

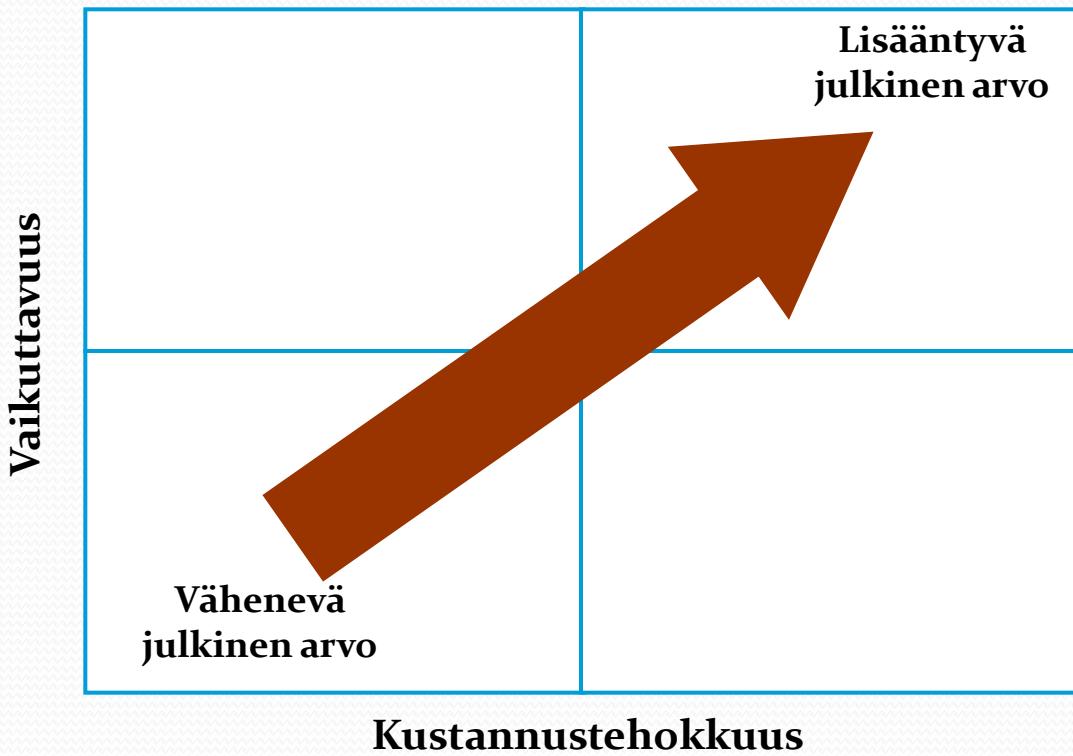
# Tiedolla johtaminen terveydenhuollossa

Terveydenhuollon ATK-päivät , 2013

Kari Harno

# VAIKUTTAVUUDEN JA ARVONLUONNIN JOHTAMINEN

Accenturen, Harvardin ja London School of Economicsin kehittämä julkisen arvon malli



- Luodakseen arvoa kansalaisille julkisten johtajien tulee siirtää huomionsa suoritteista vaikuttavuuden ja julkisen arvon johtamiseen
- Kokemukset edelläkävijä-organisaatioista osoittavat, että hallinto voi **kehittyneillä johtamisvälineillä aidosti ymmärtää, mitata ja johtaa vaikuttavuutta ja kustannustehokkuutta**

# EMRAM Maturiteetti

## European EMR Adoption Model<sup>SM</sup>

| Stage          | Cumulative Capabilities   |
|----------------|---|
| <b>Stage 7</b> | Complete EMR; CCD transactions to share data; Data warehousing feeding outcomes reports, quality assurance, and business intelligence; Data continuity with ED, ambulatory, OP.         |
| <b>Stage 6</b> | Physician documentation interaction with full CDSS (structured templates related to clinical protocols trigger variance & compliance alerts) and Closed loop medication administration. |
| <b>Stage 5</b> | Full complement of PACS displaces all film-based images.  |
| <b>Stage 4</b> | CPOE in at least one clinical service area and/or for medication (i.e. e-Prescribing); may have Clinical Decision Support based on clinical protocols.                                  |

### STAGE 7

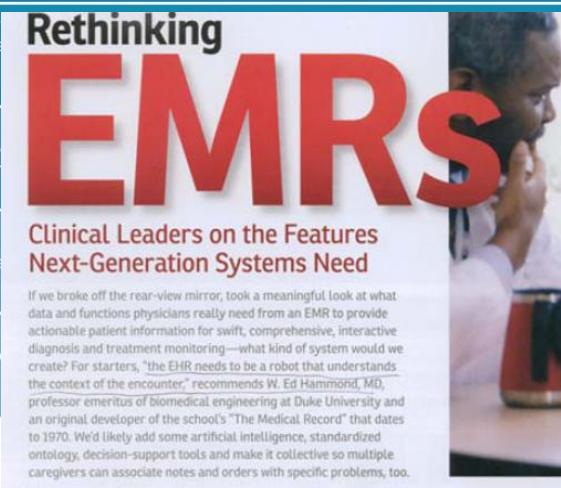
- Tietovarastot vaikuttavuuden raportointiin

