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Application of Engineering & Technology Management Practices to University R&D Research in Sustainable Healthcare Information Technology for Primary Care Clinics

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Outline

Introduction

- Definition of Healthcare Information Technology (HIT)
- Example of a typical user (Patient with multiple chronic Diseases)
- A solution: Care Management Plus Program (CMP)
- CMP Research Team

Background

- Significance of the National Healthcare crisis
- History of Care Management
- ROI of CMP (HIT) for healthcare

Developing a Next-Generation HIT Application

- Business Driver: Gap in Primary Care
- Innovation Process Gap Analysis

Applying Engineering & Tech Management Concepts:

- Technology Road Maps (TRM)
- User-Centered Innovation
- System Dynamics
- Technology Transfer

Introduction

What is Health Information Technology?

Health information technology (Health IT) allows comprehensive management of medical information and its secure exchange between health care consumers and providers.

Broad use of health IT will:

- Improve health care quality
- Prevent medical errors
- Reduce health care costs
- Increase administrative efficiencies
- Decrease paperwork
- Expand access to affordable care

Interoperable health IT will **improve individual patient care**, but it will also bring many **public health benefits** including:

- Early detection of infectious disease outbreaks around the country
- Improved tracking of chronic disease management
- Evaluation of health care based on value enabled by the collection of de-identified price and quality information that can be compared.

An Example that can benefit from HIT

Case Study:

Ms. Viera a 75-year-old woman with diabetes, systolic hypertension, mild congestive heart failure, arthritis and recently diagnosed dementia.



Ms. Viera and her caregiver come to clinic with several problems, including:

- 1) Hip and knee pain
- 2) Trouble taking all of her current 12 medicines,
- 3) Dizziness when she gets up at night,
- 4) Low blood sugars in the morning, and
- 5) A recent fall.

And Out in the hall:

- 6) The caregiver confidentially notes he is exhausted
- 7) Money is running low for additional medications.

An Example that can benefit from HIT

Case Study:

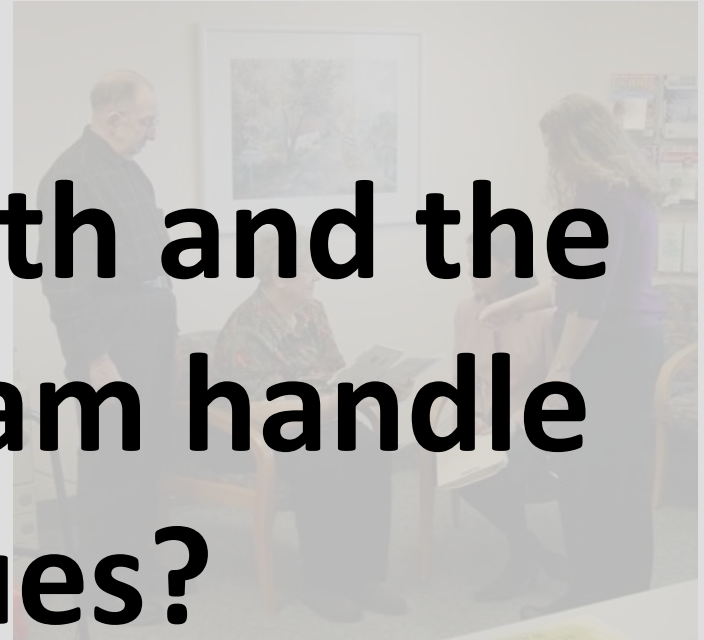
Ms. Viera a 75-year-old woman with diabetes, systemic hypertension, mild congestive heart failure, arthritis, and dementia. She has been taking several medications for these conditions.

Ms. Viera's primary care physician has referred her to a geriatrician for a comprehensive geriatric assessment. The geriatrician has identified several problems, including:

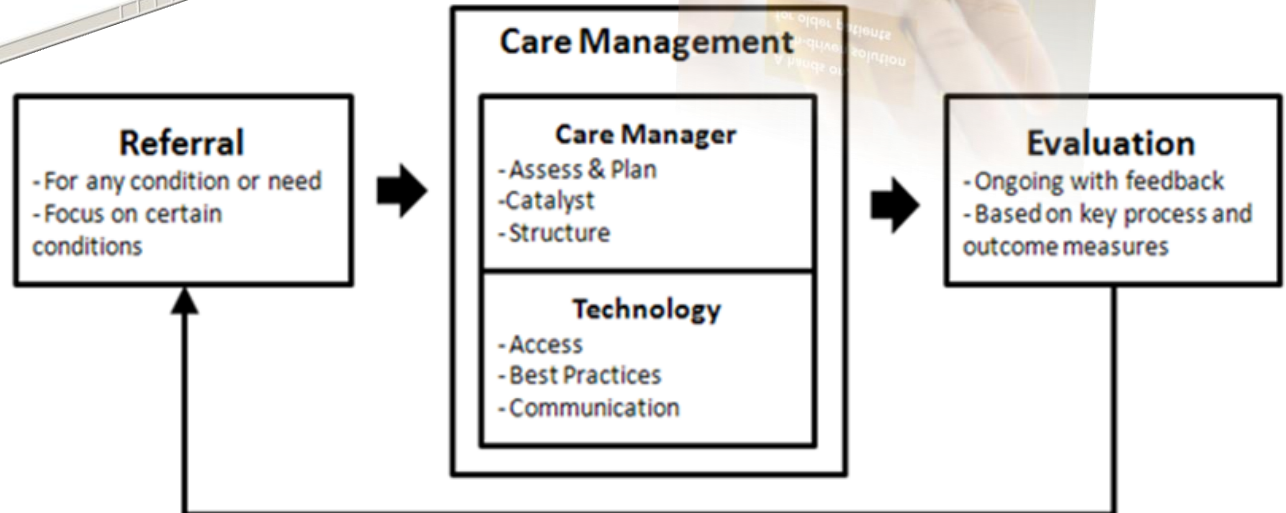
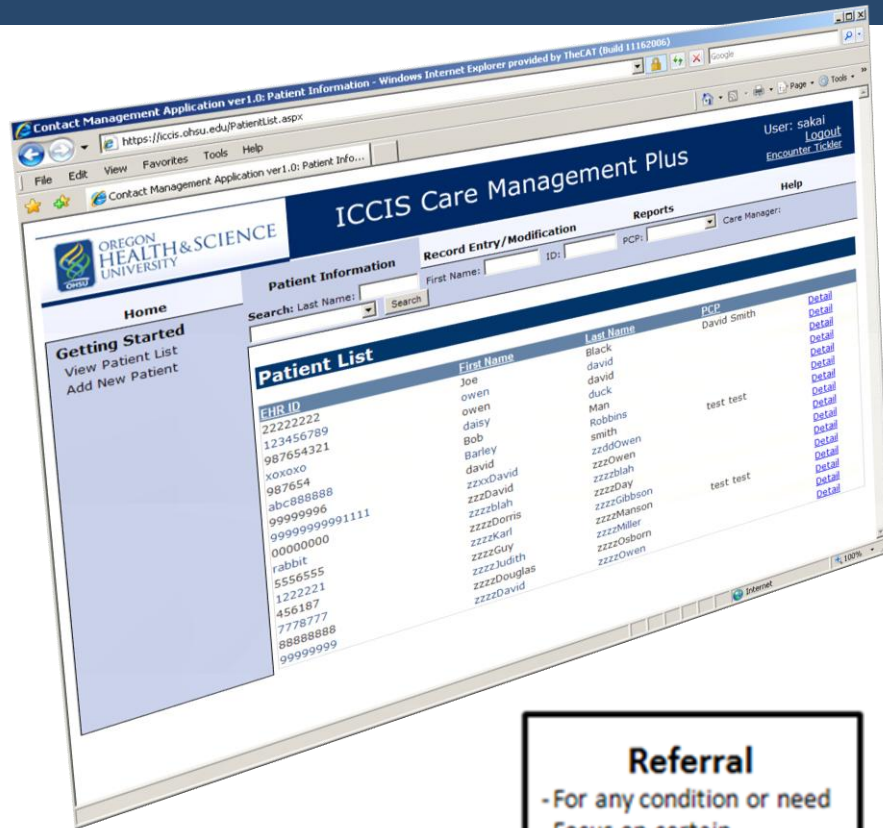
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