Vertical Integration in the Health Value Chain

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The San Raffaele Foundation
Corporate Overview

Facts and Figures, 2002
- 1,350 beds in Milano
- 3,400 employees
- 53,000 patients hospitalized
- Over 6 millions out-patient services
- Over 6 million laboratory tests
- 55,000 patients to emergency
- 22,000 surgeries performed
- 12,4% of the Italian scientific productivity

Worldwide Activities
- Poland, Brazil, Israel, India, China, etc.

Track & Trace Added Value
Business Needs

- **Patient Safety**

- Supply Chain Integrity
  - ✓ Counterfeit, Diversion (Gray Market, Internet)
  - ✓ Shelf Life Management, Recalls, Accountability
  - ✓ Environmental Conditions, e.g. Cold Chain

- Supply Chain Efficiency
  - ✓ Order and Inventory Management

- Fraud Prevention
  - ✓ State Health Insurance Reimbursement

- Counterterrorism, Bioterrorism

The San Raffaele Foundation
Case Studies, Business Process Re-engineering & Pilots

Vertical Integration of the Pharma Business Process: Hospitals

DRIVE with RFID tags for Pharma Products

Vertical Integration of the Pharma Business Process: Patient Self-Care

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DRug In Virtual Enterprise

Key action II
New methods and work for electronic commerce
Schedule: start June 1st, 2000; duration 30 months
Budget: 4,2 million EURO

Scientific Institute H San Raffaele (I)
European Community Joint Research Center JRC (EU)
Politecnico di Milano (I)
Health Projects Favero (E)

Atos Origin Integration (F)
AstraZeneca (I)
GlaxoSmithKline (I)
Karolinska Institute-CHT (S)
Gdansk University of Technology (PL)

The DRIVE Project: IST 12040
The Partners

The DRIVE Background
Healthcare Value Chain

Back End

Pharmacy Ward

H

OK OK

Laboratory etc.

Front End

**Estimated US cost-savings
11 billion $/year**

Source: Healthcare Industry Study on
Efficient Consumer Response, Nov. 1996

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The Healthcare Value Chain
Patient Care Process Needs

Back End

Pharmacy Ward

H

OK OK

Laboratory etc.

Front End

**Estimated US cost-savings
11 billion $/year**

- **Estim. US life costs 98,000/y ***
- **Worldwide Counterfeit: 8% ****

Source: Healthcare Industry Study on
Efficient Consumer Response, Nov. 1996

* Source: To Err Is Human - Dec. 2000
** Source: World Health Organization 2002

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The DRIVE Project
Objectives

☑ The First Objective: **SAFER
Healthcare System**

☑ The Second Objective: **SMARTER
Healthcare System**

☑ The Third Objective: **TRUSTED
Healthcare System**

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The DRIVE System - FP5 IST 12040
Proactive Patient Safety and System Efficiency

HOSPITAL SUPPLIER

Therapy Prescription

Therapy Administration

CLINICAL PROCESS

Anamnesis/ Diagnosis | Pharmacy Activity | Therapy Preparation | Therapy Monitoring

INBOUND LOGISTICS

Patient Admission | Contract/order management | Shipment Receiving | Pharmacy warehouse | Ward warehouse | Patient discharge

OUTBOUND LOGISTICS

Contract/order management | Drug Distribution

Drug Registration | **PUBLIC HEALTH AUTHORITY** | Drug Surveillance

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Point of Care Complexity as a Source of…
… Patient Safety Risks, non-Compliance & System Inefficiencies

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The DRIVE Clinical Module
The Focus on Patient, Products and Point of Care

PRODUCTS DATA PRODUCTS DATA PRODUCTS DATA

- **e-Prescription for Doctors**
- **e-Prescription Validation system for Pharmacists**
- **e-Preparation/Administration system for Nurses**

Tag RF ID

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Slide 1

Vertical Integration in the Health Value Chain

The DRIVE Clinical Module
The Process-Integrated Point of Care

PRODUCTS — DATA | PRODUCTS — DATA | PRODUCTS — DATA

Risk level before introducing the Smart Cart
Risk level after introducing the Smart Cart
Risk Level reduction (percentage)

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Slide 2

Vertical Integration in the Health Value Chain

The DRIVE Pilot
Pilot results: Supply Chain, Trust & Security

Digital Wristband - 91,3 % patients approval.
Significant improvement in Patient Safety

Trust Infrastructure (digital signature and RBAC)
Significant improvements in:
• Patient Privacy,
• Healthcare Operator Accountability,
• Business to Business Confidentiality.

Digital Label - Complete *Real Time Traceability @ Item Level* of drug life-cycle (production, logistics and clinical phases by means of unique serial number,lot, exp-date,etc.)Significant improv. in fraud prevention.

