- INF5210 -
The Electronic Patient Record
and the Hospital Information Infrastructure

Edoardo Iacucci

Department of Informatics

University of Oslo

Aims

- Example of Complex "IS" in Organizations
- Interpretation as Information Infrastructure
- Use of Concepts from II

Content

1. Vision of the EPR

2. Implementation of the EPR

3. EPR as an Infrastructure

4. Managing the Infrastructure and Coping with Complexity

1. Vision of the EPR

- 1.1 What is an EPR
- 1.2 Distributed Paper -> Centralized DB
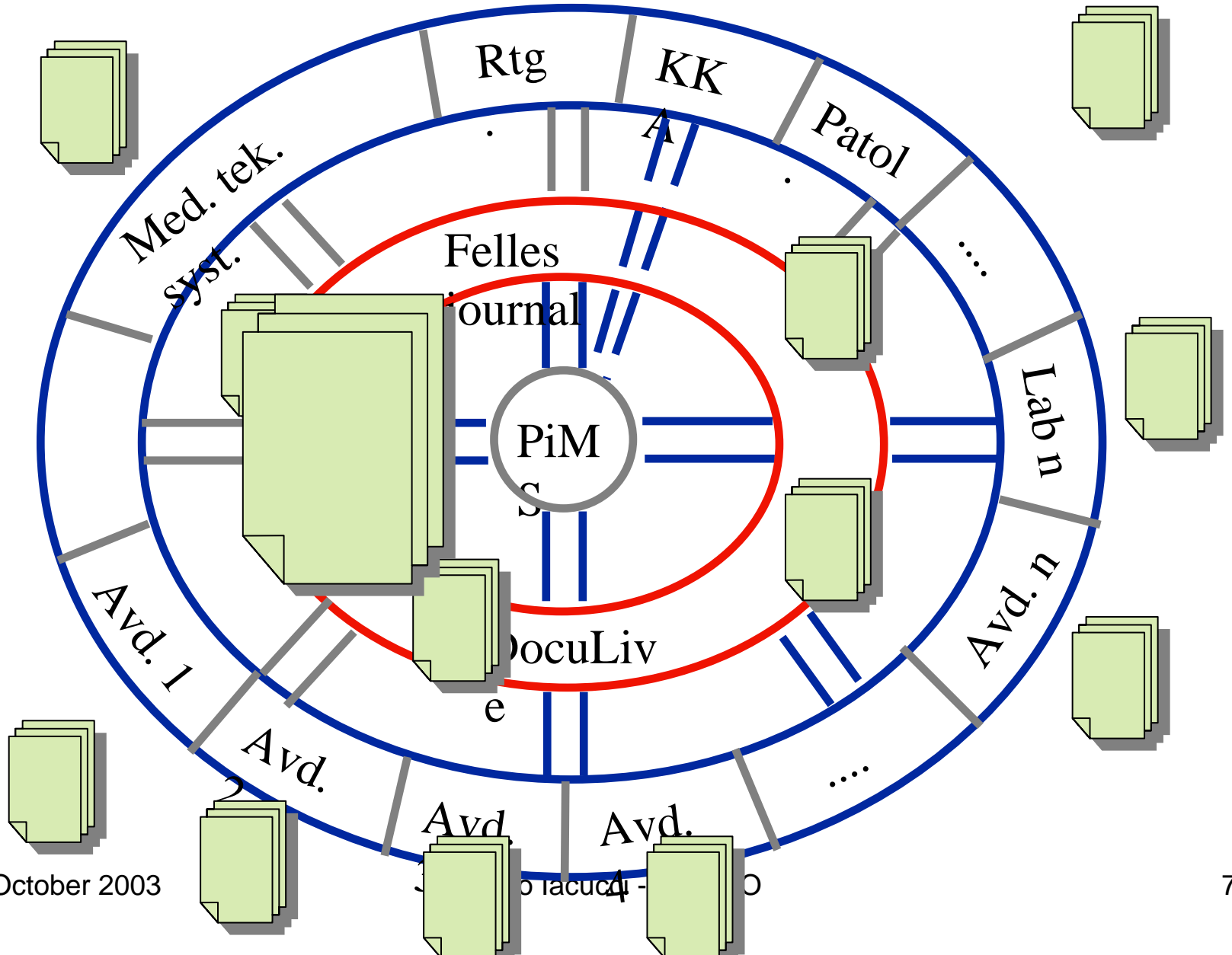
1.1 What is an EPR

- Storing Clinical Information
- Structured Standardized Presentation
- +Accessibility + Availability – Redundancy + Consistency
- Workflow
- System Integration