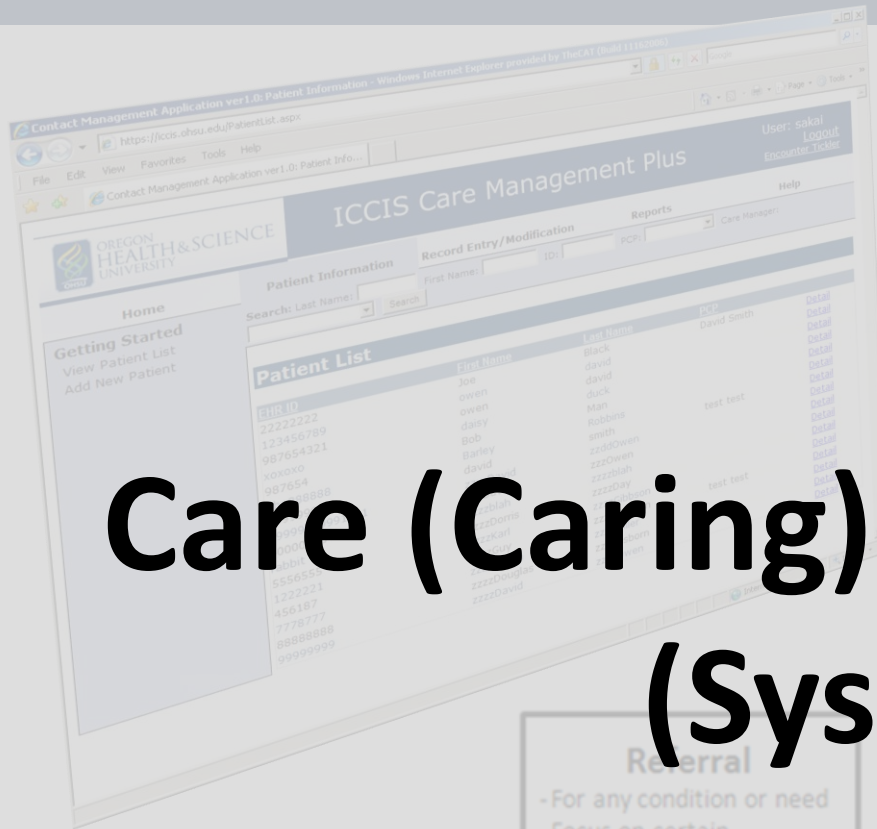
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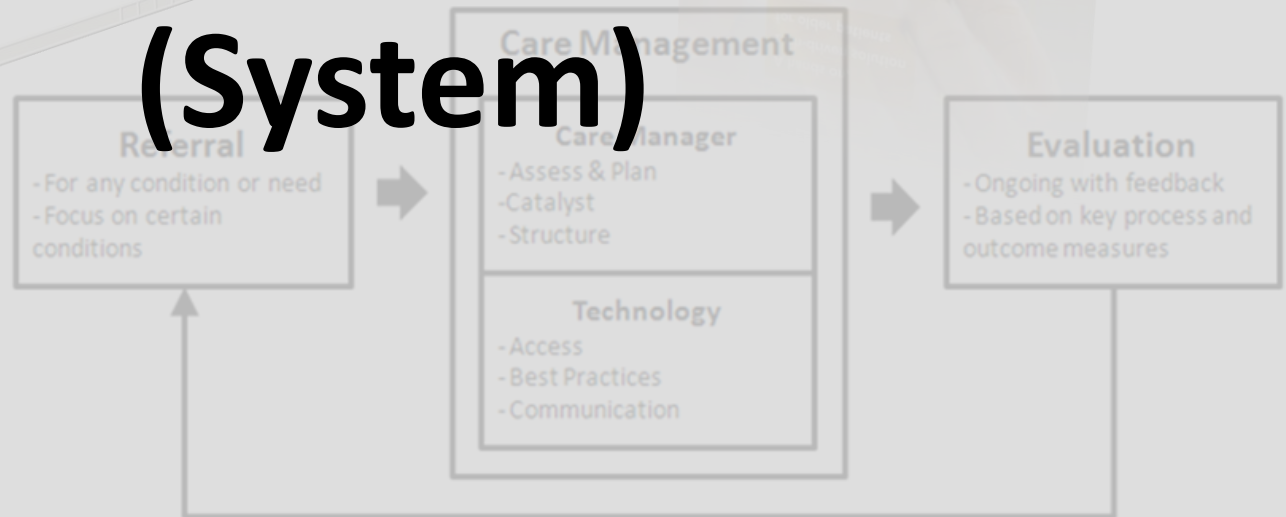
Care Management Plus Program