### Laadunvalvonta (QA)

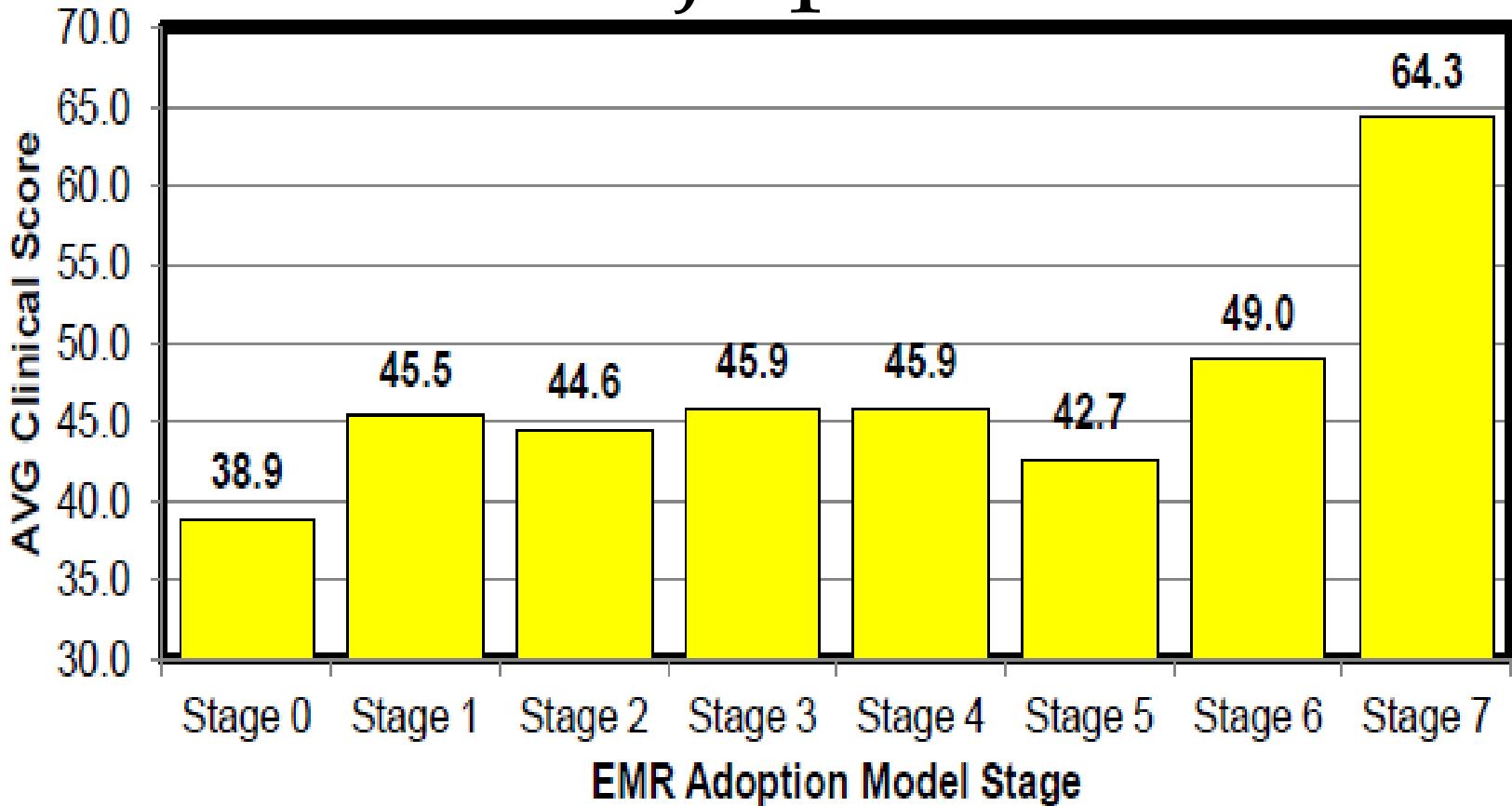
- CI & BI

Documentation (flow sheet or checking during ordering).  
Dictionary (CDR) / Electronic Vocabulary, Clinical Decision checking, Document Imaging.

LIS, RIS, PHIS. Not Iarmacy data output o



# Potilastietojärjestelmän maturiteetti ja prosessilaatu



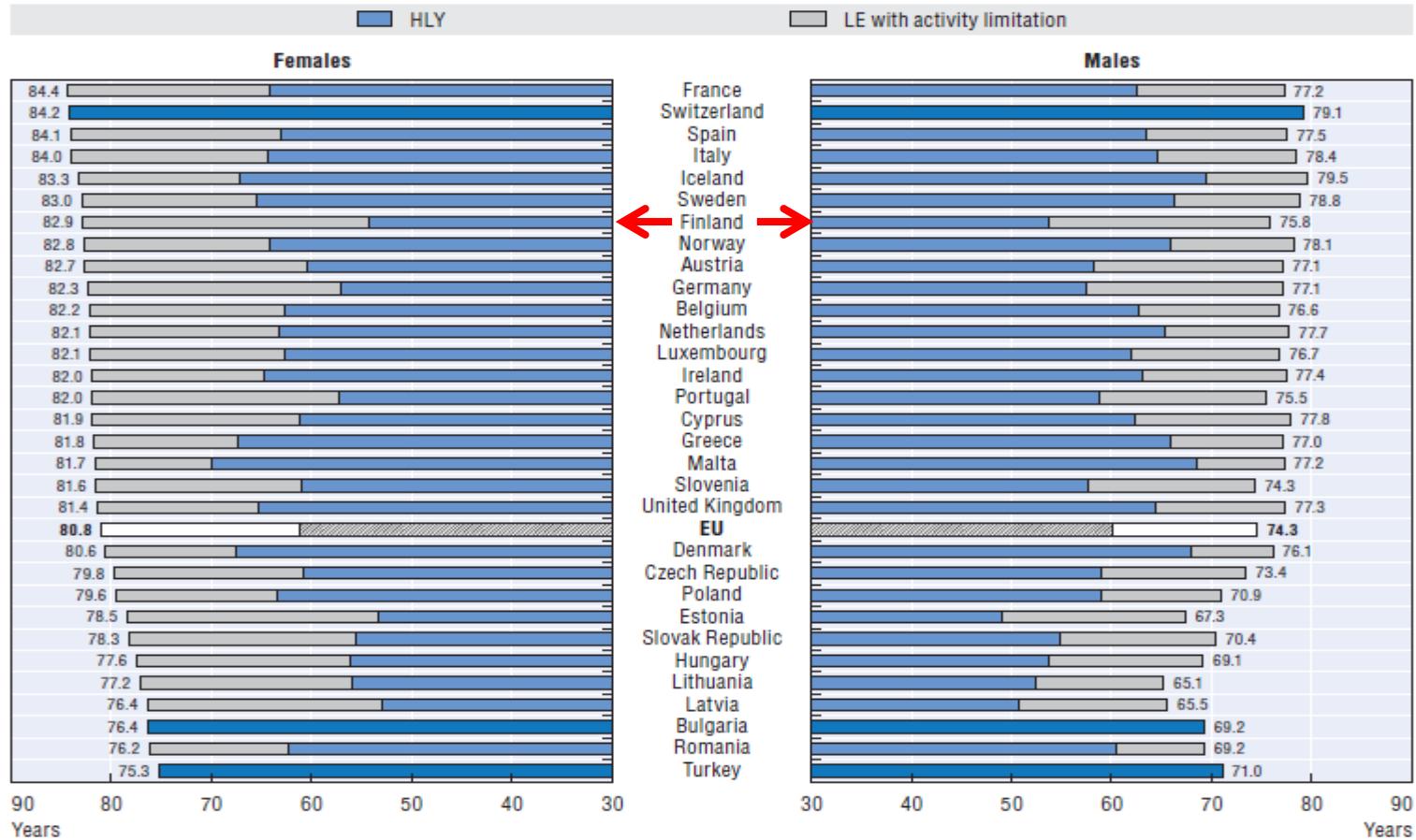
- Kriittinen massavaikutus eli kaikki tai ei mitään efekti?

Hospital EMRs and Value Based Purchasing. 2012  
HIMSS

# Miksi tiedolla johtaminen on tärkeää?

“Sairaat elämät” Markus Leikola 2011

## 1.1.1. Life expectancy and healthy life years (HLY) at birth, by gender, 2005-07



Source: European Health and Life Expectancy Information System (EHLEIS); OECD Health Data 2010; Eurostat Statistics Database.