Centralized Integrated Standardized Information Control System

1.1 What is an EPR

- Stakeholders:
  - Doctors, Nurses, Secretaries (users)
  - IT Department
  - Vendor
  - Hospital Administration
  - Government (Ministry of Health)
  - International Institutions (Cooperation/Standardization)
  - …

1.2 From paper to DB

Rtg
KK
A
Patol
Med. tek. syst.
Felles Journal
PiM S
Lab n
Avd. 1
Avd. 2
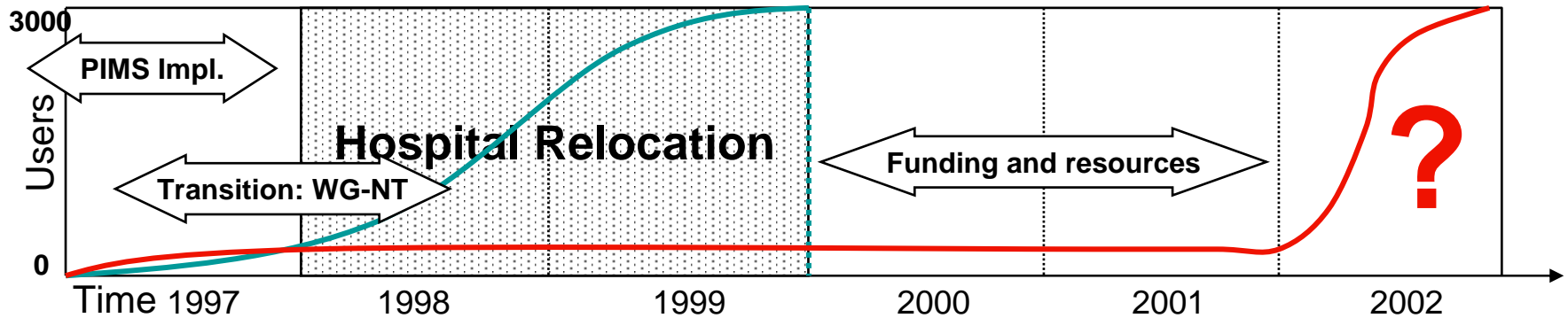Avd. DocuLive
Avd. 4
Avd. n
...
...

2. Implementation of the EPR

- 2.1 Background
- 2.2 Fragmentation
- 2.3 Crisis
- 2.4 Growing Ambition
- 2.5 Going Global

2.1 Background

- Medakis project
- Siemens DocuLive EPR
- Timeframe: 1996 – (1999) 2002 …
- ~3000 target users
- Adoption:
  - 1997-2001 from 0 to 400
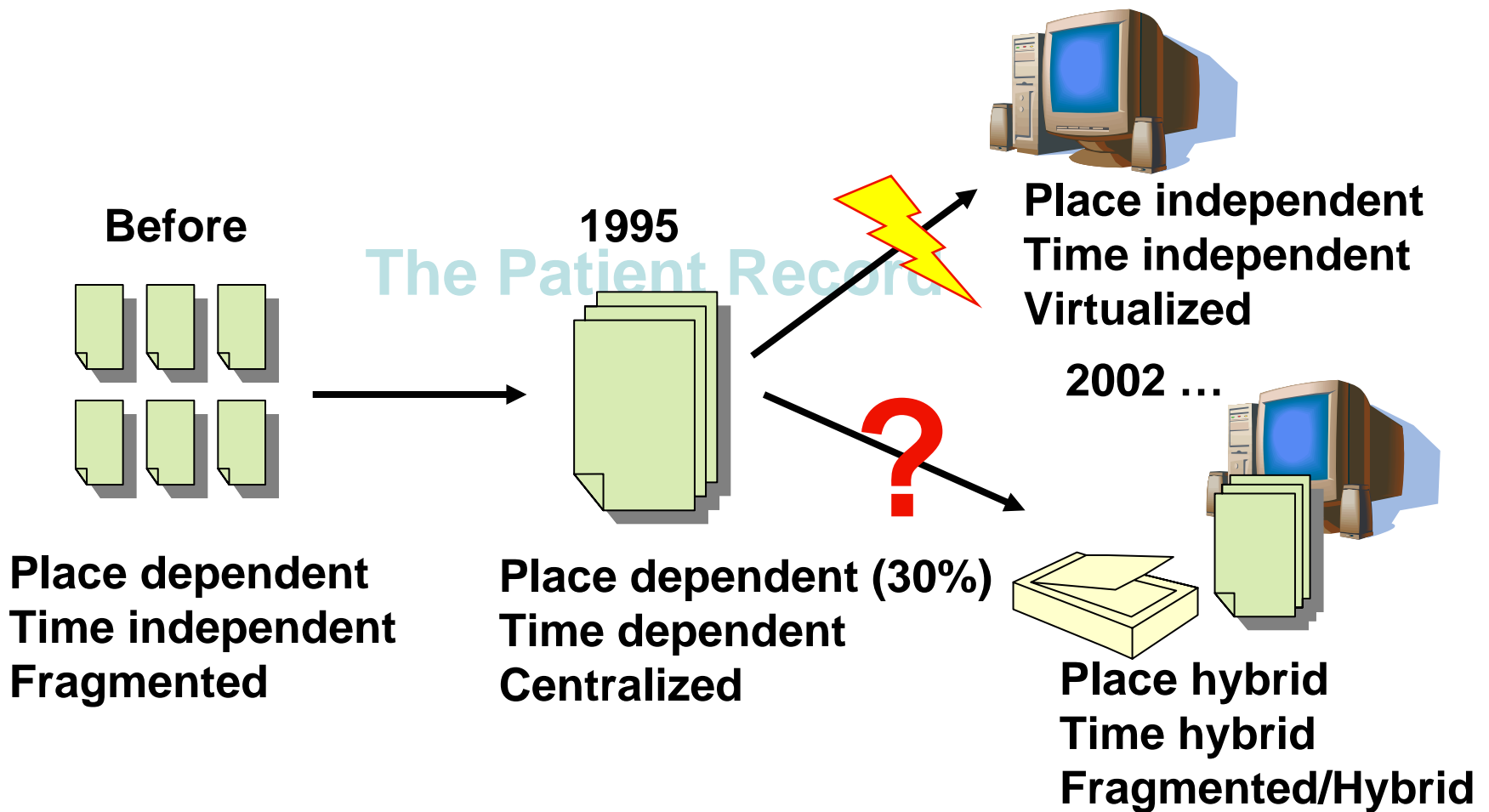 - 2002 from 400 to ~3000
- Norwegian Health Reform