Care Management Plus Program



Care (Caring) management (System)



CMP Research Team



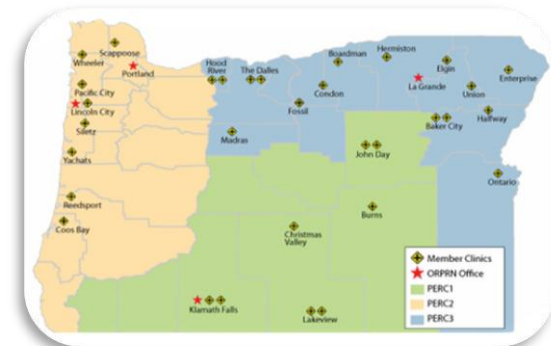
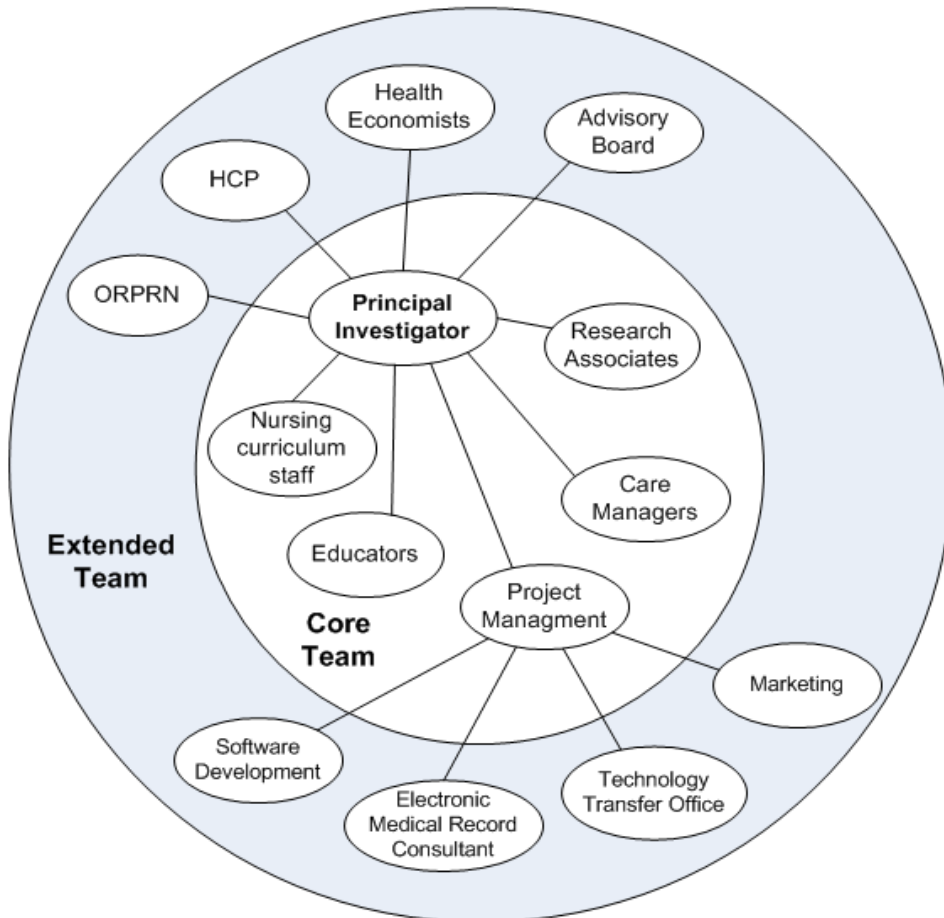
DEDICATED TO IMPROVING HEALTH CARE FOR OLDER AMERICANS

