Predictive Modeling Summit
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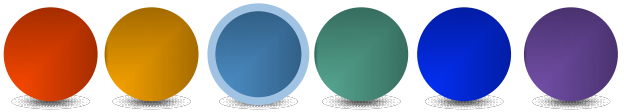
Analytics for Decision Support in Patient-Centered Medical Home Care Delivery

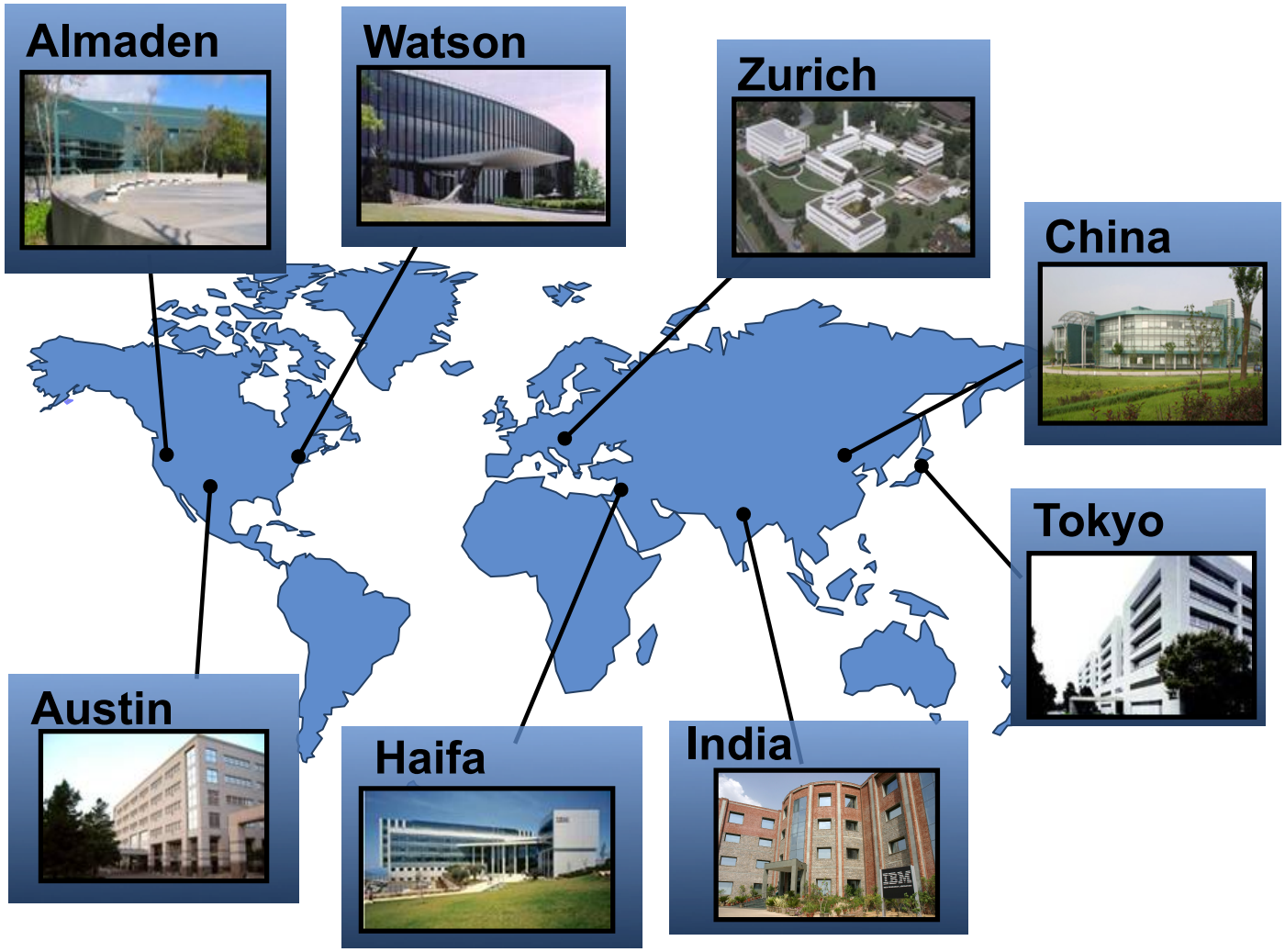
Speaker: Shahram Ebadollahi, PhD
Manager, Healthcare Informatics Research Group
Program Manager, Healthcare Transformation Big Bet
IBM T.J. Watson Research Center
Hawthorne, New York

E-mail: ebad@us.ibm.com



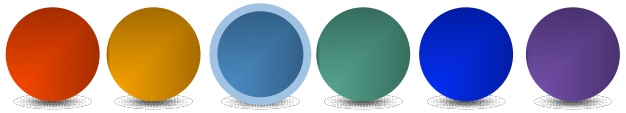
IBM Research Labs

- **Eight Research Labs worldwide**
- **Over 3100 employees**
- **Research**
  - **Exploratory, Applied & Product Research**
  - **Differentiation for next-generation products, services and solutions**



GTO 2010

Enabling Technologies for Healthcare Transformation



IBM Point of View

Thesis

The industry is moving towards an Evidence-centric healthcare ecosystem to drive healthcare transformation and yield lower costs and improved outcomes

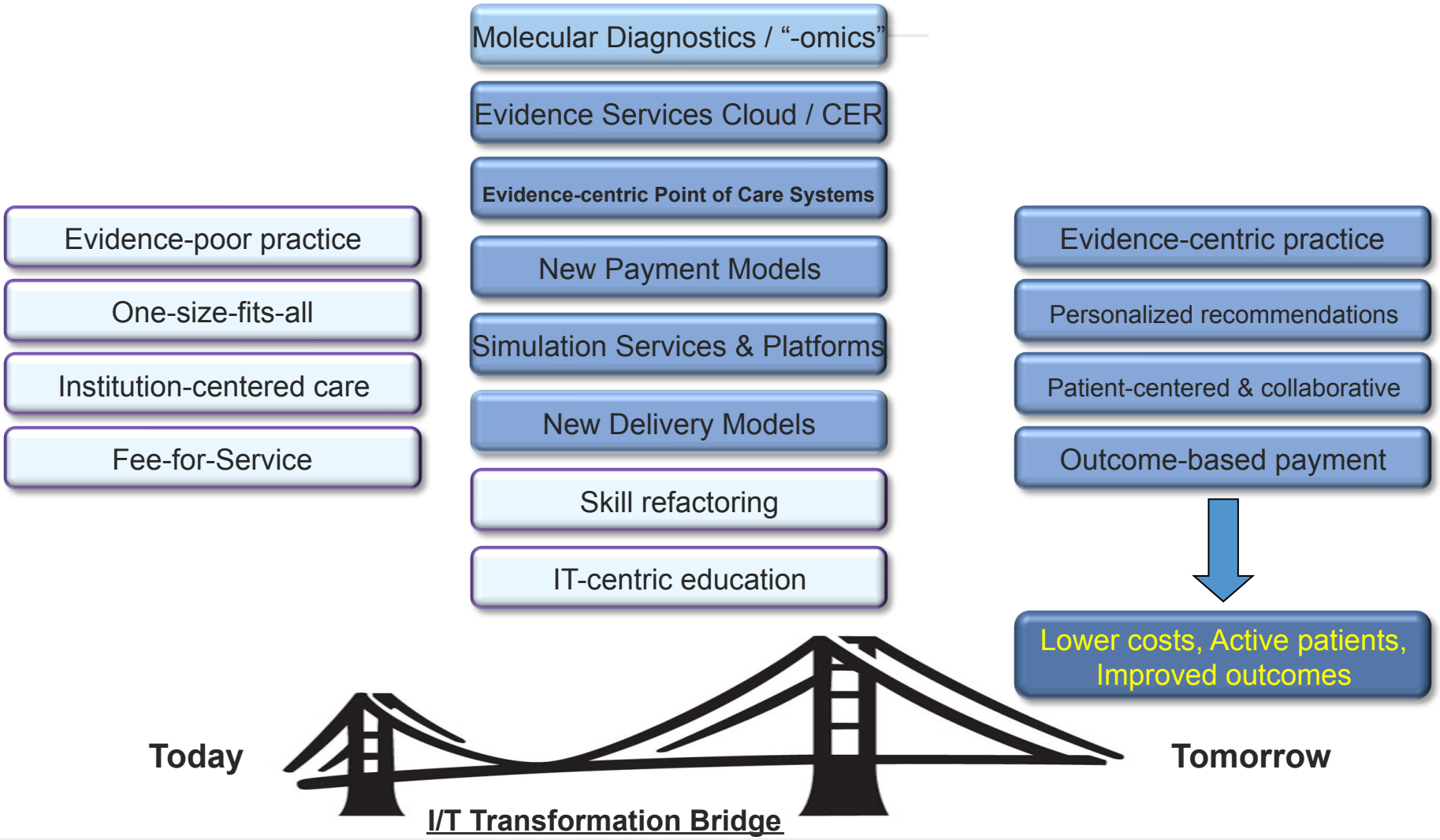
Change Implications

Proper alignment of payment and incentives to evidence-centric healthcare delivery, along with large-scale comparative effectiveness evidence generation and delivery platforms is critical to drive this transformation