2.1 Background

Historical Reconstruction:
- Product
- Introduction Strategy
- Technical Infrastructure
- Administrative Support
- Attitude of users
- System competition…

2.2 Fragmentation

1999

Before

1995

The Patient Record

**Place independent
Time independent
Virtualized**

2002 …

?

**Place dependent
Time independent
Fragmented**

**Place dependent (30%)
Time dependent
Centralized**

**Place hybrid
Time hybrid
Fragmented/Hybrid**

2.2 Fragmentation

- Only 30% of Paper Record Digitalized
  - Design Challenges (graphical representation)
  - Older records (Scanning)

Integration demands more integration

Integration system causes systems fragmentation

2.3 Crisis

- 1995: Centralizedand Standardized Paper Record

- 2003: 8000 shelf meters (sm)

- Annual growth 1200 sm

- Now 300 sm on the floor

- 800 requests/day

- 30% requests not fulfilled

2.3 Crisis

- Time bomb
- EPR and Paper Record run in **parallel**
- EPR used for **printing** (inefficient)
- Lousy update routines for **incomplete integration**

EPR => Increased Paper Budget!

EPR => Worsen Archive Crisis!

2.4 Growing Ambition

- Scope: Hospital -> Health Region
- EPR: Work in progress -> 'Closed' Standard
- Growth as survival strategy
- **The more you standardize the more you need to standardize**

2.5 Going Global

- Escalation from Norwegian project to Global Project

- Escalation as strategy to manage complexity

- (Unveiled) Strategy:
  To manage complexity increase complexity of what you try to manage

3. EPR as Infrastructure

- 3.1 Main Concepts
- 3.2 Side-effects
- 3.3 Path Dependency
- 3.4 Lock-in
- 3.5 Reflexivity

3.1 Main Concepts

- II: evolving, shared, open, heterogeneous, installed base

- II as a Complex System
  - Number of actors
  - Interdependecies
  - History

- Network Externalities, Path Dependecy, Lock-in, Side-effects, Reflexivity

3.2 Side-effects

- EPR => Information and systems fragmentation
- Increased production of paper

3.3 Path Dependency

- Inscription of Paper Guidelines in Intranet based technology (1995-2003)
- Centralization of paper record (time bomb)

3.4 Lock in

- Migration to new version of EPR
- Migration to new vendor of EPR
- Switching the installed base

3.5 Reflexivity

- Integration requires more integration
- Standardization requires more standardization
- Managing complexity increases complexity to be managed

WHAT IS THE WAY OUT??????

4. Managing the Infrastructure

- Strategy so far:
  - Interdisciplinarity
  - Corresponsibility
  - Openness
  - Improvisation/Bricolage
  - Politics
  - Cultivation
- But Risks:
  - Escalation
  - Control Crisis
  - Enron syndrome

Concluding Remarks

- Reality in organizations far more complex than SE text books

- Information Infrastructure as a perspective
  - Understand reality
  - Suggest intervention strategies

- Your Job: **Find New Strategies!**