Logistics - Drug supply chain efficiency improvement (-**30 %** operative costs)

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Vertical Integration in the Health Value Chain

The DRIVE Labeling Strategy
Redundant and Distributed Databases: Self-Informative Products

AIC: **025212034**
GLAZIDIM'IM FL 1 G + F 3 ML
Scad .: 12/2004
Lotto: 932589A123
N.: 123456789
GLAXOSMITHKLINE S.p.A.

Field Name
Label Type
Product Code
Product Name
Manufacturer Name
Unitary Dosage Unit
Unitary Dosage
Number Of Doses
Preservation Rule
Expiration Date
Lot Code
Serial Number

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Vertical Integration in the Health Value Chain

The (end-to-end) DRIVE System
Supplier + Hospital = Safety + Efficiency

Pharmaceutical Industries | **Collaborative Logistics** | **Hospitals**

AstraZeneca
gsk GlaxoSmithKline

COLLABORATIVE LOGISTICS MODULE
Internet

HOSPITAL LOGISTICS MODULE — CLINICAL MODULE
HOSPITAL LOGISTICS MODULE — CLINICAL MODULE
HOSPITAL LOGISTICS MODULE — CLINICAL MODULE

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Vertical Integration in the Health Value Chain

EU Cen Tc 251: Patient Safety
Safety Procedures for Identification of Patient & Related Objects

• *In Vitro Diagnostics (e.g., Lab Medicine)*
• *Pharmaceutical Therapy Management*
• *In Vivo Diagnostics (e.g.,Bio-Imaging)*
• *Blood Transfusion and Transplant*
• *Surgery*

**CEN TC251 Tech Report SAFE ID N00-049
(approved 19 Sept 2000)
Safety Procedures for Identification of Patient & Related Objects
A. Sanna, P.A. Bonini, M. Wilikens, G. Klein**

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Vertical Integration in the Health Value Chain

Italian "Bollino" Law (Aug. 2, 2001)
Italian-wide serial number for drug packages

Progressive *(Item-level)* Number on labels to uniquely dentifying all pre-packaged drugs under the Italian public healthcare insurance reimbursement system.

D.M. 2 agosto 2001
(G.U. n.270 del 20.11.2001)

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Slide 1

Labels for end-to-end Value Chain Integration

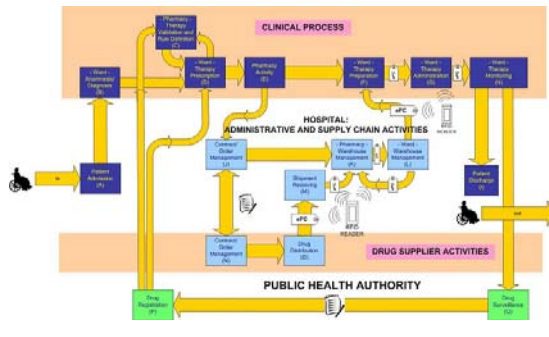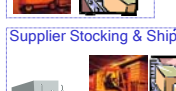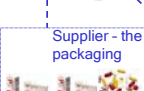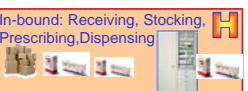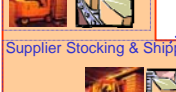*Comparing "Line of sight" vs "Cluster" readings in the process*

1D Code (2/5 Interl.)	1D + 2D Composite (Mesaztec)	2D Code (Aztec)	TAG RF ID (13.56 MHz)

Preliminary results* of the *DRIVE Task Group on RFID* :

- full traceability of single items through the whole of the supply chain (supplier-distributor-hospital-patient) is the enabler of VALUE-ADDED SERVICES (Patient Safety & Products Logistics), with short term RoI;

- system costs with optical reading are 4 times higher than costs with RFID tags.

* The estimate has been performed comparing end-to-end processes of 4 Typical products

Slide 2

D²

RFID and ePC enabled DRIVE System

Slide 3

D²

RFID + ePC enabled DRIVE System

Slide 4

D²: RFID + ePC enabled DRIVE System

Real Time Track & Trace

In-bound: Receiving, Stocking, Shipping

In-bound: Receiving, Stocking, Prescribing, Dispensing

Distributor: Stocking & Shipping

RT³

Administering

Supplier Stocking & Shipping

Supplier – the packaging

Slide 5

D²: RFID + ePC enabled DRIVE System

RFID Competitive Zone

In-bound: Receiving, Stocking, Shipping

In-bound: Receiving, Stocking, Prescribing, Dispensing

Distributor: Stocking & Shipping

RT³

Administering

Supplier Stocking & Shipping

Supplier – the packaging

Slide 6

D²: RFID + ePC enabled DRIVE System

RFID Competitive Zone

In-bound: Receiving, Stocking, Shipping

In-bound: Receiving, Stocking, Prescribing, Dispensing

Distributor: Stocking & Shipping

RT³

Administering

Supplier Stocking & Shipping

Supplier – the packaging
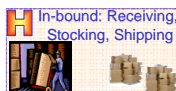
Vertical Integration in the Health Value Chain
D²: RFID + ePC enabled DRIVE System
Tunnel for Simultaneous Item Reading

In-bound: Receiving, Stocking, Shipping

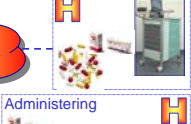| Tunnel reading frequency | | 13.56 MHz |
Tunnel size (approximately):	Height Width Length	1650 mm 1060 mm 980 mm
Max Package size (approximately)		H 630 mm x W 600 mm
Voltage		230V / 400V
Middleware for RFId integration and control		included

Tunnel for simultaneous reading of RFID tagged Packages, randomly distributed in shipping boxes.

