive innovation

Every disruption is comprised of three components:

- a technology that transforms the fundamental technical problem in an industry from a complicated one into a simple one

- a business model that can take that simplified solution to the market at low cost

- a supporting cast of suppliers and distributors whose business models are consistent with one another, which we call a value network.
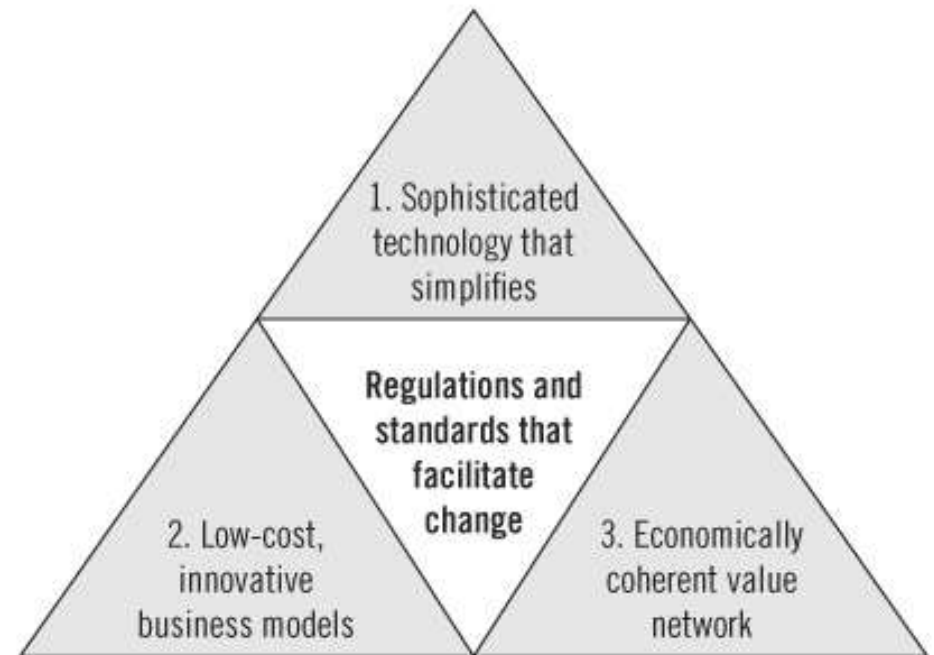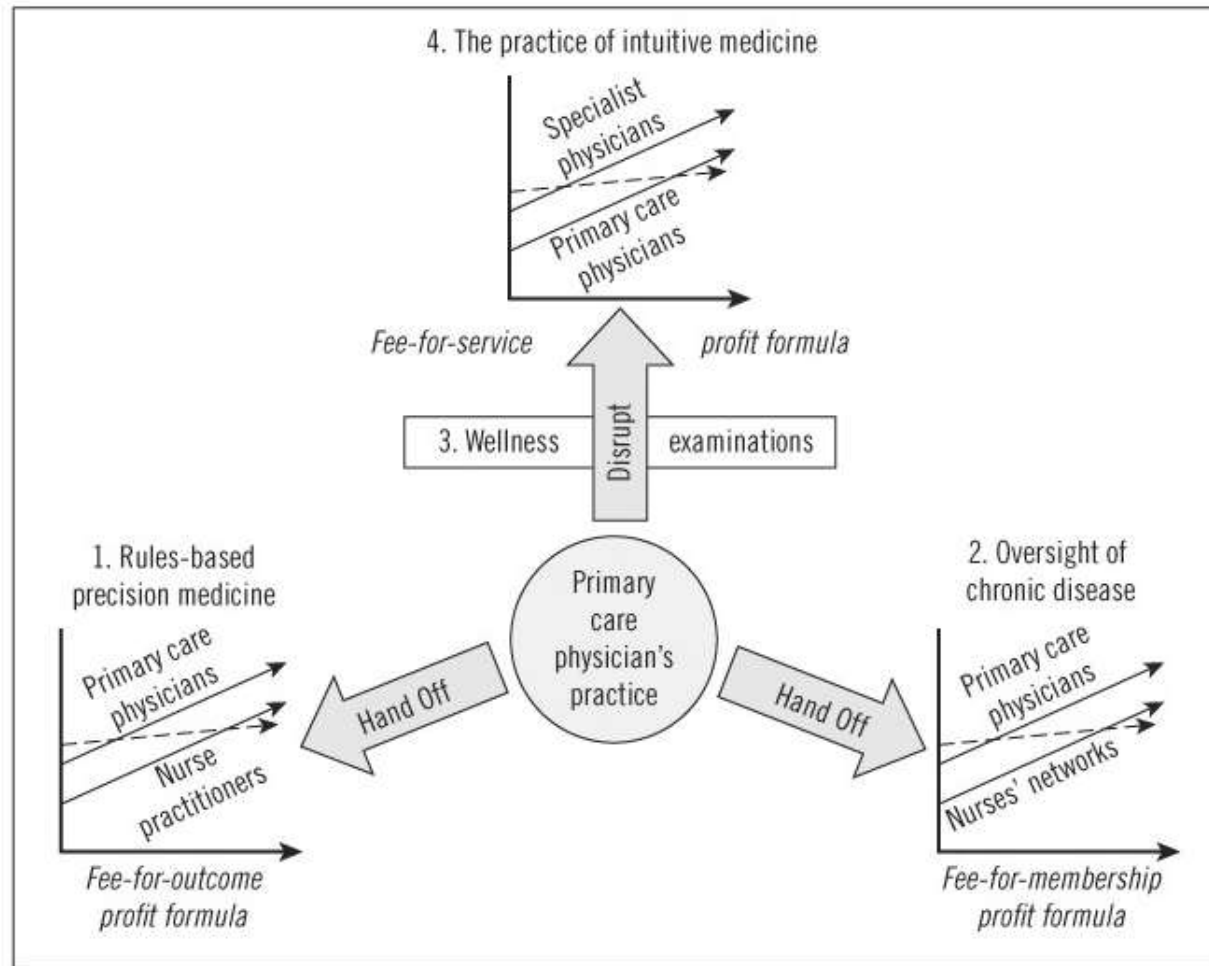
[Christensen, Cl.; Grossman J.; Hwang J. (2008-12-25). The Innovator's Prescription: A Disruptive Solution for Health Care (p. 420).]