StatLink <http://dx.doi.org/10.1787/888932335400>

# Tiedon kerääminen ja Big Data

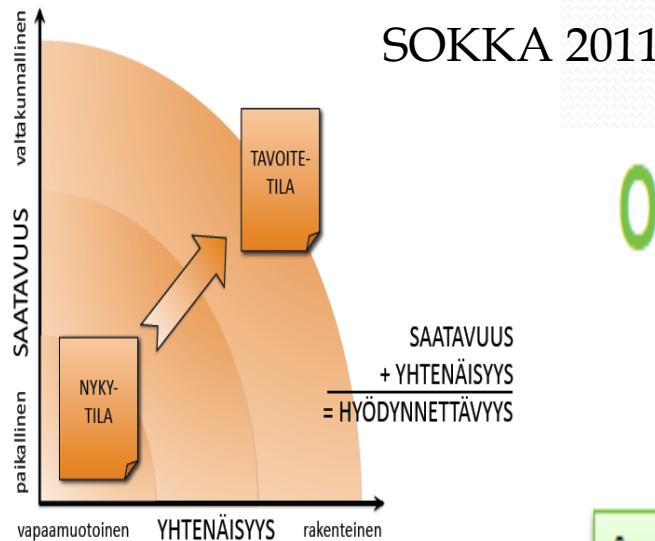


Lots of data, little information and less knowledge

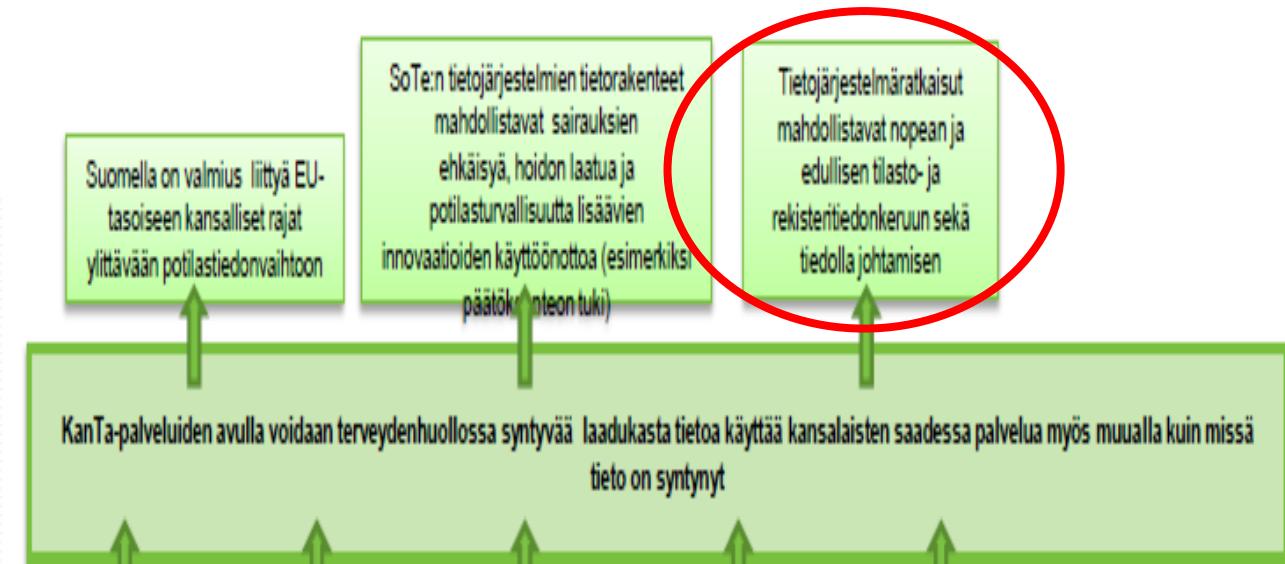


# Tiedon hyödynnettävyys

Asiakastiedon hyödynnettävyys



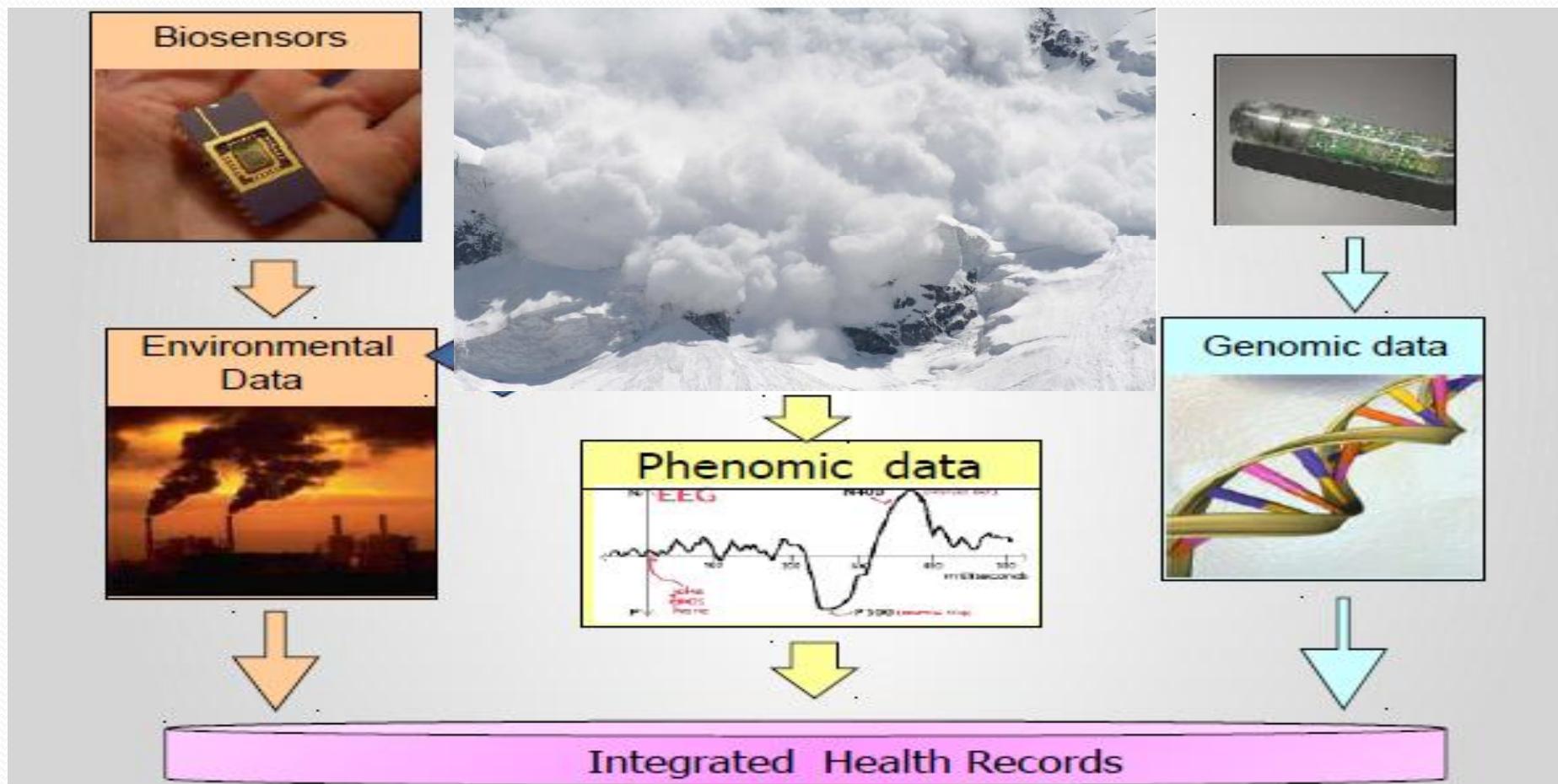
Operatiivisen ohjauksen tavoitteet v 2015 ja  
keinot niiden saavuttamiseksi