IBM Response

- **Participate and lead transformation of Healthcare delivery models like Patient Centered Medical Home**
- **Deliver business analytics solutions that facilitate the implementation of evidence-centric models through service, software and cloud computing capabilities**

IT reduces cost and data overload. It improves quality of care through systemic evidence generation and use, and allows new payment and delivery models



There are four key IT components enabling healthcare transformation

- ***Cognitive support and decision intelligence***
- *Evidence in the context of care delivery process*
- *Meaningful use*
- *Anticipate the need, tailor delivery*

- ***Practice-based Evidence / Comparative Effectiveness***
- *Cloud and Data Trusts at the infrastructure level*
- *Analytics on federated data structures*
- *Novel security paradigms*

- ***Workflow and Business process transformation***
- ***Collaboration***
- *New delivery models*
- *Information in context*
- *Feedback loop*

- ***Evidence and outcome based payment models***
- *Optimization*
- *Tailoring payments to disease categories*

The healthcare transformation at Geisinger is an example of how an evidence-centric ecosystem with novel incentives, comprehensive digitization of EHR, and analytics for identifying best practices can enable improved outcomes and operational efficiency

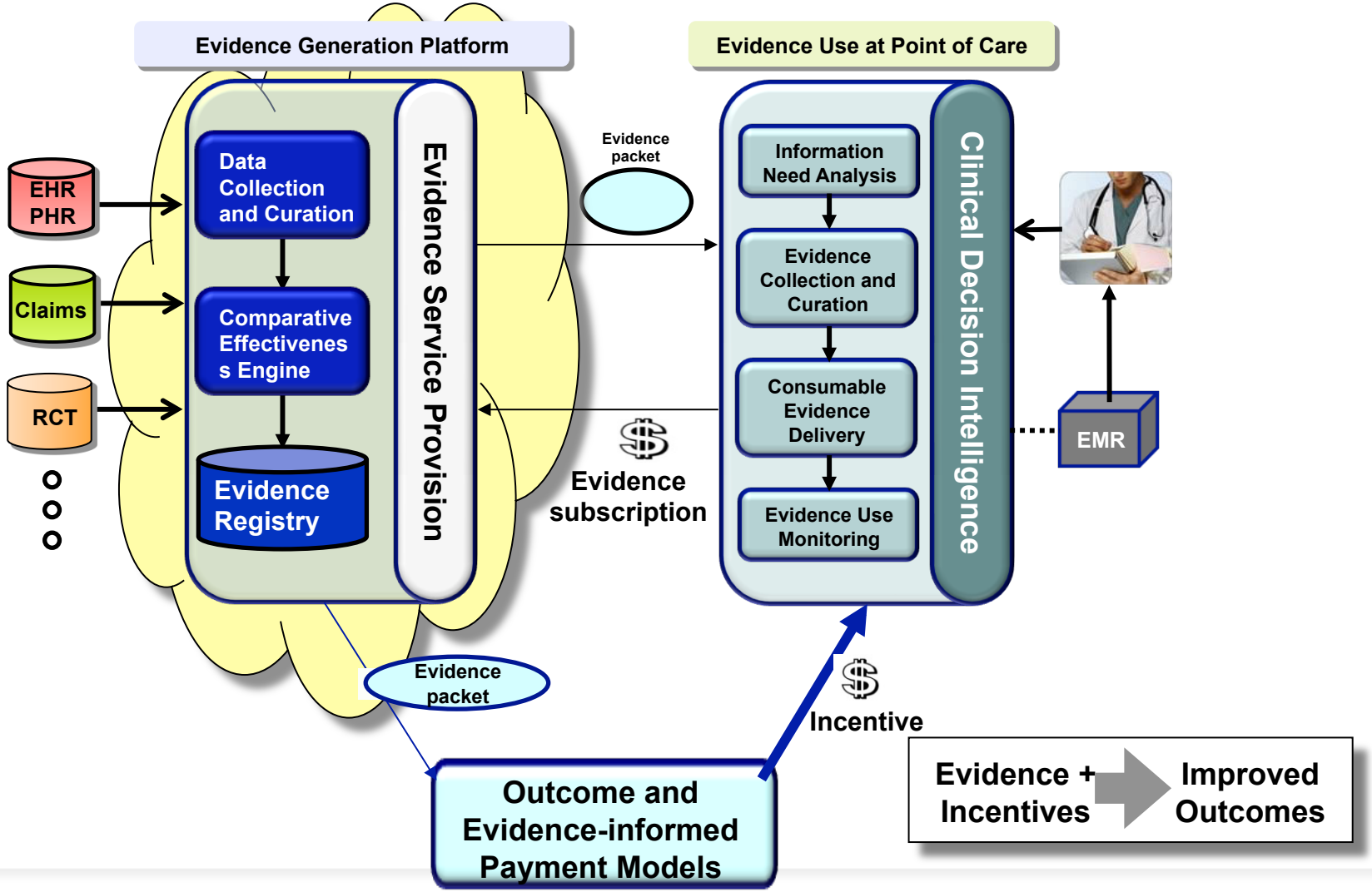
Geisinger ProvenCare (CABG)

- ***Implemented EHR in 1995, CDIS in 2009***
- ***Developed best practice guidelines in 2008***
- ***ProvenCare/Acute episodic care program provides warranty on outcomes***

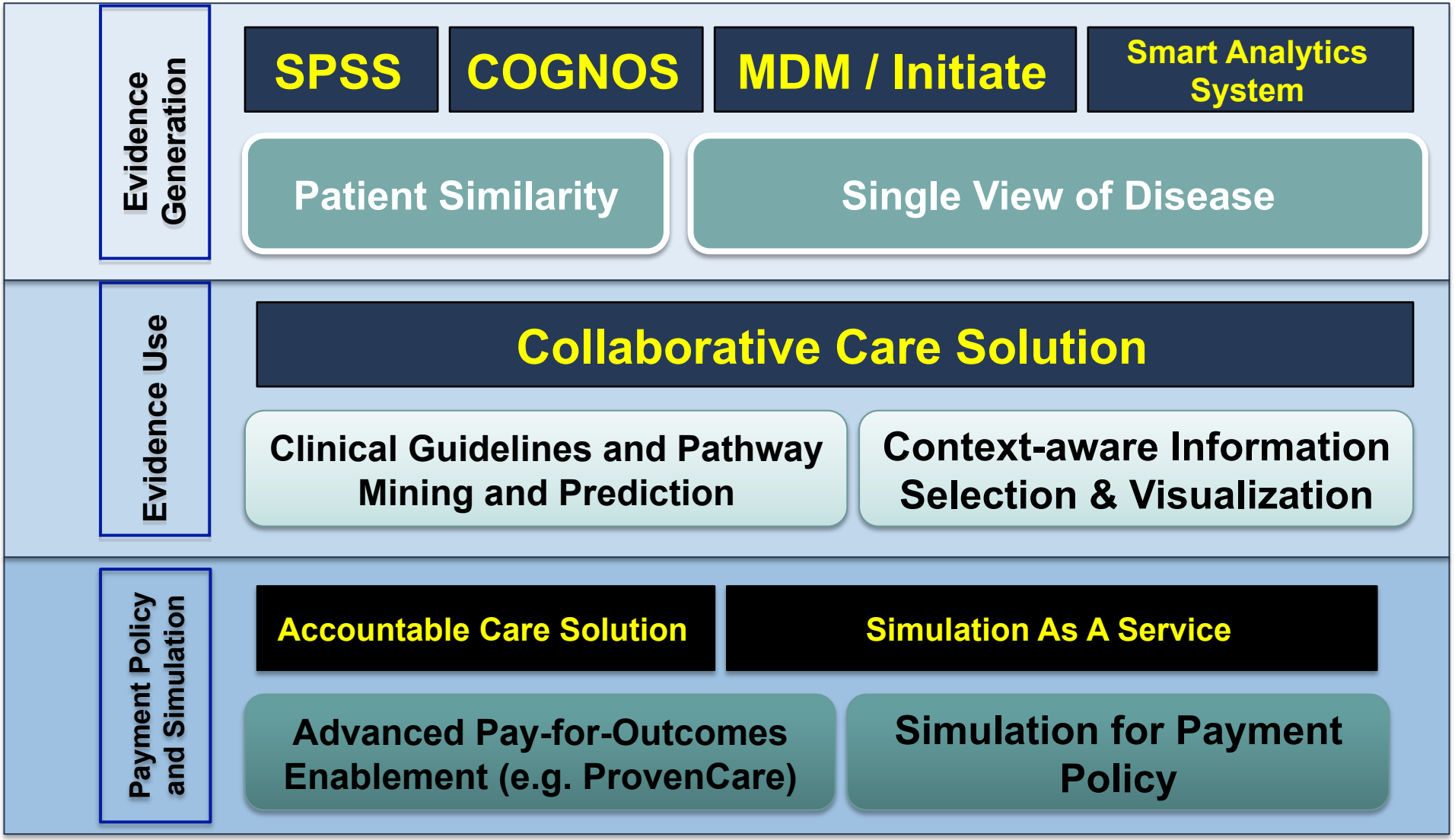
Benefits

- *Readmission within 30 days (6.9% → 3.8%) ; average total Length of Stay (LOS): (6.2d → 5.7d)*
- *Reduced hospital mortality (1.5% → 0%); number of Neurological complications (1.5% → 0.6%) ;*

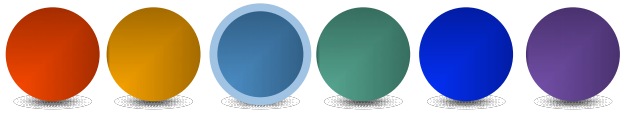
Outcome based payment incentives lead to improved outcomes and demand for evidence at point of care. This requires large scale evidence generation and comparative effectiveness clouds.