Model of disruptive innovation

Sustaining innovations, whether incremental or radical, make good products better.

Pace of performance improvement that companies provide

Performance improvement that customers can utilize

Performance

Time

Different measure of performance

Nonconsumers or Nonconsuming occasions

Disruptive innovations make products simpler and more affordable

Time

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Focus and disruption in the business models of medical practice

4. The practice of intuitive medicine

Specialist physicians

Primary care physicians

Fee-for-service   profit formula

Disrupt

3. Wellness   examinations

1. Rules-based precision medicine

Primary care physicians

Nurse practitioners

Fee-for-outcome profit formula

Hand Off

Primary care physician's practice

Hand Off

2. Oversight of chronic disease

Primary care physicians

Nurses' networks

Fee-for-membership profit formula

Business models:
 1) Solution shops→ fee-for-service basis.
2) Value-adding process businesses→ fee-for-outcome basis.
3) Facilitated networks→ fee-for-membership basis (keep people well)

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HL7 Leads eHealth Standards development since 1987

1987 | 1997 | 2000 | 2005 | 2007 | 2009 | 2010 | 2012 | 2013 | 2014

- **Mission**: build the <u>best</u> most widely <u>used</u> Health Information Technology standards

- **History**: Since 1987 HL7 grows steadily - demand outstrips capacity, HL7 v2.x, HL7 v3, HL7 CDA, HL7 FHIR, 40+ WGs, 50+ standards products in use; currently 35 Affiliates and members in 55+ countries

- **1997**: first national affiliate on board/ IHIC conference

- **2000**: HL7 CDA r1 release

- **2005**: HL7 CDA r2 release

- **2007**: HL7 founding member for the SDO Joint Initiative Council

- **2009**: HL7 International, USA on the International Council

- **2010**: **HL7 Foundation in Europe** established, ePSOS uses HL7 CDA

- **2012**: 25 years youth celebration with FHIR, HL7 Asia

- **2013**: HL7 makes standards available under **free license**

- **2014**: FHIR appeal in e-/m-Health, CDA growth, PHC-34

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eStandards 35
kick-off, May 6-