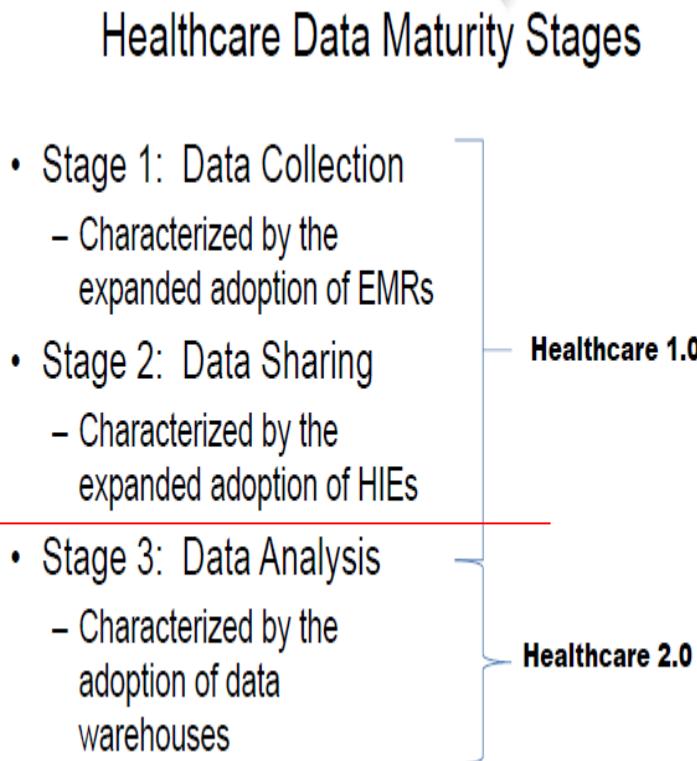
**OPER**

Vesa Jormanainen

# Tietointensiivisyyden muutos



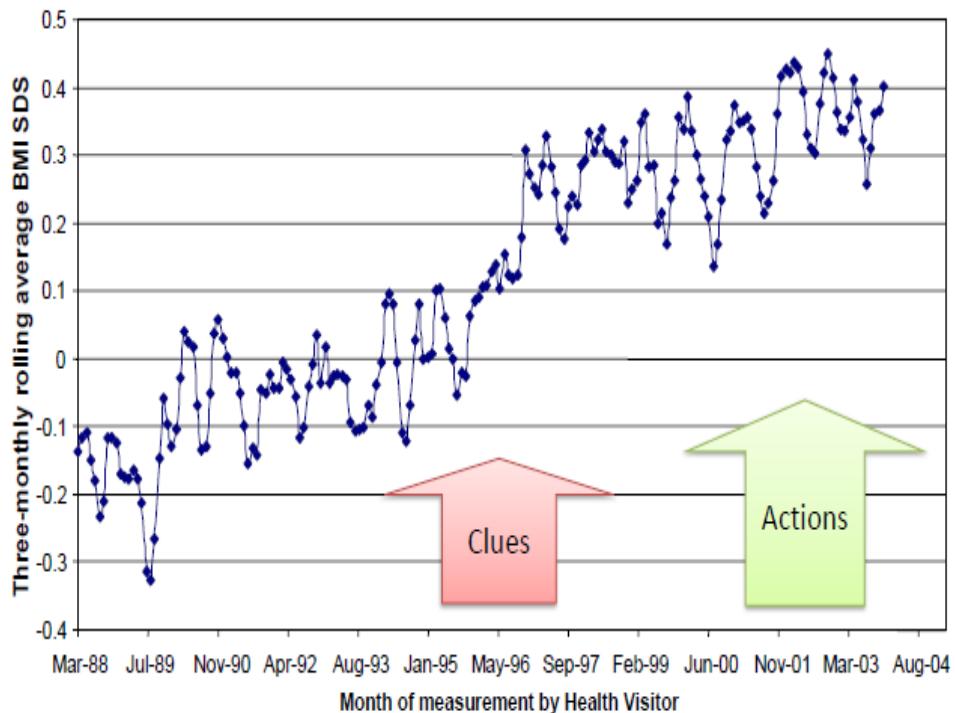
# Tiedolla johtaminen Healthcare 2.0



Workflow-integrated information which enables healthcare providers to drill from reports into detailed analyses of quality, safety, efficiency, effectiveness, regulatory and financial aspects of care practice to identify poor quality, waste, non-standard practices, under or over-utilized services, & opportunities for improvement.

# Ennakoinnin haasteet

Body Mass Index (BMI) trend in Wirral 3y-olds from 1988 to 2003



SDS = standard deviation score from 1990 British Growth Reference charts – adjusts for age and sex of the child

Adapted from Iain Buchan



Child obesity levels have been rising for decades

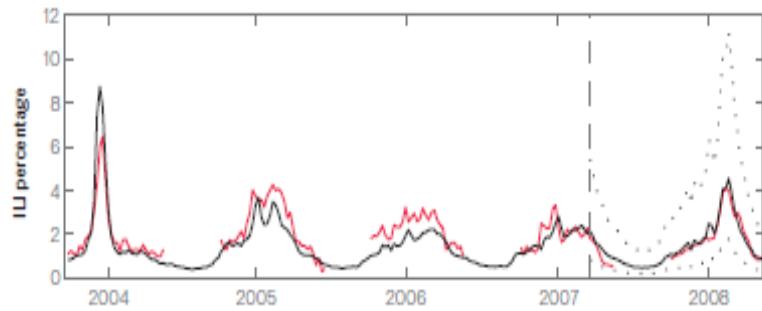


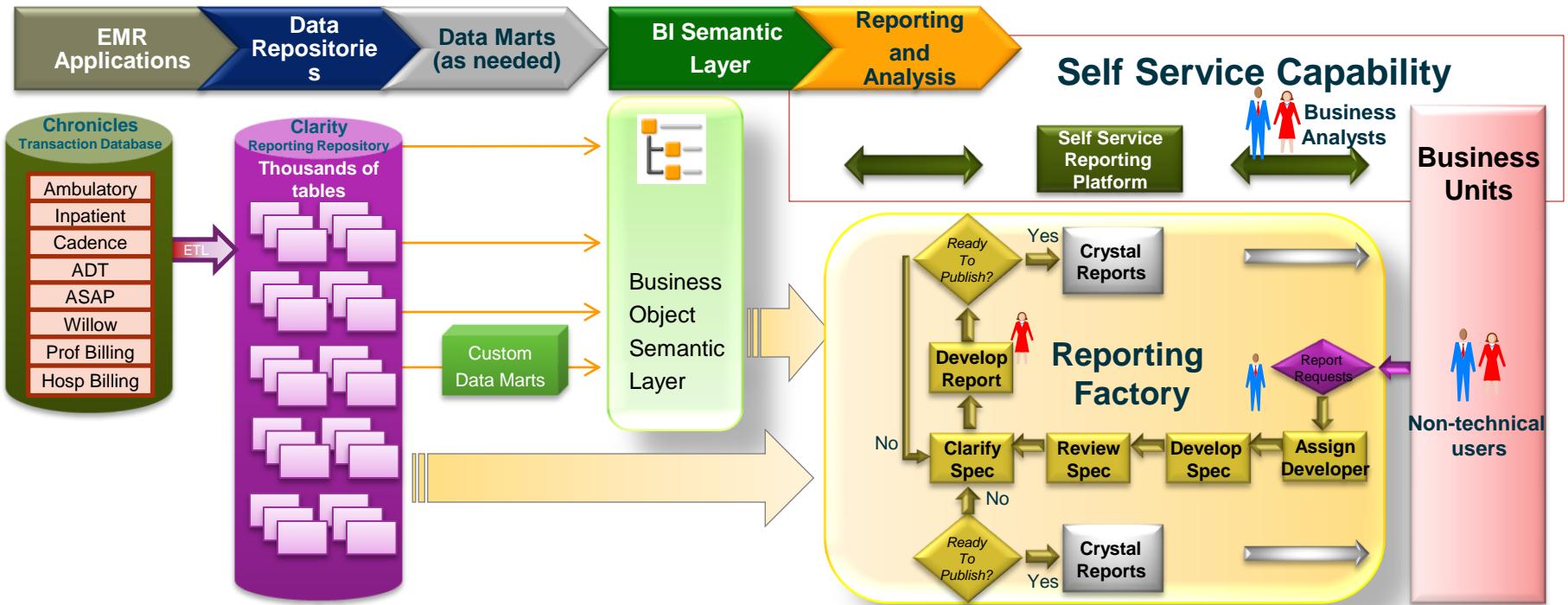
Figure 2: A comparison of model estimates for the Mid-Atlantic Region (black) against CDC-reported ILI percentages (red), including points over which the model was fit and validated. A correlation of 0.85 was obtained over 128 points from this region to which the model was fit, while a correlation of 0.96 was obtained over 42 validation points. 95% prediction intervals are indicated.