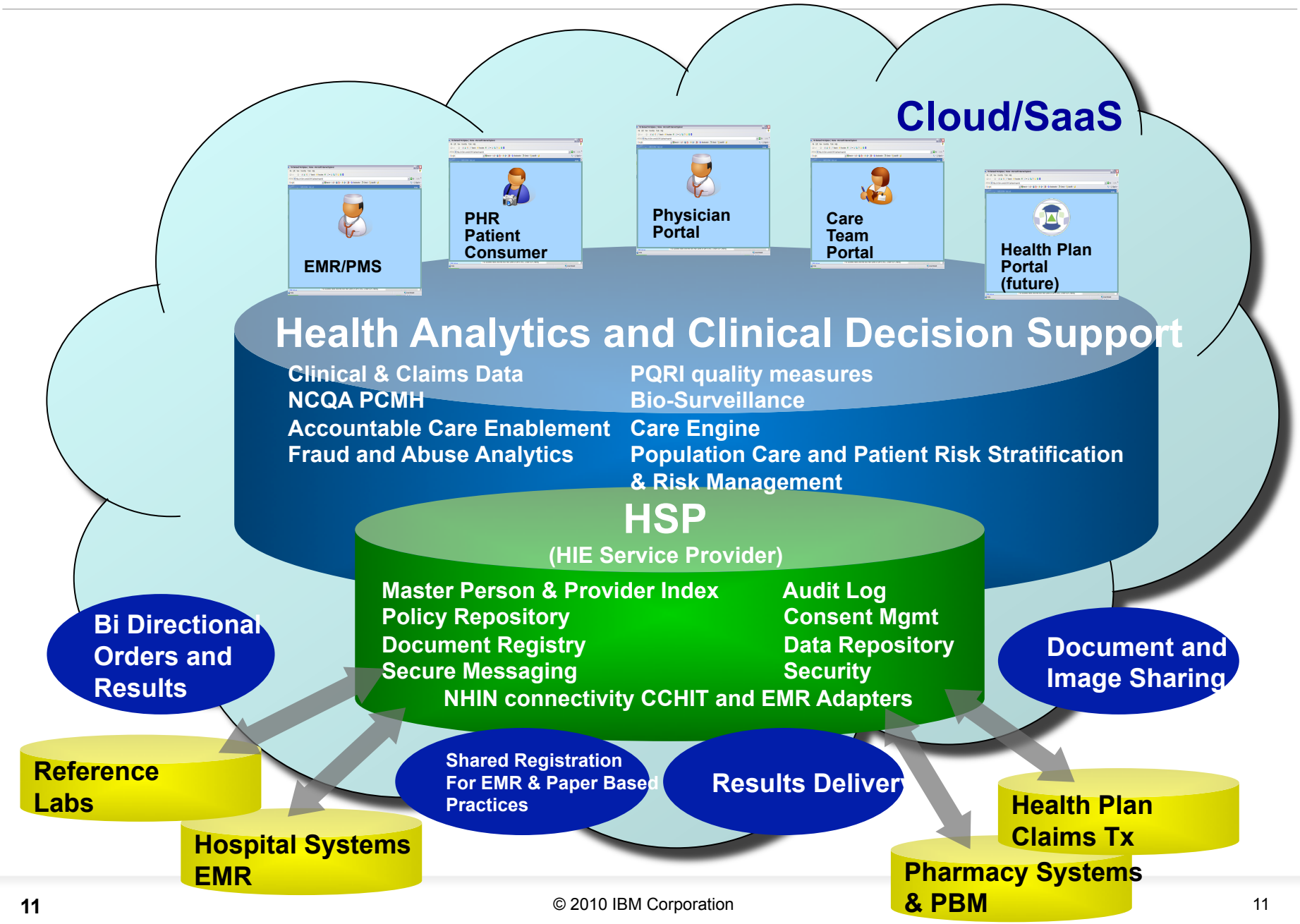
Key Plays to Enable Evidence-Centric Healthcare Ecosystem



Collaborative Care Solution



IBM/AHM Collaborative Care SaaS/Cloud Solution



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Overview of IBM Analytics in Solution

- **Key industry drivers being addressed include:**
  - **Improving Quality of Healthcare**
  - **Reimbursement Incentives**
  - **Meeting NCQA Requirements**
  - **Demonstrating Meaningful Use**
  - **Cost Savings and foundation for ACO's**
- **The Collaborative Care Analytics solution includes:**
  - **NCQA's Physician Practice Connections--Patient-Centered Medical Home standards.**
  - **NCQA's Disease Management programs certification in asthma, diabetes, chronic obstructive pulmonary disease (COPD), heart failure and ischemic vascular disease (IVD).**
  - **Financial analytics and predictive modeling ("what if") capabilities to demonstrate real time performance against KPI's & P4P/ Clinical Integration metrics (future)**
- **Current Release: provides initial foundation to analyze NQF performance measures required for NCQA and patient stratification by condition**
- **Future Releases: continue to extend the performance measures required to support the ARRA quality, safety, and efficiency health outcomes policy priorities**
- **IBM Research Project underway related to Predictive Cohort Analytics**

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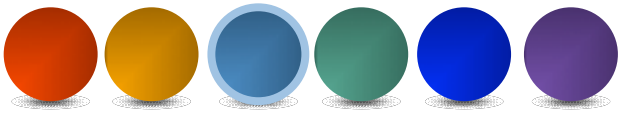
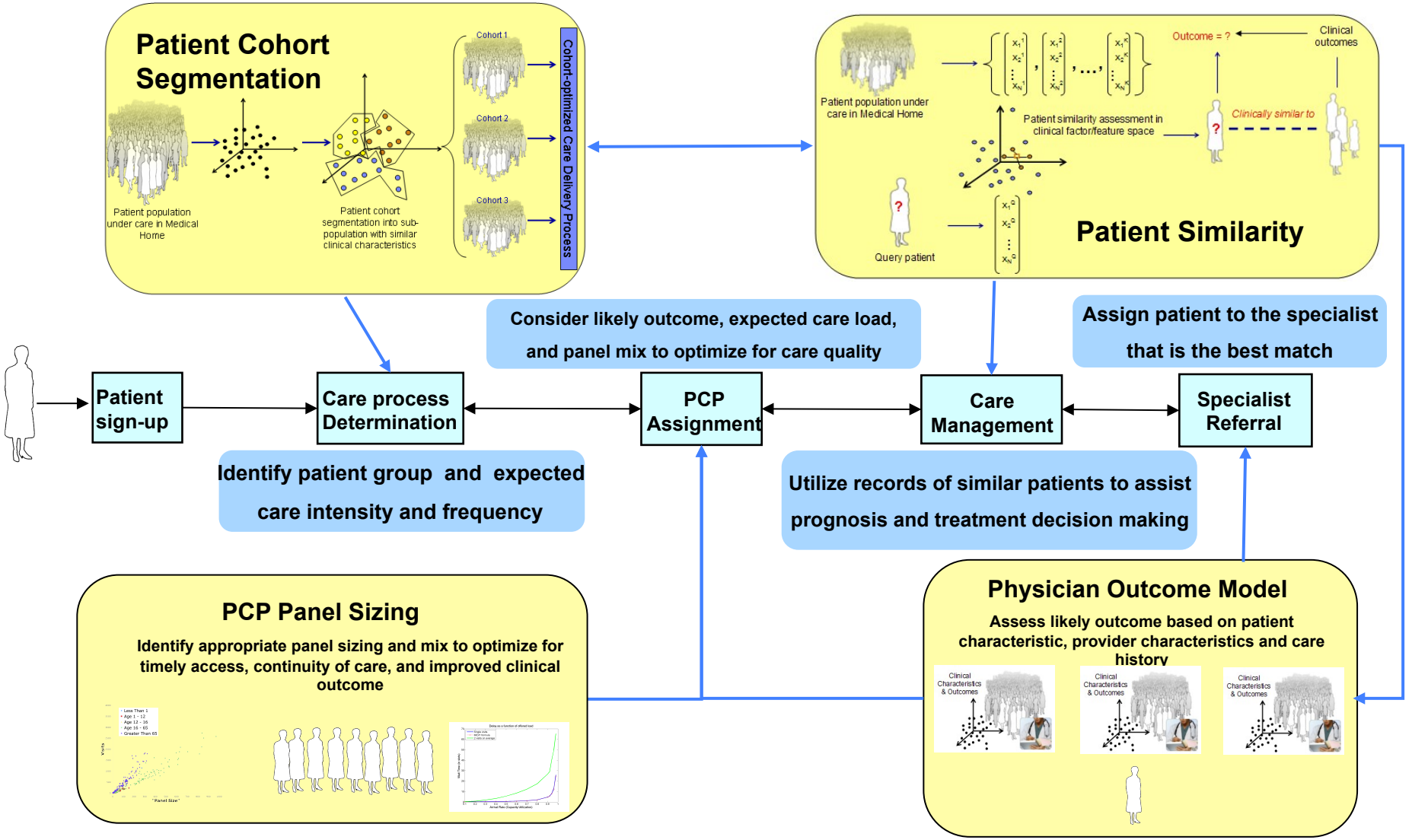
Population Analytics for Collaborative Care Solution