Disruptive innovation in eHealth Standards

- Complex → simple
- Costly → free
- Specialized → generic
- Comprehensive → simple and tools-driven

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Vision of *e*Standards

eHealth Standards and Profiles in Action for Europe and Beyond

- Think of a global **eHealth ecosystem** where:

  - **people** (digital natives and immigrants)
    enjoy timely safe and informed health, anywhere around the globe

  - interoperability assets fuel **creativity**, **entrepreneurship**, and **innovation**

- where *e*Standards

  - **nurture** large-scale eHealth deployments to strengthen **Europe's voice** and **impact** locally on its citizens and globally on the world

  - enable **co-creation** in interoperability where **trusted dialogs** on health, costs, and plans meet **great expectations.**

GOVERNMENT LED INNOVATION

HENRIQUE MARTINS

SPMS Shared Services of the Ministry of Health, Portugal

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Government led Innovation ...on information and integration (Interoperability in action)

- SPMS Framework agreement for telemedicine/telemonitoring (with continua alliance standards/IHE Standards) for suppliers

- SPMS Innovation Clinic

- SPMS Innovation with IBM (analytics; external business development – third party agent outside Portugal)

2015

Template Definition

Evaluation of Policies and Innovation Management Methodologies (structure, conditions, resources, processes and results)

Engagement of internal team

Alignment with the ICT-Health innovation model

Ensure Financial Sustainability

Partnerships achievement for Research, Development and Innovation

Create *Innovation Clinic* at SPMS (University; R&D&I Units; Enterprises – Samsung, IBM, …)