Ginsberg et al. Nature 2009

| Phase<br>Impact            | The Old World   |  |  | The New Era   |
|----------------------------|---|--|--|---|
|                            | Pilot   | Departmental Analytics   | Enterprise Analytics   | Big Data Analytics  |
| Staff Skills (IT)          | Little or no expertise in analytics – basic of knowledge BI tools | Data warehouse team focused on performance, availability and security              | Advanced data modelers and stewards key part of the IT department              | Business Analytics Competency Center (BACC) that includes 'data scientists'                                     |
| Staff Skills (Business/IT) | Functional knowledge for BI tools                                 | Few business analysts – limited usage of advanced analytics                        | Savvy analytical modelers and statisticians utilized                           | Complex problem solving integrated into Business Analytics Competency Center (BACC)                             |
| Technology & Tools         | Simple historical BI reporting and dashboards                     | Data warehouse implemented, broad usage of BI tools, limited analytical data marts | In database mining, usage of high performance computing & analytical appliance | Widespread adoption of appliances for multiple workloads. Architecture and governance for emerging technologies |
| Financial Impact           | No substantial financial impact. No ROI Models in place           | Certain revenue generating KPI's in place with ROI clearly understood              | Significant revenue impact (measured and monitored on a regular basis)         | Business strategy & competitive differentiation is based on analytics   |
| Data Governance            | Little or none (Skunk works)                                      | Initial data warehouse model and architecture                                      | Data definitions & models standardized   | Clear master data management strategy   |
| Line of Business           | Frustrated  | Visible  | Aligned (including LoB executives)   | Cross-departmental (with CEO visibility)  |
| CIO Engagement             | Hidden  | Limited  | Involved   | Transformative  |

Source: IDC Asia/Pacific Business Analytics Practice (July, 2011)

# Creating a Business Object Semantic Layer on top of Clarity as the new reporting platform can support the continuum of user needs



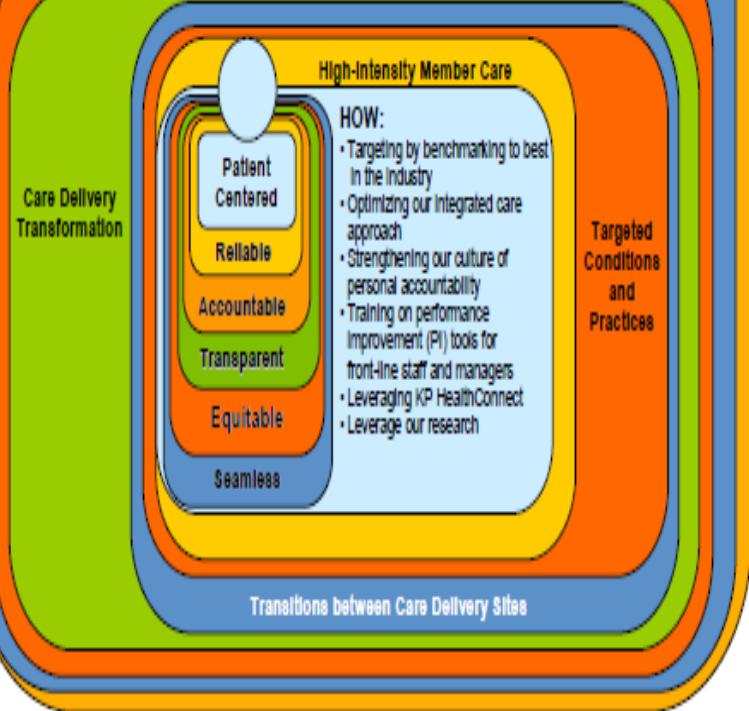
- Leverage report factory model to support production report development
  - Reduce overall report development effort and delivery time by leveraging the semantic layer and BO tools.
  - Reduced cost of report production by leveraging offshore factory labor cost.
- Enable self service capability to deliver a complete and dynamic analytic solution
  - Root cause analysis to identify clinical, operational, and financial problems
  - On demand access of data allows for problems to be identified before they become entrenched
  - Steering compliance decisions at enterprise, practice or physician level with flexible drilldown path
  - Consistently monitoring KPIs and performance with dashboards and scorecards for management leadership