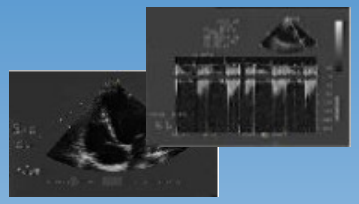


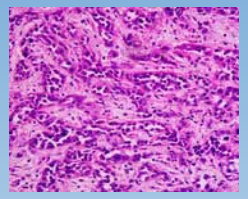
Overview of Analytics

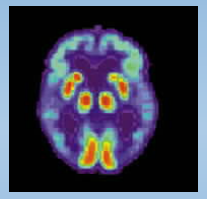


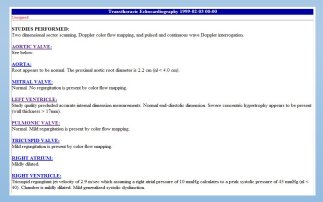
Patient Similarity – A high-level view

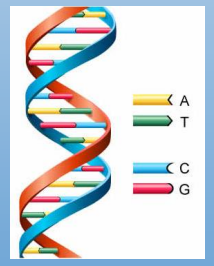
Patient Data

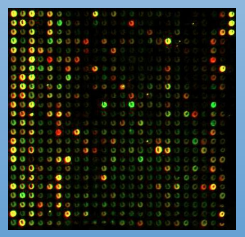












EHR

Patient Similarity

Similarity assessment analytics

Patient characterization

Applications

- Clinical Decision Support
- CER & Outcomes Research
- Resource Allocation (Patient Referral Services)
- Data Quality Services
- Predictive Analytics (Clinical Pathways)
- Clinical Trial Services (Patient Recruitment)
- Patient social networks

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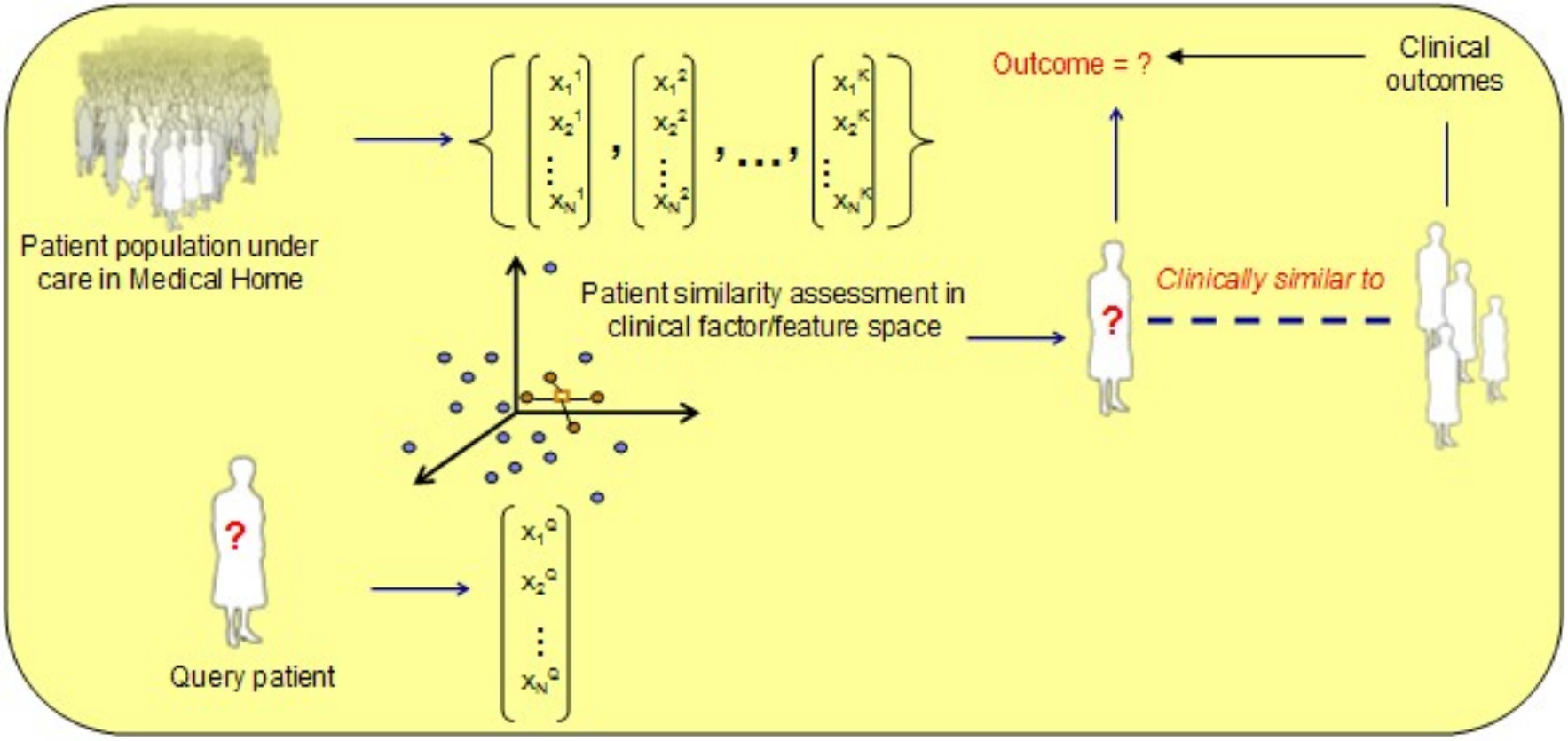
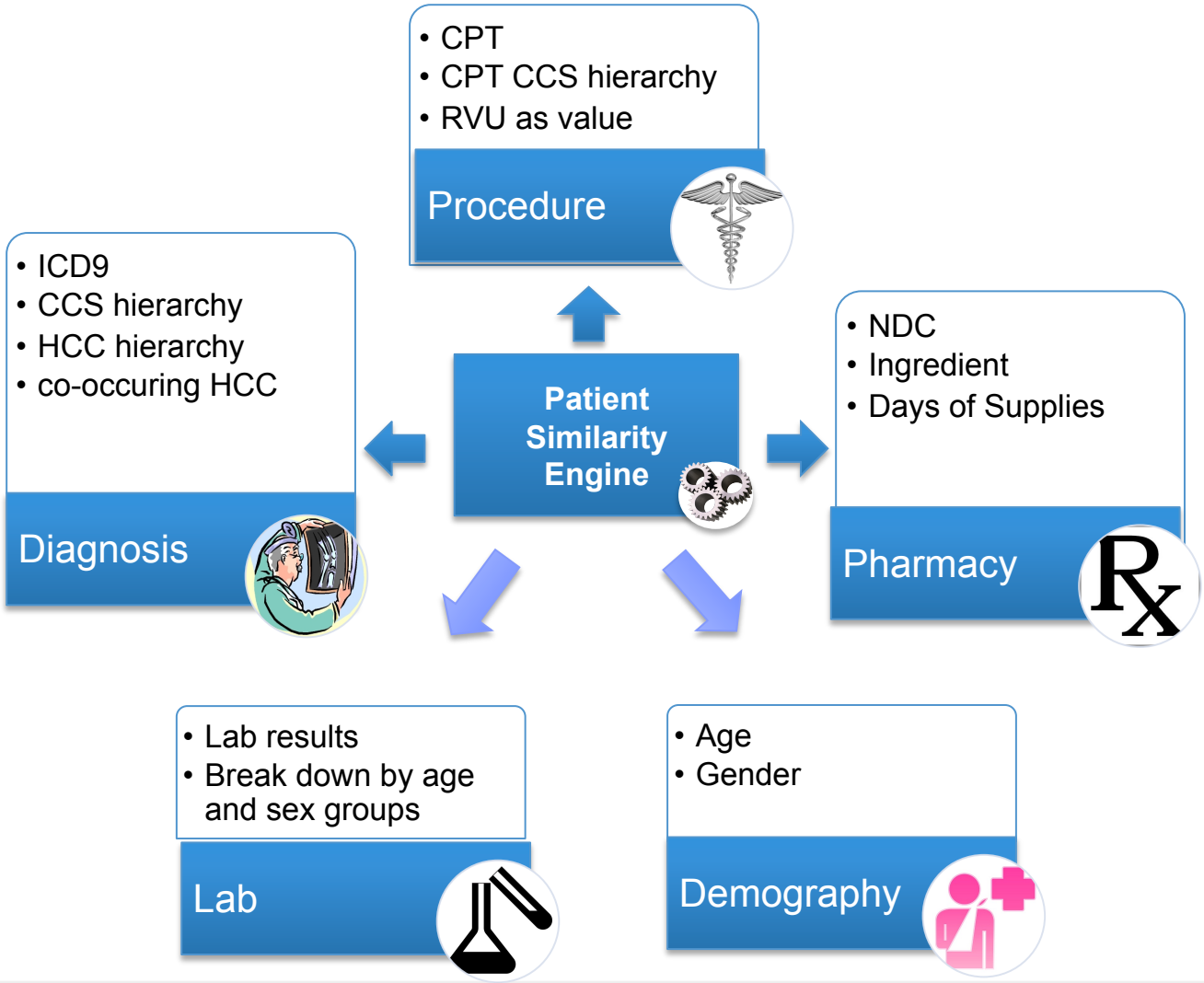
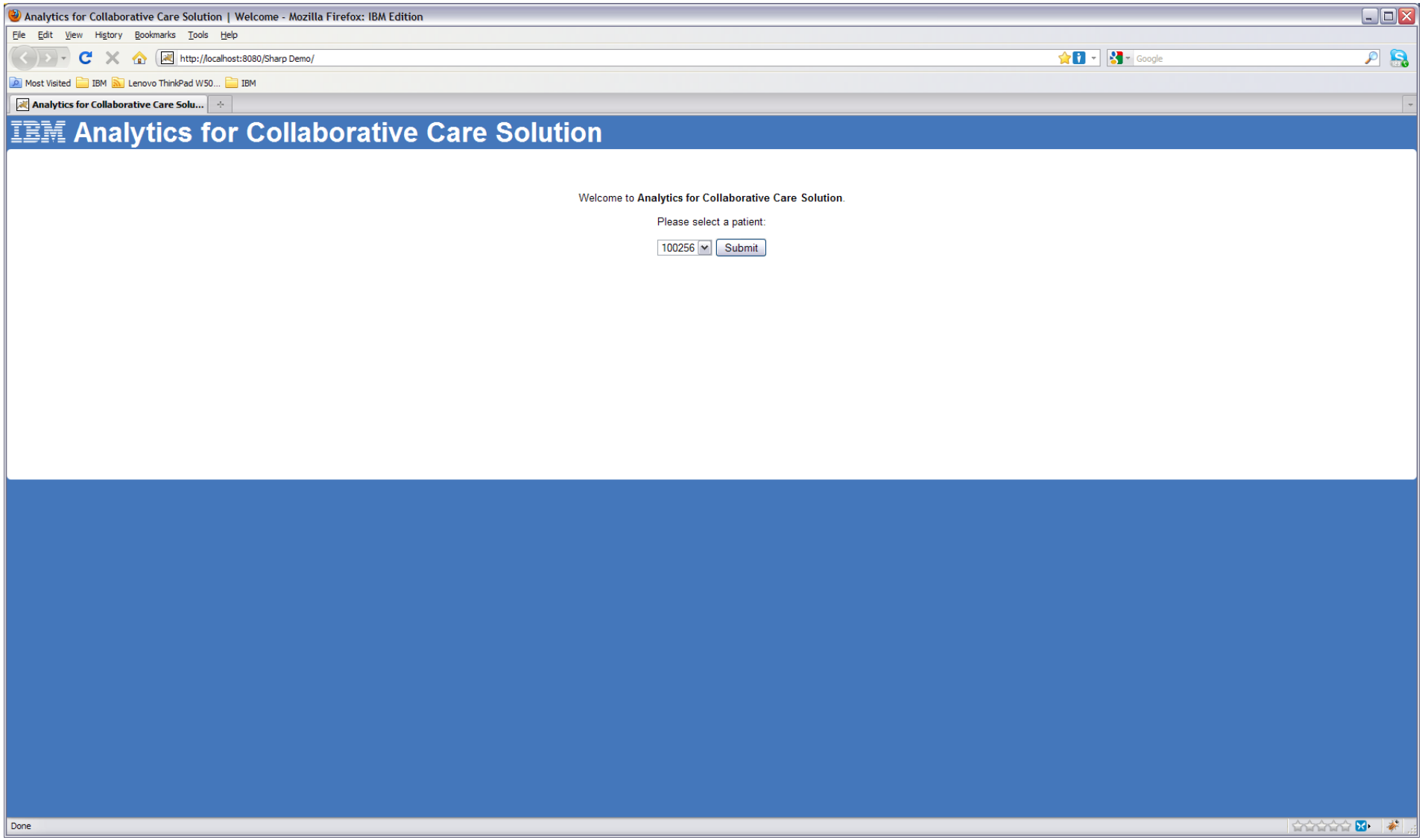
Patient Similarity Assessment