A Vision for the Future: INNOVATION CLINIC - Building on Success and Beyond

C	Capturing
L	Leading
I	Inspiring
N	Nurturing
I	Integrating
C	Counseling

A Vision for the Future: INNOVATION CLINIC - Building on Success and Beyond

Pie chart segments:
- Counseling
- Capturing
- Leading
- Inspiring
- Nurturing
- Integrating
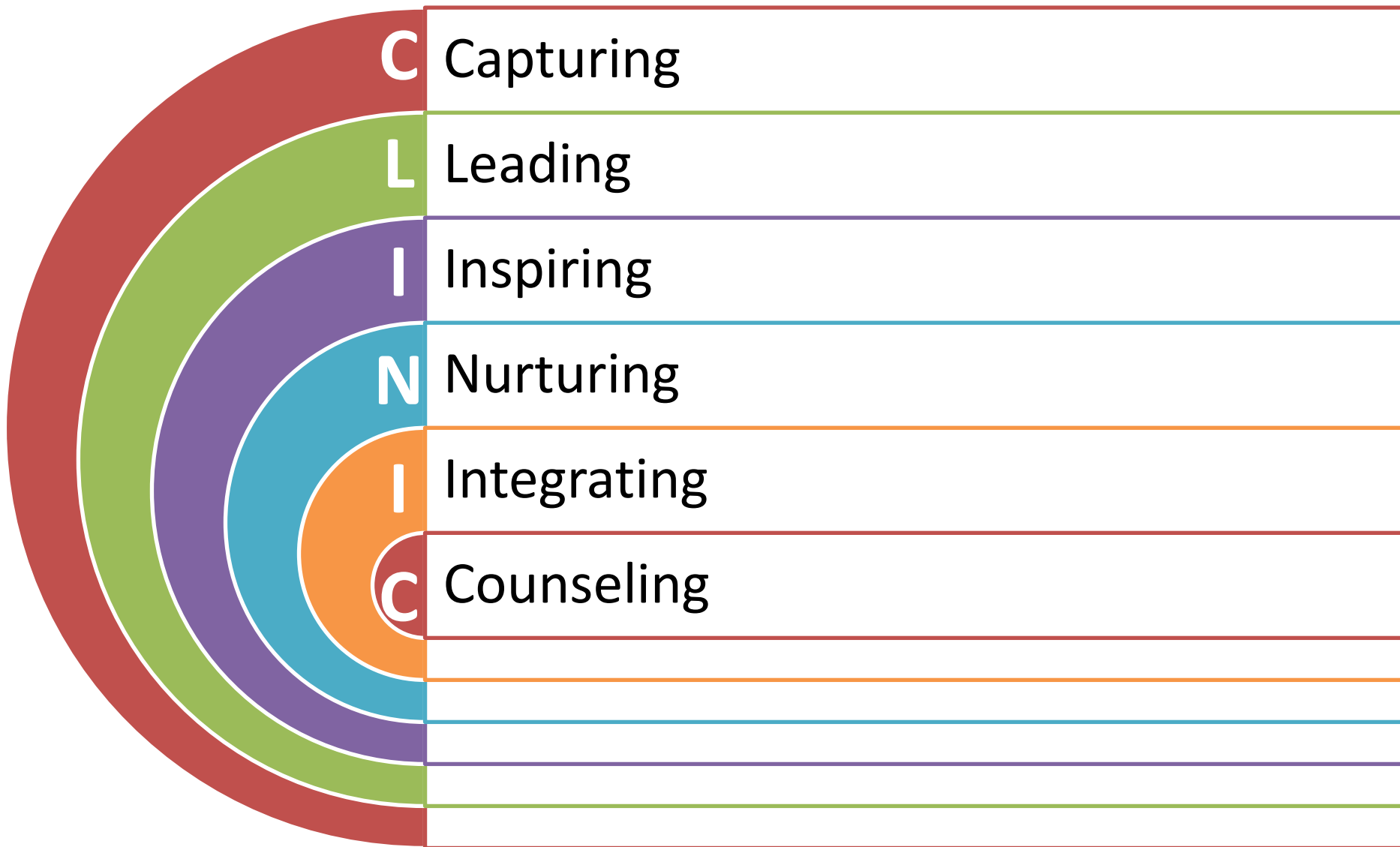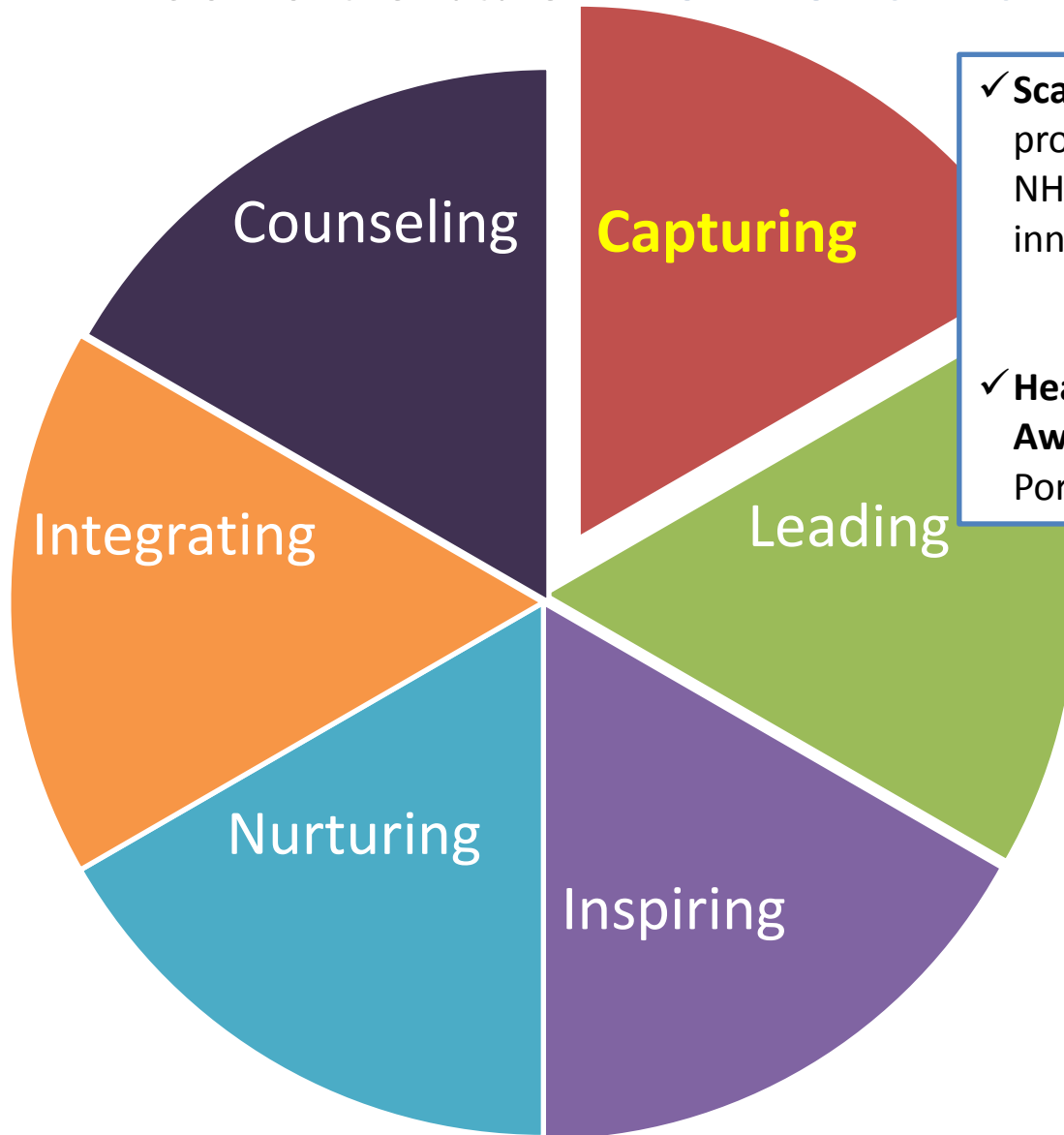
✓ **Scanning Innovation** – Radar structures, processes and Innovation results in hospitals NHS = what is innovator? What is the innovation potential/profile of NHS units?