**Quality You Can Trust**  
**Caring with a Personal Touch & Convenient/Easy**  
**Affordable**

**OUR AIM:** Safest, most effective and personalized health care in the country

#### Performance Monitoring - Big Q Measures

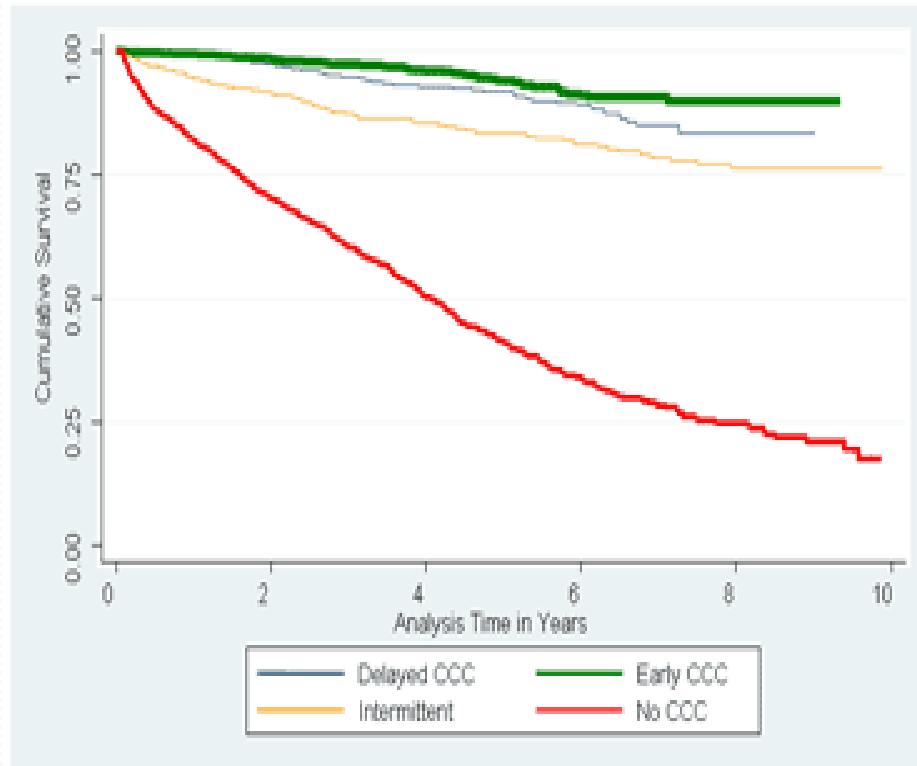


## KP "Big Q" Dashboard

### Big Q Performance Metrics Top Level or Program View



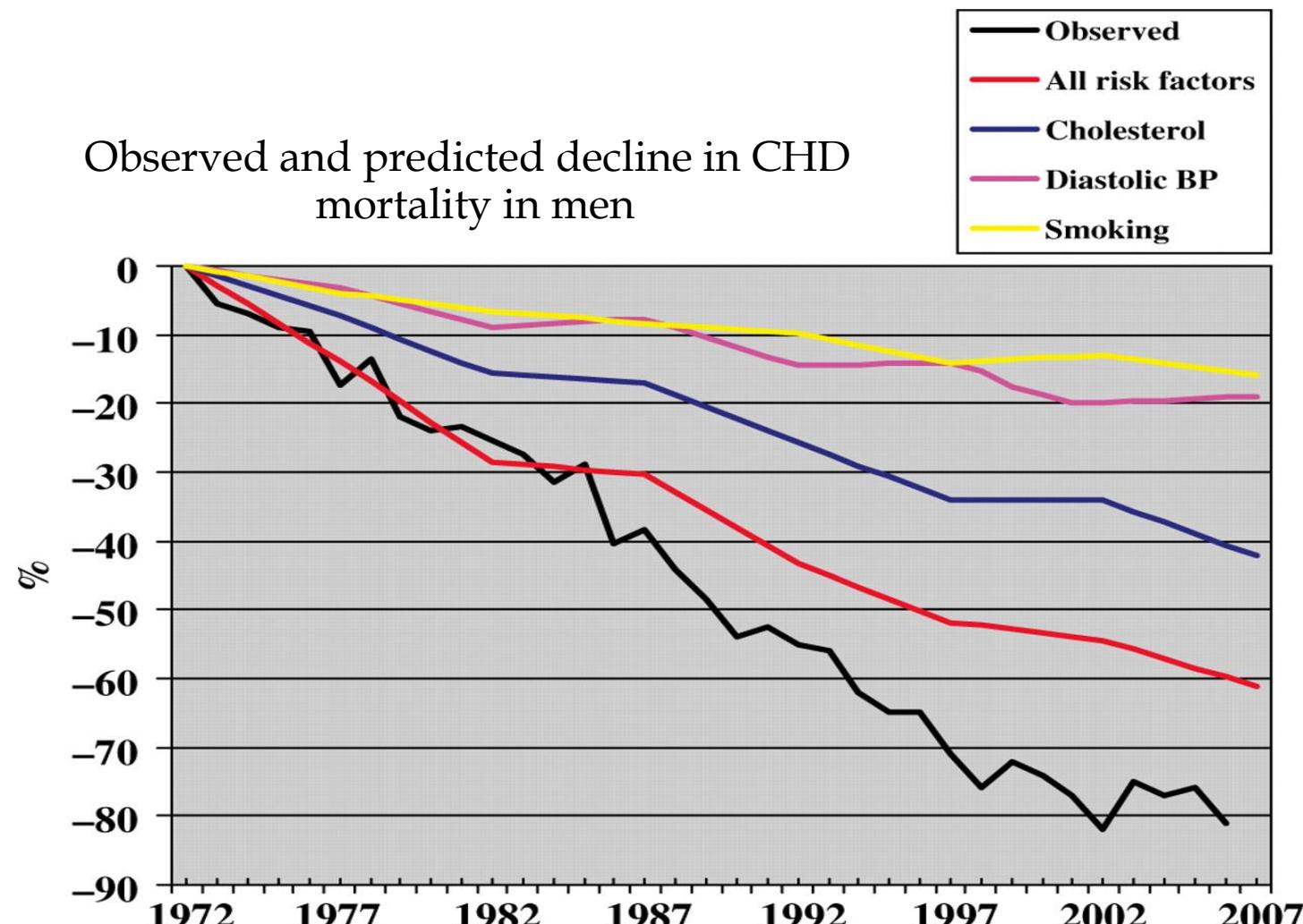
# Kaiser Permanente ja laatu



- Sepelvaltimotautipotilaiden rekisteri
  - elämäntapa ohjaus
  - lääkehoidon tehostaminen
  - käypähoito suunnitelma ja päätöksentuen ohjaus
- Vaikuttavuus
  - kuolleisuus väheni
- Miljardin säästöt

Case Study: Collaborative Cardiac Care Service – Collaborative Teams Improve Cardiac Care with Health Information Technology (Wong et al. 2011)

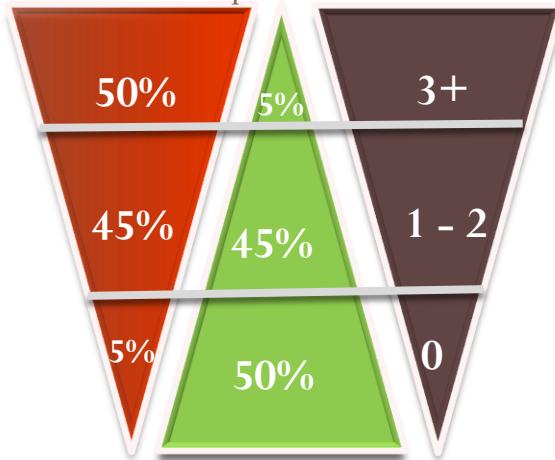
# Pohjois-Karjala projekti 1972 - 77



Vartiainen E et al. Int. J. Epidemiol. 2010;39:504-518

International Journal of  
**Epidemiology**

### Cost    Population    Chronic Disease



# Yksilöllinen hoito

## Matching medicines to patients

Personalised Healthcare (PHC) aims to match medicines to only those patients who will benefit from them. Advances in science mean we can increasingly design and use tests to tell us how an individual patient is likely to respond to a particular medication before prescribing it for them.

## Success story

### AZD4547

AZD4547 is a fibroblast growth factor receptor (FGFR) tyrosine kinase inhibitor currently in Phase I trials for gastric and breast cancers. An early PHC strategy let us focus our discovery and translational effort to the right disease segment, using the relevant models.