- **Objective: Given an index patient's record, find clinically similar patients from database for decision support**



Representing Patients using Information Obtained from Multiple Sources of Data





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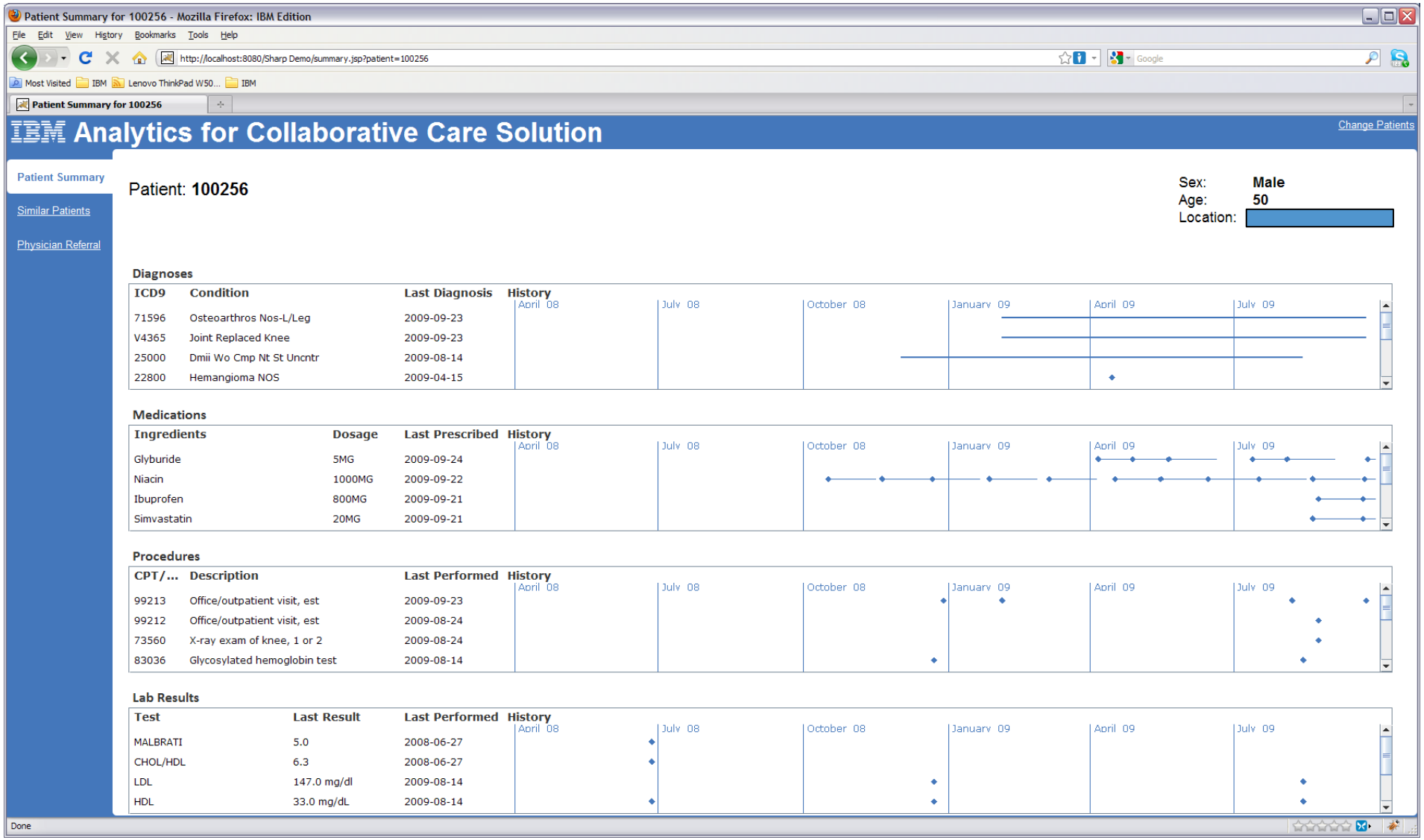