✓ **Health innovation Prize /ICT Health Innovation Award/ Innovative** e-**Health** Solutions in Portugal – "Premio de Inovação SI/TIC Saúde"

A Vision for the Future: INNOVATION CLINIC - Building on Success and Beyond

Counseling

Capturing

Integrating

Leading

Nurturing

Inspiring
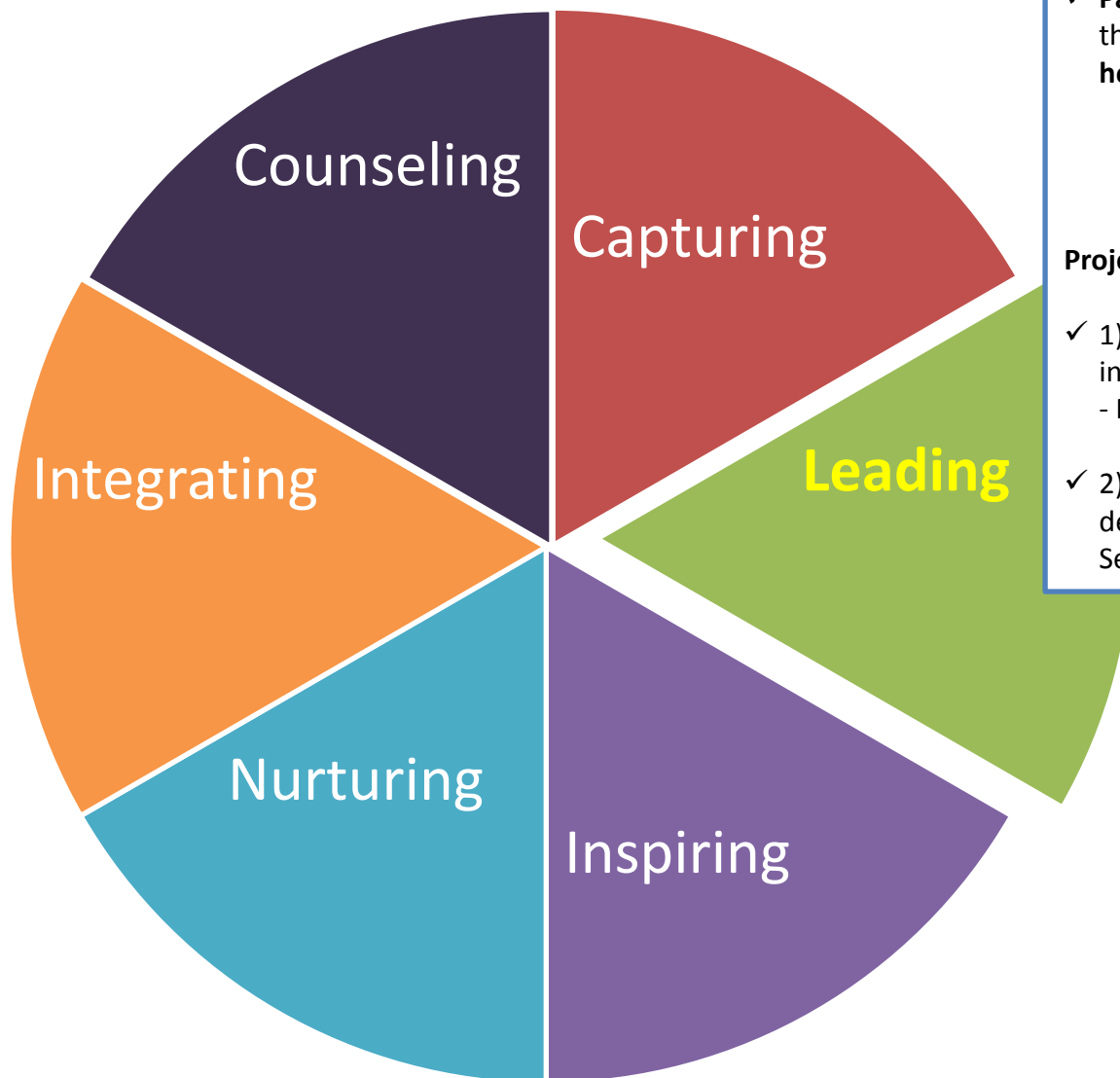
✓ **Partnership** Agreement SPMS-SAMSUNG - example of the innovative alliances = mHealth/mobile technologies: **health** and wellbeing **apps**

Projects:

✓ 1) **Samsung S-Health App** (Patient Monitoring Devices) integration with Healthcare National information systems - Portuguese Health Data Platform;

✓ 2) **Health in All Apps**: Patient monitoring devices/Mobile telemedicine/telecare devices/Air Quality Sensing Technologies

A Vision for the Future: INNOVATION CLINIC - Building on Success and Beyond

Counseling

Capturing

Integrating

Leading

Nurturing

Inspiring

✓ **TED_SPMS_MED_SNS** is an bi-annual conference focusing on **health technology** and medicine in NHS Portuguese (*July/December*) - brilliant talks, stunning artistic performances and transformative innovators.

✓ **Aniversary of the Portuguese Health Data Platform** (6 July 2015) - Program explores the technology, creativity and innovation that contribute to a healthier future.

Tasks:

✓ **Organizing conferences,** exhibitions, workshops, seminars, training programs, technical meetings for the **TED_SPMS_MED_SNS;**
✓ **Plan ahead** - Aniversary of the Portuguese Health Data Platform (organize thoughts, to give thanks and to dream)

A Vision for the Future: INNOVATION CLINIC - Building on Success and Beyond

- Counseling
- Capturing
- Integrating
- Leading
- Nurturing
- Inspiring

✓ **Development and nurturing of innovative ideas and initiatives** – Support in the preparation of applications to PORTUGAL 2020/HORIZONT2020

Tasks:

✓ **Work Plan PORTUGAL 2020-** focus support and funding on priority projects;
   ✓ participate and have fair access to research and funding opportunities;
✓ **Plan ahead** - have access to better financing opportunities and conditions, for key financial and other supports

A Vision for the Future: INNOVATION CLINIC - Building on Success and Beyond

Pie chart segments: Counseling, Capturing, Integrating, Leading, Nurturing, Inspiring

✓ **Stakeholders:** national and local governments, boards, companies, academia, organizations of technical support and from the organized civil society;

✓ **Follow sustainability initiatives in the ICT Healthcare Sector** - Knowledge and Innovation Communities (KICs);