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Vertical Integration in the Health Value Chain
D²: RFID + ePC enabled DRIVE System
RFID Competitive Zone

In-bound: Receiving, Stocking, Shipping

In-bound: Receiving, Stocking, Prescribing,Dispensing

Distributor: Stocking & Shipping

RT³

Administering

Supplier Stocking & Shipping

Supplier – the packaging

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Vertical Integration in the Health Value Chain
D²: RFID + ePC enabled DRIVE System
RFID Competitive Zone

In-bound: Receiving, Stocking, Prescribing,Dispensing
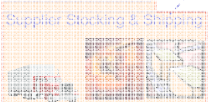
RT³

Administering

Supplier – the packaging

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Vertical Integration in the Health Value Chain
D²: RFID + ePC enabled DRIVE System
RFID & WiFi Seamless Supply Chain Integrity Check

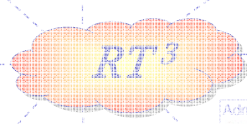In-bound: Receiving, Stocking, Prescribing,Dispensing

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Vertical Integration in the Health Value Chain
D²: RFID + ePC enabled DRIVE System
RFID & WiFi Seamless Supply Chain Integrity Check

In-bound: Receiving, Stocking, Prescribing,Dispensing

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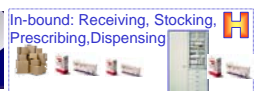

Vertical Integration in the Health Value Chain
D²: RFID + ePC enabled DRIVE System
RFID & WiFi Seamless Supply Chain Integrity Check

In-bound: Receiving, Stocking, Prescribing,Dispensing

Check List
Product : ALFAMOX 12 cpr
Product STOLEN
Recalled Batch
Product Expired

ServerSocket
The product has been STOLEN
Would you like to inform the control center?
Note: Choosing YES a precompiled mail will be displayed.
YES   NO

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D²: RFID + ePC enabled DRIVE System
RFID & WiFi Seamless Supply Chain Integrity Check

In-bound: Receiving, Stocking, Prescribing, Dispensing

EU FP6 IST 507019 PIPS
Personalized Information Platform for Life and Health Services

FP6 IST e-Health,

Budget: 14,330,660 €

Start: Jan. 1,2004 End: Dic. 31, 2007

Project Coordinator: Alberto Sanna, Scientific Institute H San Raffaele

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EU FP6 IST 507019 PIPS: the Partners
Personalized Information Platform for Life and Health Services

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The Patient Safety Issue
Hospitalized Patient Care

Pharma & Medical Device

Hospital

FP6 IST 507019 PIPS: Personalized e-Services…
… to Assist the Person in Daily Life

Pharma & Medical Device

Hospital

Home

Pharmacy

Medical Doctor

FP6 IST 507019 PIPS: Personalized e-Services…
… to assist Individual Choices for Better Lifestyle & Health

Pharma & Medical Device

Hospital

Home

Pharmacy

Medical Doctor

FP6 IST 507019 PIPS: Personalized e-Services…

… to assist Individual Choices for Better Lifestyle & Health

Pharma & Medical Device
Hospital
Gym & Spa
Supermarket
Home
Food & Beverage
Pharmacy
Medical Doctor
Restaurant
The Person
P.I.N. Kiosk

The San Raffaele Foundation

Case Studies, Business Process Re-engineering & Pilots

Vertical Integration of the Pharma Business Process: Hospitals

DRIVE with RFID tags for Pharma Products

Vertical Integration of the Pharma Business Process: Patient Self-Care

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Track&Trace-based Services

Main Issues

- **Supply Chain Efficiency**
  - ✓ Sustainable Data Capture of Cluster of Products

- **Standardization and Coding at the Item Level**
  - ✓ Global, European, National, Regional, Provider level?
  - ✓ Blister Level? Medical Devices, Reagents, Implantable Devices? Packaging Requirements?

- **Safety critical application**
  - ✓ Redundancy for Critical Data Availabiliy at the Point of Care (Decision)

- **Protection of Sensitive Data**
  - ✓ Patient Privacy, Business Confidentiality
  - ✓ Health Authorities and Regulatory Bodies

Vertical Integration in Life & Health Value Chain

Alberto Sanna, e-Services for Life and Health Director

Prof. Pierangelo Bonini, Laboratory Director

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