The John A. Hartford Foundation



Agency for Healthcare Research and Quality

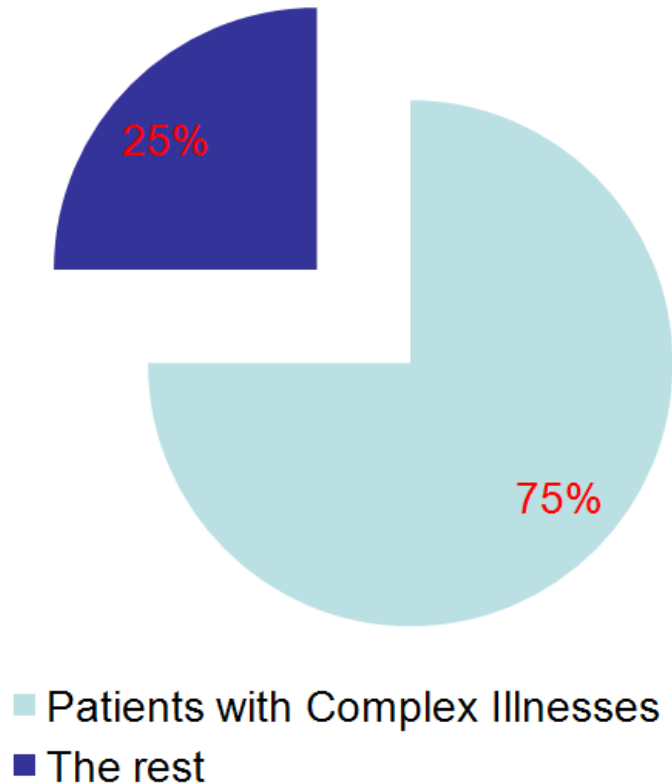
Advancing Excellence in Health Care www.ahrq.gov