✓ **OPEN DAY SPMS** (creating a diverse range of solutions to increase choice, improve clinical practice and enhance patient engagement, including EHR, ePrescribing, departmental systems such as electronic observations and integrated cross community portal solutions;

Tasks:

✓ **Work Plan -** broadening our vision and our knowledge, widening our horizons, becoming involved, risking ourselves, committing ourselves responsibly;

   ✓ common content and involve regular contacts between partners;

   ✓ participate and have fair access to opportunities - Knowledge and Innovation Communities (KICs);;

✓ **Plan ahead** – OPEN DAY SPMS: Academy, Industry and Government

A Vision for the Future: INNOVATION CLINIC - Building on Success and Beyond

Counseling

Capturing

Integrating

Leading

Nurturing

Inspiring

- ✓ **Innovation Health Board SPMS**

- ✓ **Health Innovation Advisory Council NHS Portuguese** (20 Medical Advisory Board/CNO -Chief nursing Ofiicer/CIO-Chief Information Officer; Researchers Team,...)

- ✓ **ICT Health Innovation Labs** - future information and communication society – National, Regional, Local - Building Organisational Capacity for Public Sector Innovation'

Tasks:

- ✓ **National/Regional Advisory Councils** - Innovation Health Board SPMS
- ✓ Create **Scientific advisory bodies**: Academy, Industry and Government
- ✓ **Draft work plan**

Portal dos **Profissionais da saúde**

Methods used in the forecast

estimates based on linear regression
- statistical process for estimating the relationships among variables. It includes many techniques for modeling and analysing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables.

time series forecasts
- A time series is a sequence of data points, typically consisting of successive measurements made over a time interval. Time series analysis comprises methods for analyzing time series data in order to extract meaningful statistics and other characteristics of the data. Time series forecasting is the use of a model to predict future values based on previously observed values.

Lee-Carter Method
- Lee–Carter model is a numerical algorithm used in mortality forecasting and life expectancy forecasting. The input to the model is a matrix of age specific mortality rates ordered monotonically by time, usually with ages in columns and years in rows. The output is another forecasted matrix of mortality rates.

Mortality Forecasts
(using eVM - Electronic Mortality Surveillance)
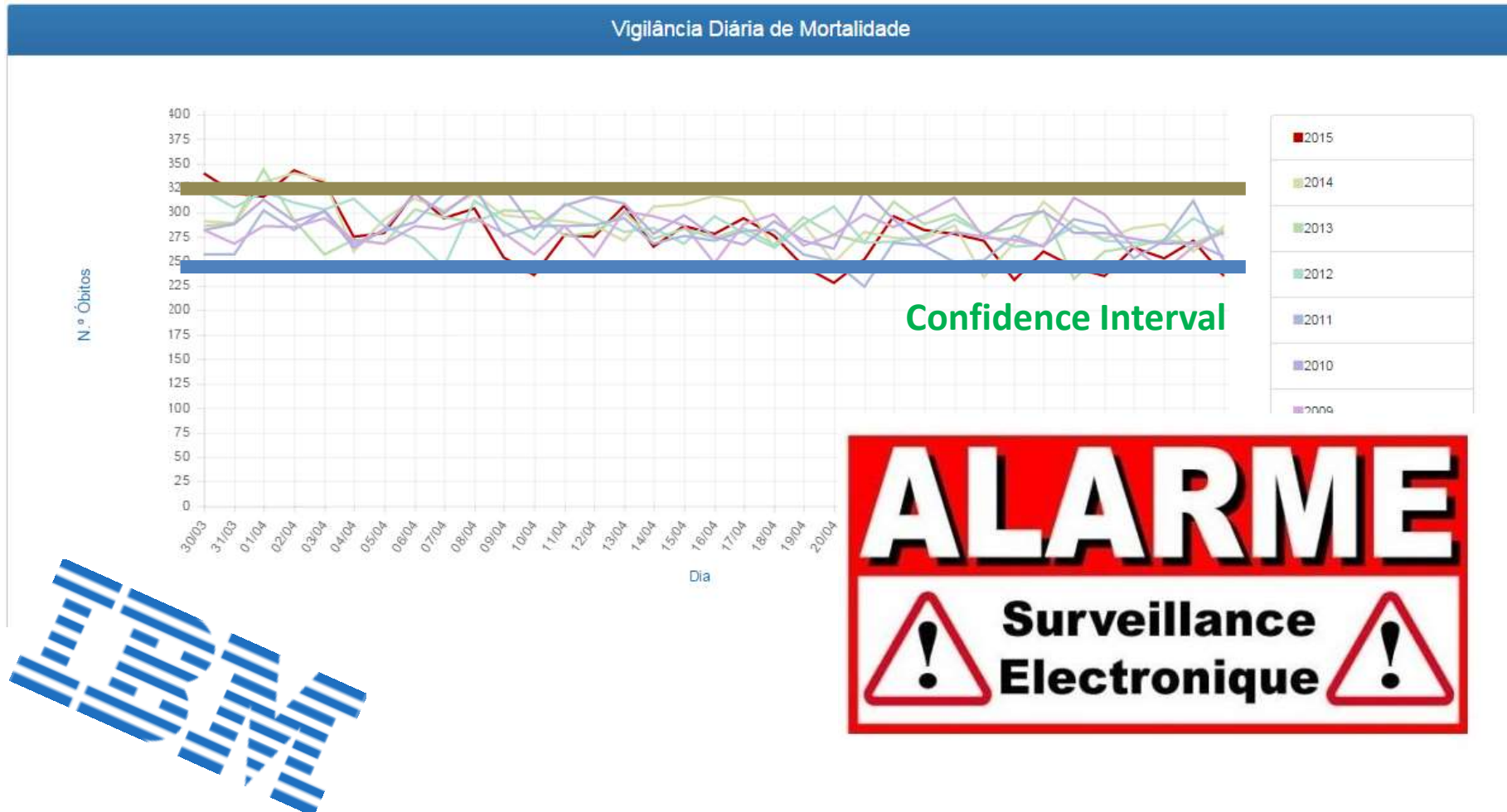
Vigilância Diária de Mortalidade