We now have robust preclinical data that will enable us to target the right patient population starting in early development.

**Active assistance technology** – automated processing of health or behaviour change information that is ongoing as the user interacts with the technology.

- Omahoitoa tukeva teknologia, joka
  - prosessoi ja sopeuttaa *mittaustietoa lähetämisen* aikana ja
  - *just-in-time palautteellaan edistää tavoitteellista käyttäytymistä*

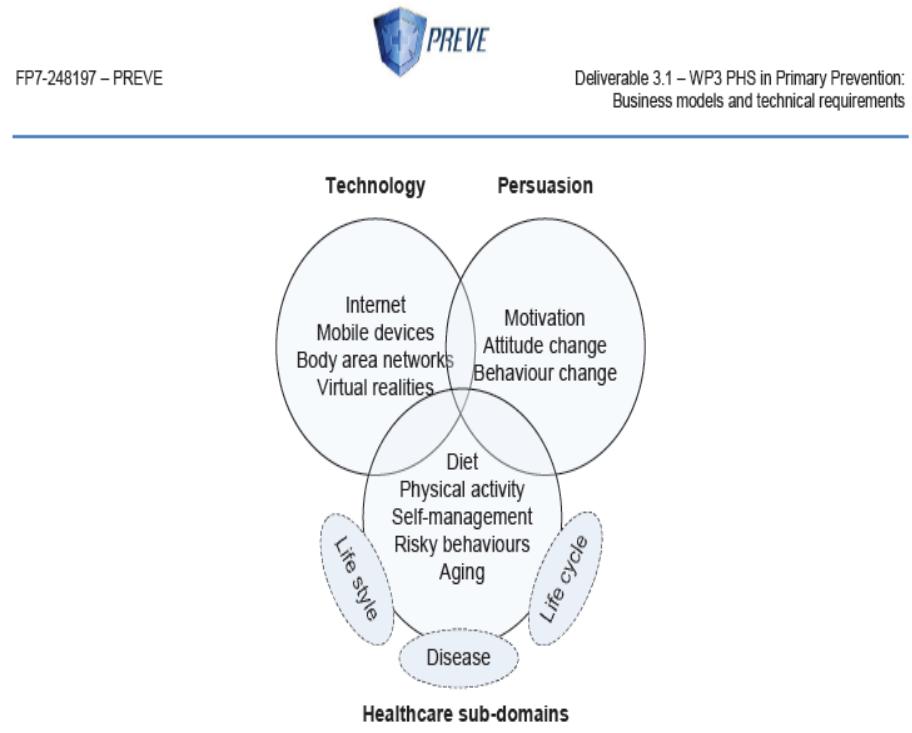


Figure 1. Framework of persuasive technologies in health domain (adapted from Chatterjee & Price, 2009).

# Ennakoiva mallintaminen

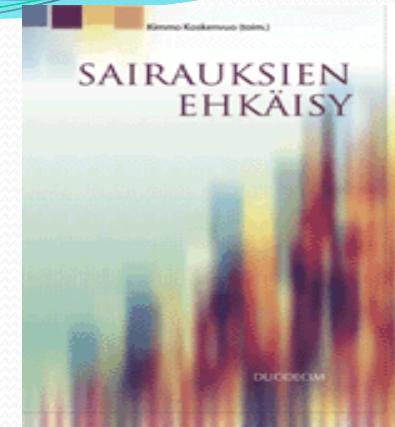
“...is truth best apprehended in terms of many little things or in terms of one big thing”.

Benjamin T. Williams  
(1931 – 2012)

Computer Aids to Medical Decision Making, 1982

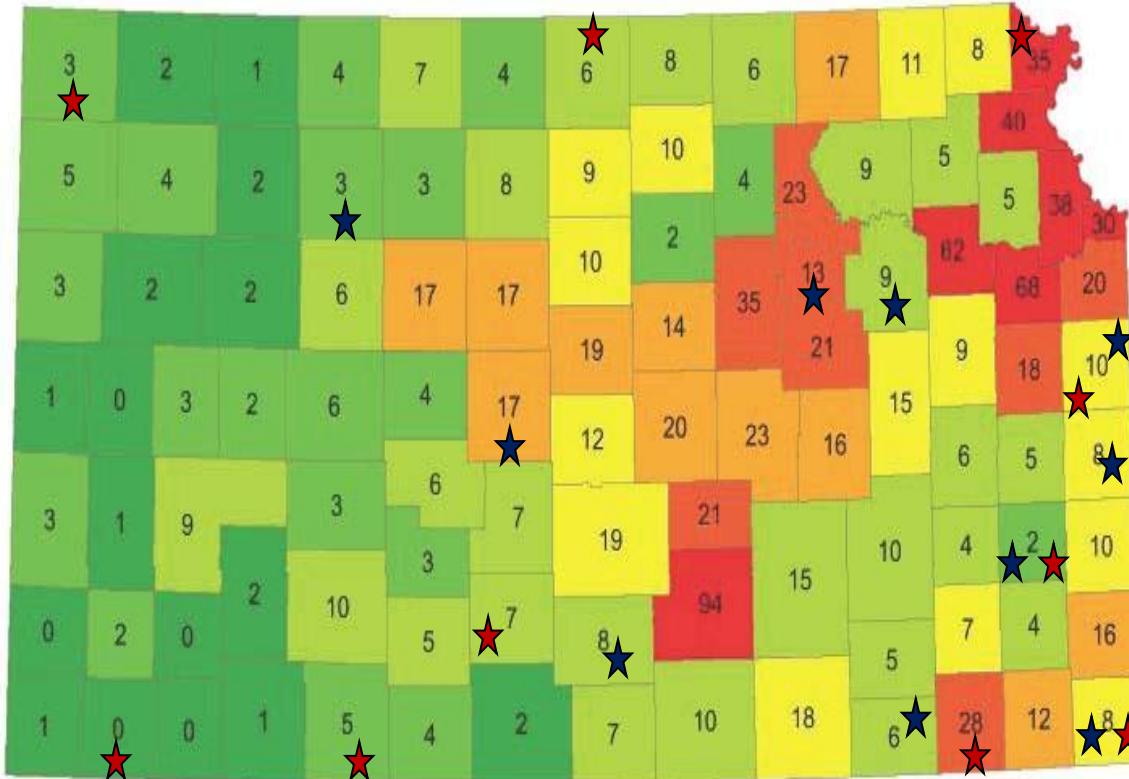
## Success story AZD8329 (diabetes)

AZD8329 is an oral, once daily inhibitor of the  $\text{11}\beta\text{HSD1}$  enzyme with best-in-class potential for the treatment of Type 2 diabetes. Using all available information, a preclinical in vitro model was developed to explore the mechanism of action. The results were used to predict what would happen in patients. This model was then used to design the dose-finding study. As a result of insight gained through modelling, the team was able to recommend reducing the proposed study size from 270 to 115 patients for the Phase IIb trial. This outcome resulted in lowering the cost of the study.