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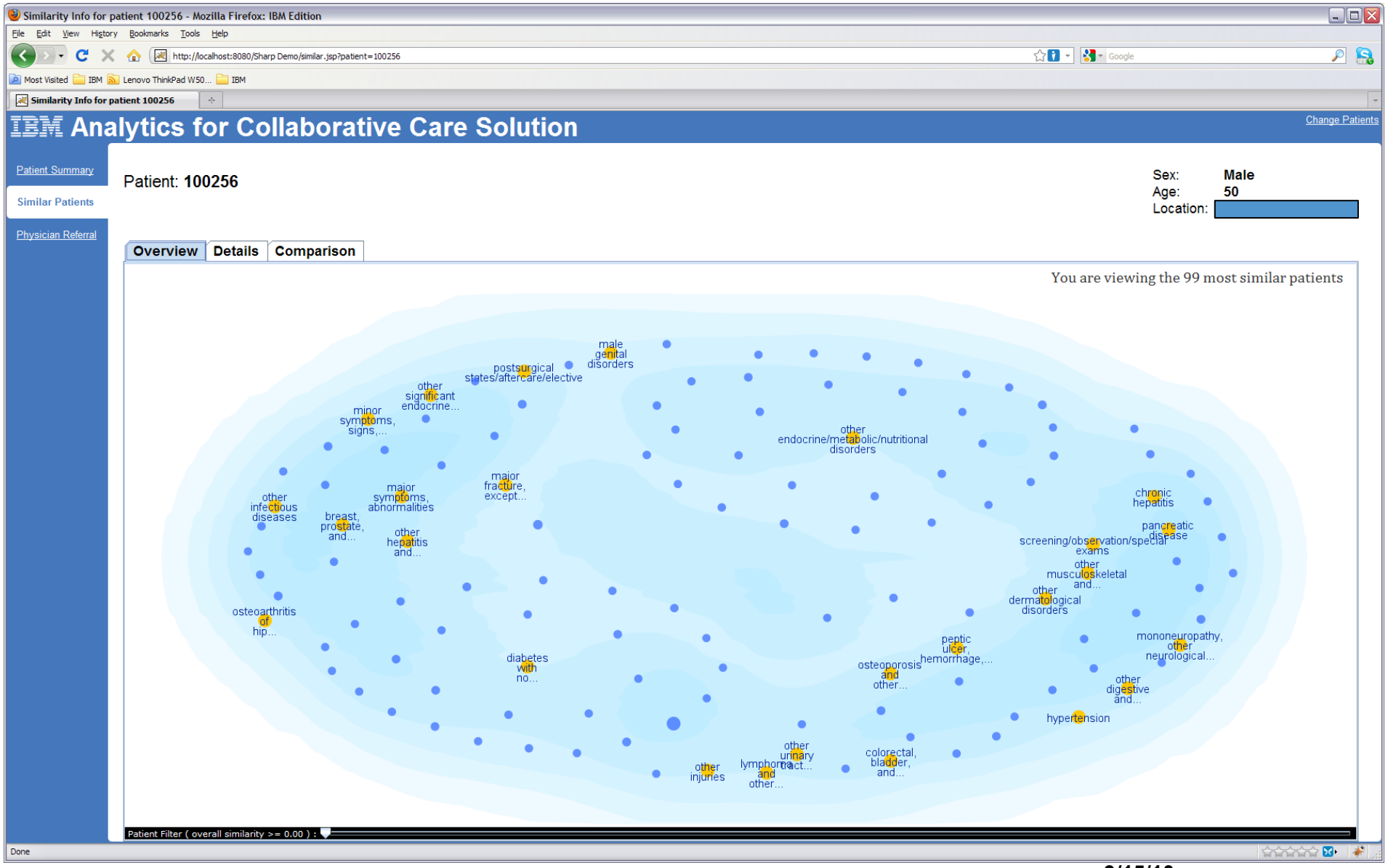

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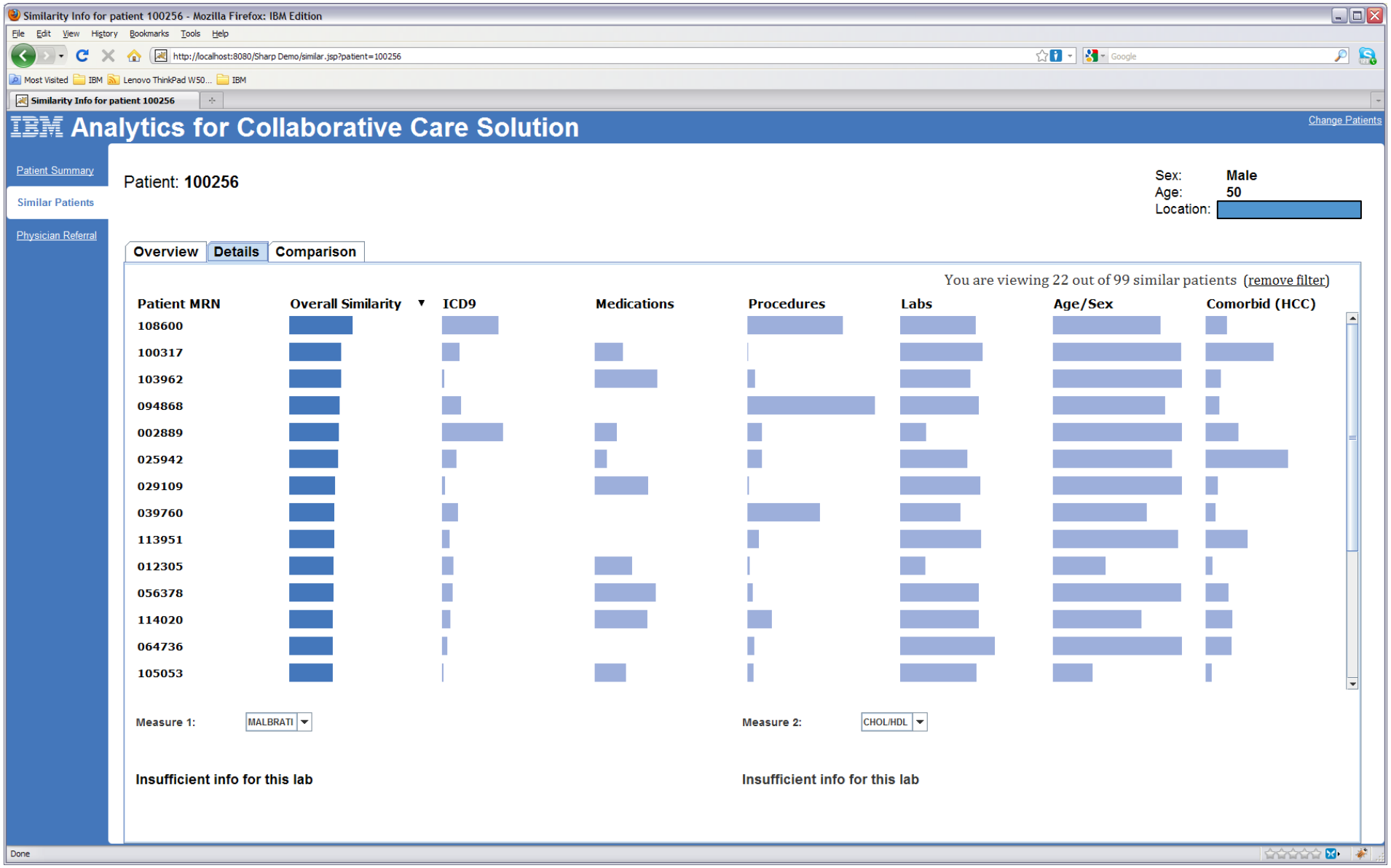