Confidence Interval

CONTINUOUS PROFESSIONAL HEALTH EDUCATION AND INNOVATION

Anne Moen, *President, European Federation for Medical Informatics*

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Perspectives
Continuous Professional Education

Practice innovation

- – Learning about opportunities in conceived innovation
- – Creating understanding across stakeholders
- – Translate the opportunities - for health care
- – Critical appraisal – achieve clinical goals for health
- – Embrace or reject conceived innovation

- Skilled work force for the challenges ahead

Translation – practice innovation

- Type of innovation opportunity (ies)
  – Attributes and perception of e.g. medical device – procedure - comprehensive information system
  – Change as new infrastructures or altered clinical processes
- What does the innovation mean
  – Understandability – advantageous or detrimental to activities
  – Trialability – experiences relating to the conceived innovation
  – Personally - for me, my patients, and the work I care about
  – Locally - for us, in my unit (of some type and size)

Innovation – adoption

- Type of decision(s)
  - Individual – collective – authority – contingent
- Unit of decision(s)
  - Individual – activities I am responsible / accountable for
    - does the new scale in the mundane realities of every practice
  - Organization(s) – networks

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Call for Interoperability in action

- Consensus to adopt & embrace innovation(s)
  - Centralization   (low)
  - Complexity – networks' interconnectedness   (high)
  - Uncommitted resources   (high)
  - Formalization – standards   (low)

Skilled work force …. we need

- Team-based, trans-professional competence
- Differentiate activities and actors
  – Wellness and maintenance of health
  – Acute care – specialized, targeted treatment
  – Chronic disease conditions' management
- Differentiate requirements for support
  – Information at the point of action
  – Knowledge accumulation – distill evidence & experience

Questions for discussion

Data – Information to nurture innovation ?

– Do we have enough data and information ?

– Are they right for **actions** and **types** of practices?

– Cost effective analytics driven resources ?

Co-creation, standards and innovation

– Convergence of cultures OR creation of new cultures ?

– What are necessary bridging operations to "control" the emerging gap of specialized and general practices ?

– New forms and strategies to curate information for accumulation and aggregation for knowledge ?