# Hospitalization Risk By County

Prepared by the HP Medical Informatics Center of Excellence



## Population Density Peer Group

- Frontier (less than 6 persons per sq. mile)
- Rural (6 to 19.9 persons per sq. mile)
- Densely-settled Rural (20.00 to 39.9 persons per sq. mile)
- Semi-urban (40 to 149.9 persons per sq. mile)
- Urban (150+ persons per sq. mile)

- ★ Male Elevated Risk Score
- ★ Female Elevated Risk Score

Sidorov et al. 2012



**Ennakoiva mallintaminen:**  
Erillisten aikaisempien tietojen analysointi riskihenkilöiden tunnistamiseksi

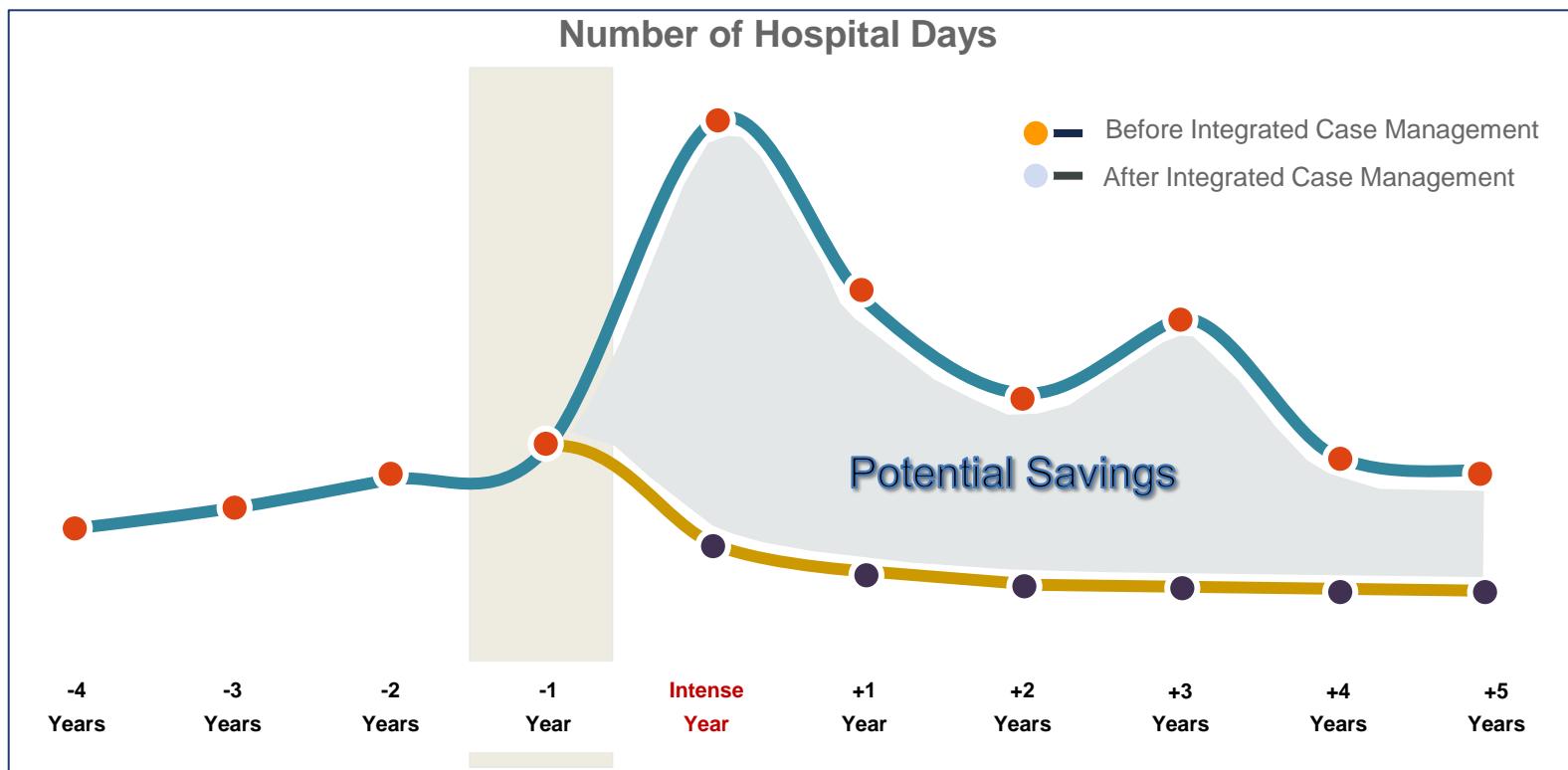
1. Riskihenkilöiden kartoitus
2. Riskien arvointi
3. Toimenpiteet



# Our Approach



By anticipating which patients are evolving to their 'Intense Years' we can maximize the potential savings



# EU ja tiedon uusiokäyttö

- Redesigning health in Europe for 2020
  - "my data, my decisions"
  - "liberate the data"



## Trustworthy reuse of health data: A transnational perspective

A. Geissbuhler<sup>a,b,\*</sup>, C. Safran<sup>c</sup>, I. Buchand<sup>d</sup>, R. Bellazzi<sup>a,c</sup>, S. Labkoff<sup>f</sup>, K. Eilenberg<sup>a</sup>, A. Leese<sup>h</sup>, C. Richardson<sup>i</sup>, J. Mantas<sup>a,j</sup>, P. Murray<sup>a</sup>, G. De Moor<sup>k</sup>  
<sup>a</sup> International Medical Informatics Association, Geneva, Switzerland  
<sup>b</sup> Harvard University, Cambridge, MA, USA  
<sup>c</sup> Harvard Medical School, Boston, USA  
<sup>d</sup> Manchester University, Manchester, UK  
<sup>e</sup> Penn State University, Pennsylvania, USA  
<sup>f</sup> AstraZeneca, Wilmington, USA  
<sup>g</sup> Mayo Clinic, Rochester, Minnesota, USA  
<sup>h</sup> Deloitte MCS Ltd., UK  
<sup>i</sup> Janssen Pharmaceuticals, USA  
<sup>j</sup> EPFL School of Computer and Medical Informatics, Lausanne, Switzerland  
<sup>k</sup> Ghent University, Ghent, Belgium

## Levers for change

| Stakeholder group                 | My data, my decisions   | Liberate the data  | Revolutionise health  | Connect up everything   | Include everyone                                 |
|-----------------------------------|---|--|---|---|--|
|                                   | Patients and institutions share their data, flexible consent mechanisms | Health outcomes and performance data freely published with full transparency | Technology and information management drives the pace of change | Link lifestyle data with health data, lots of new apps and tools from entrepreneurs | Contribution to and benefit from eHealth for all |
| Citizens and patients             | High  | High   | High  | High  | High   |
| Regulators and policy makers      | Medium  | High   | Medium  | Medium  | Medium   |
| Clinicians and care professionals | Medium  | High   | High  | High  | High   |
| Payers and insurers               | Medium  | High   | High  | Medium  | Low  |
| Service providers and managers    | Low   | High   | High  | High  | High   |
| Researchers                       | High  | High   | Medium  | High  | High   |

High

If the preconditions were met and this lever utilised, there would be a high-level impact on the stakeholder group.

Medium

If the preconditions were met and this lever utilised, there would be a medium-level impact on the stakeholder group.

Low

If the preconditions were met and this lever utilised, there would be a low-level impact on the stakeholder group.

Source: eHealth Task Force Report: Redesigning Health for 2020