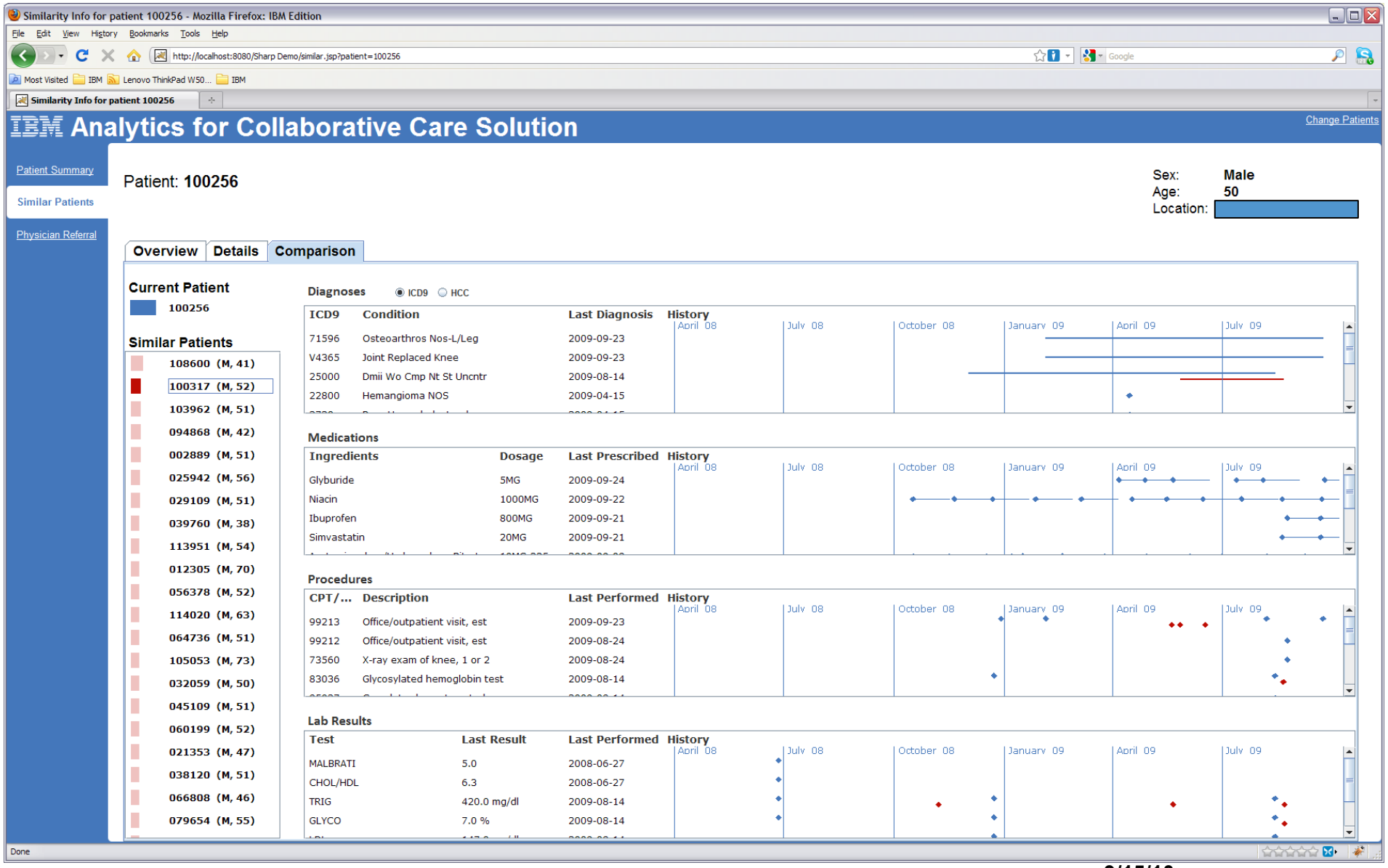

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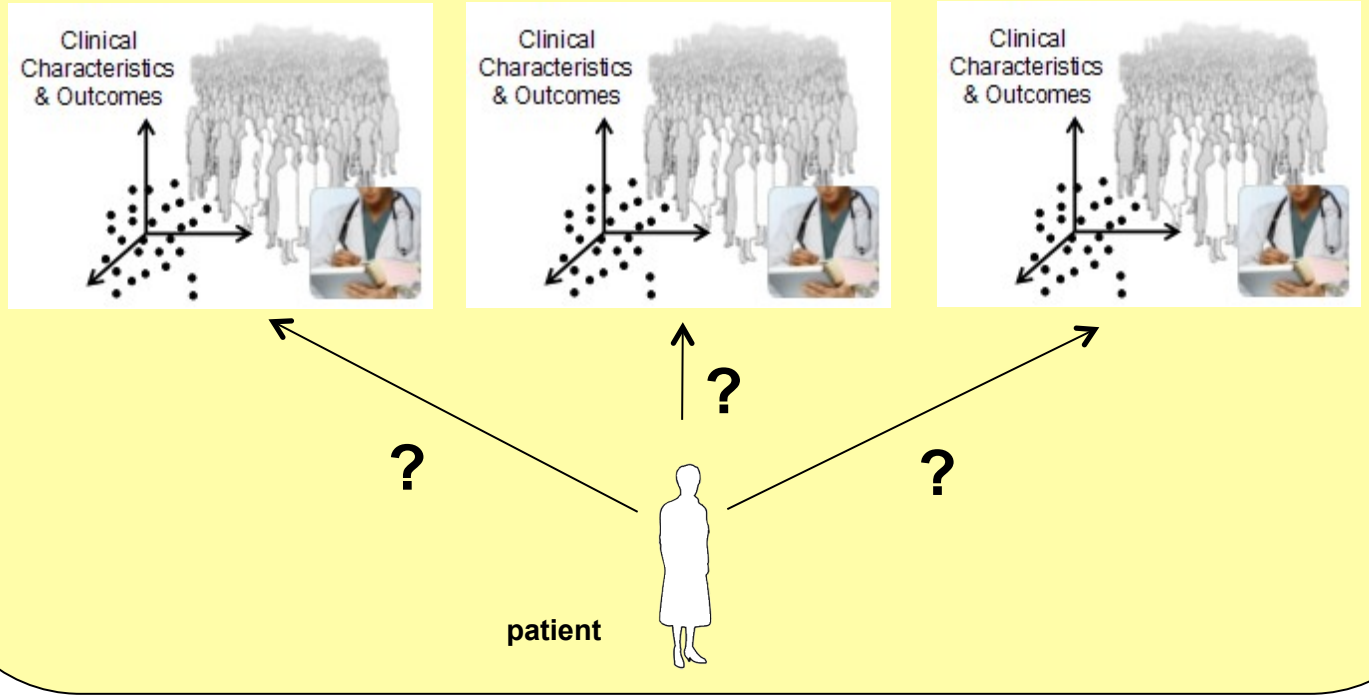
Physician Outcome Model

Objective: predict the likely outcome of a (patient, physician) pair based on population medical records, to provide decision support for physician referral and organizing physicians into collaborative pods

Assess likely outcome based on patient characteristic, provider characteristics and care history



Problem Formulation

- Data:
  - Diabetic patients and their Primary Care Physicians (PCP)
- Outcome
  - Lab test range change between first and last test

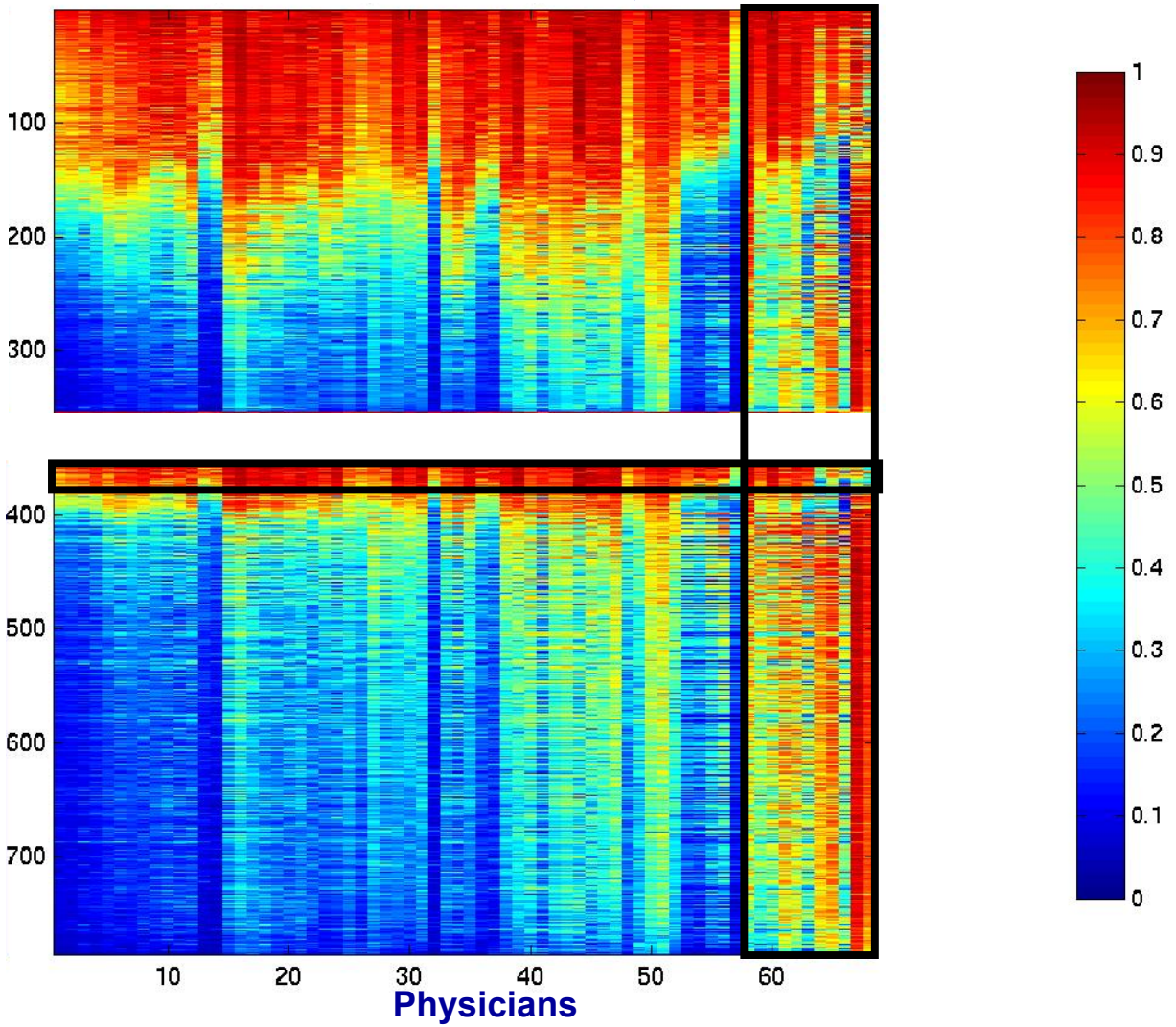
  - Initial model focus:
    - Positive outcome: range change closer to normal
    - Negative outcome: range change further away from normal

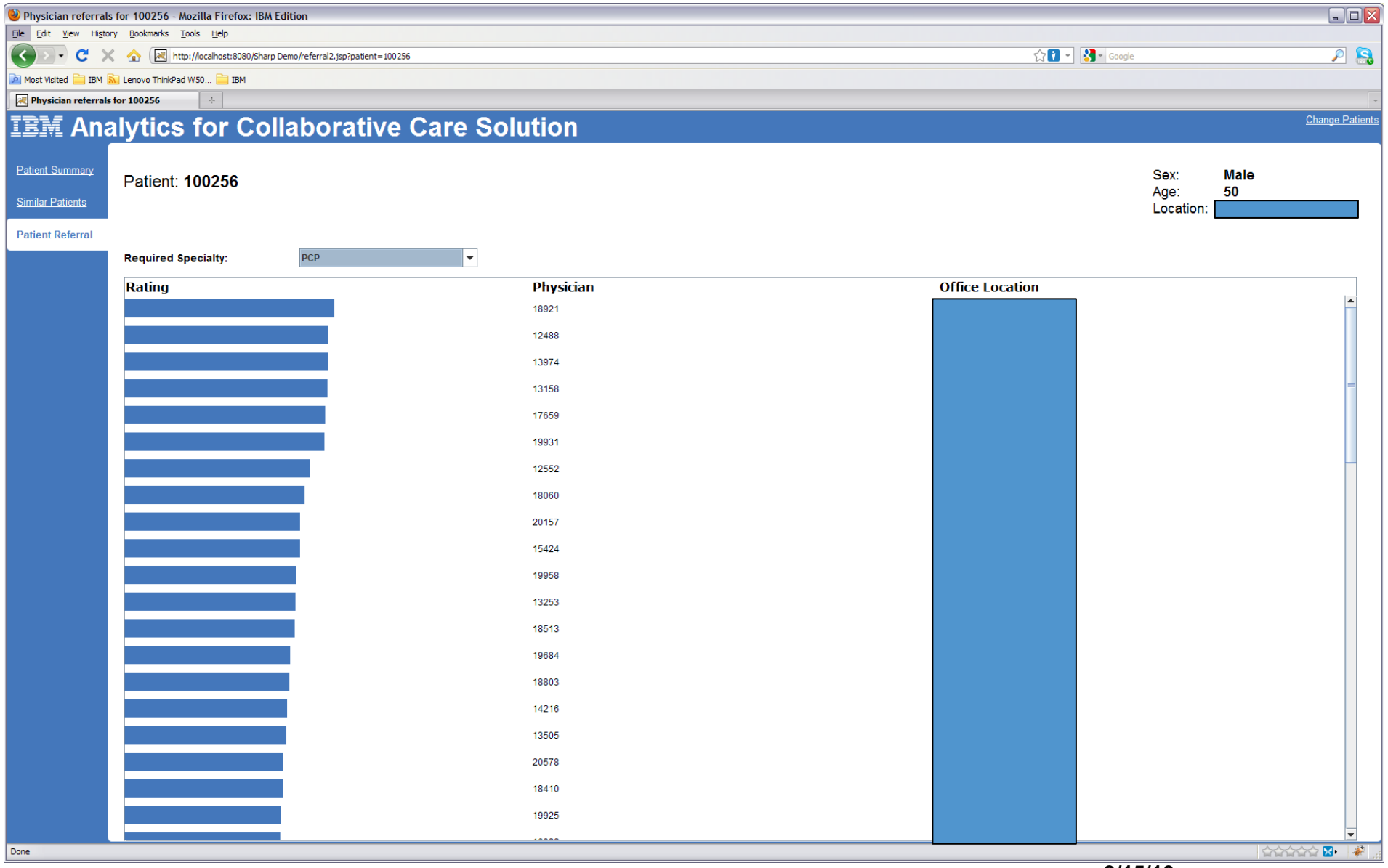
Predicted probability of good outcome for each (patient, physician) pair

Using dataset with minimum 10 patients per physician

Patients well managed by assigned physician

Patients suboptimally managed by assigned physician





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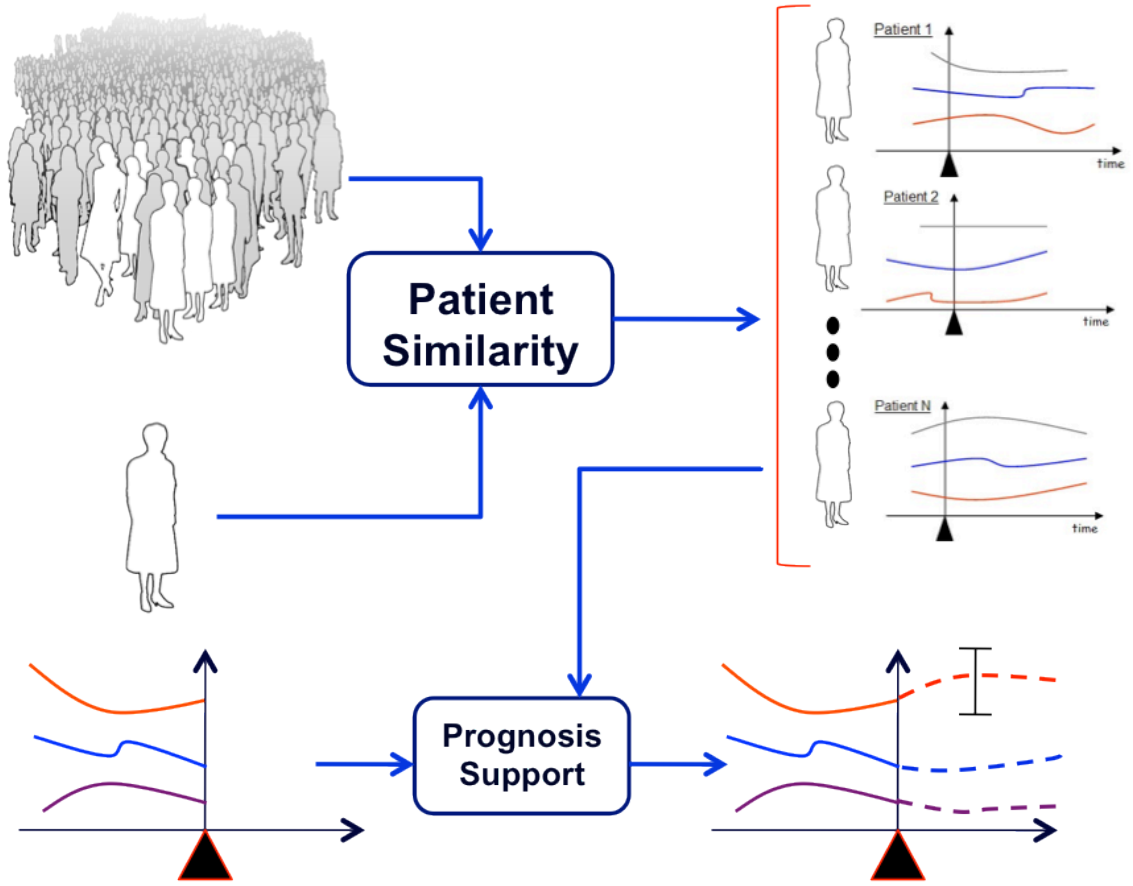
Patient Similarity for Near-Term Prognostication



- **This work focuses on designing the similarity measure that can leverage both patient characteristics and physician's knowledge**

Near-term Prognostics using Similar Patient Cohort

Questions?