Background

Significance of our National Health Crisis

US Healthcare Expenditure

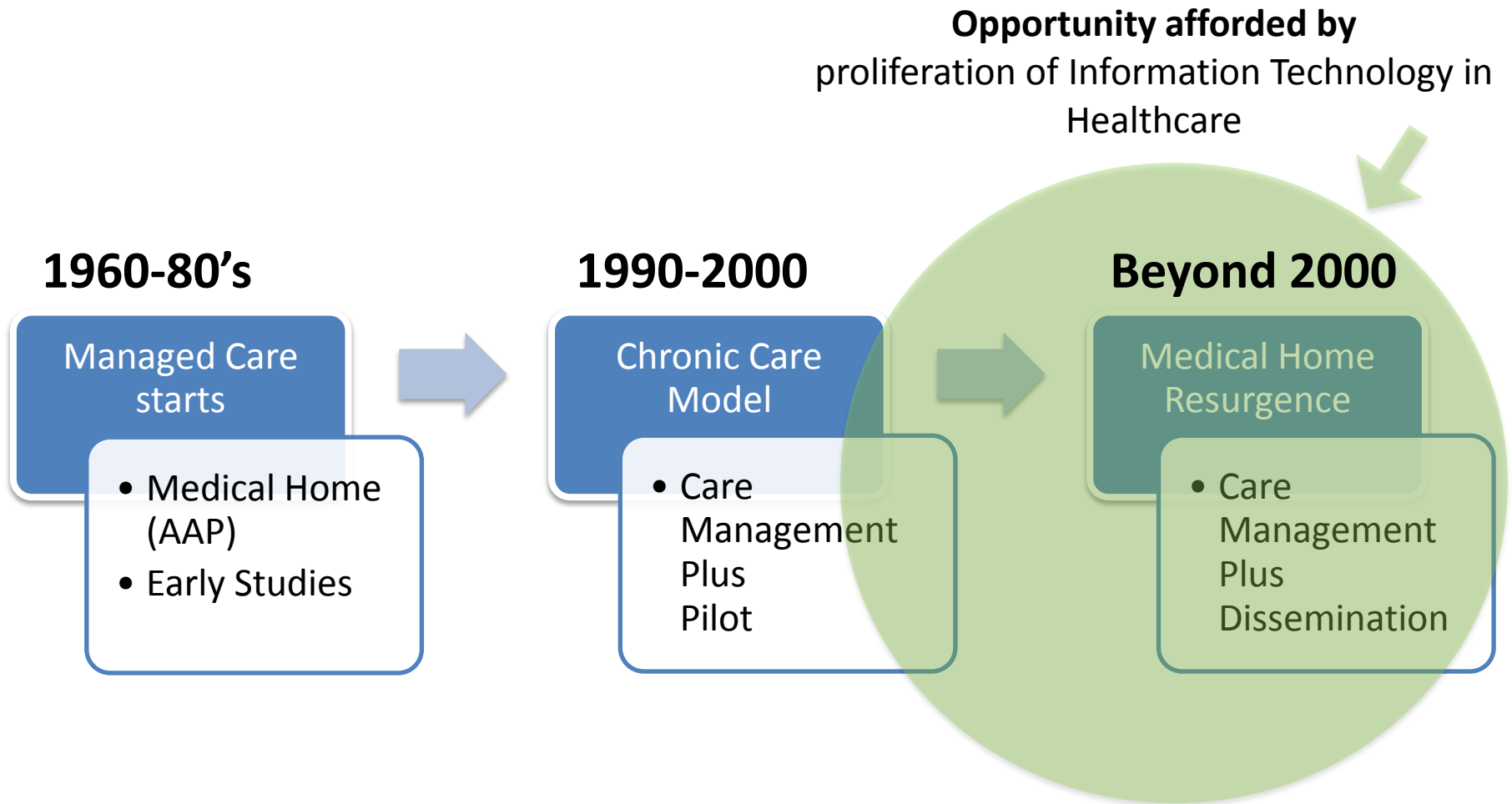


A person with complex illnesses on average:

- Can have 5 different diseases
- See a physician 14 times a year
- Fill up to 50 different prescriptions

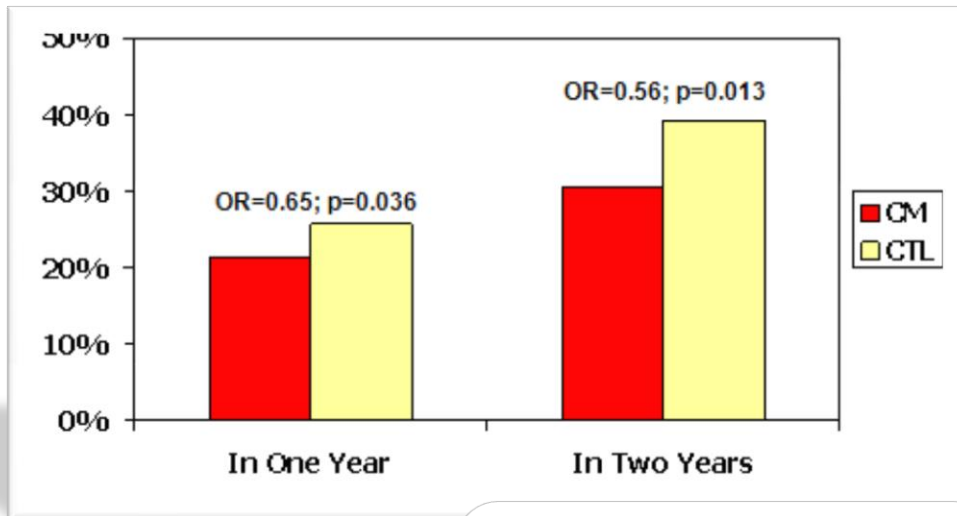


History of Care Management



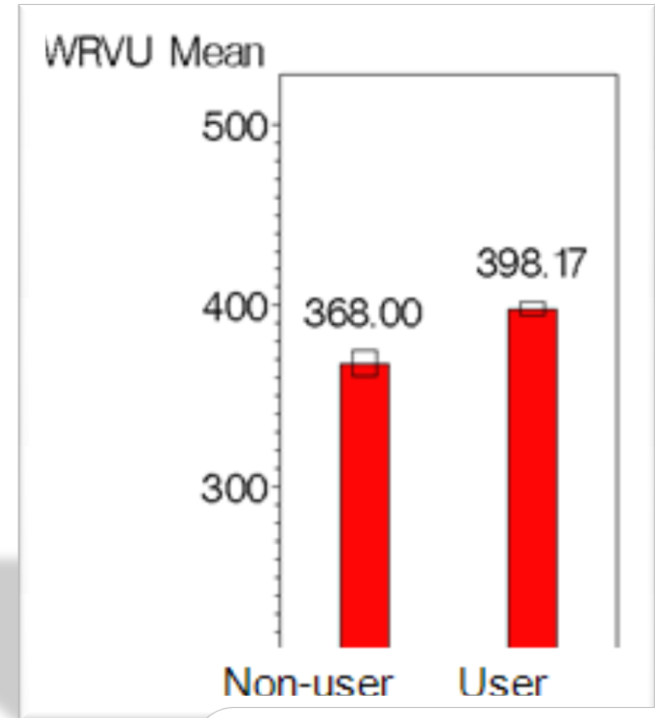
Return on Investment

* Dorr, AJMC, 2007



* Dorr, JAGS, Dec 2008

Reduction in
Hospitalization

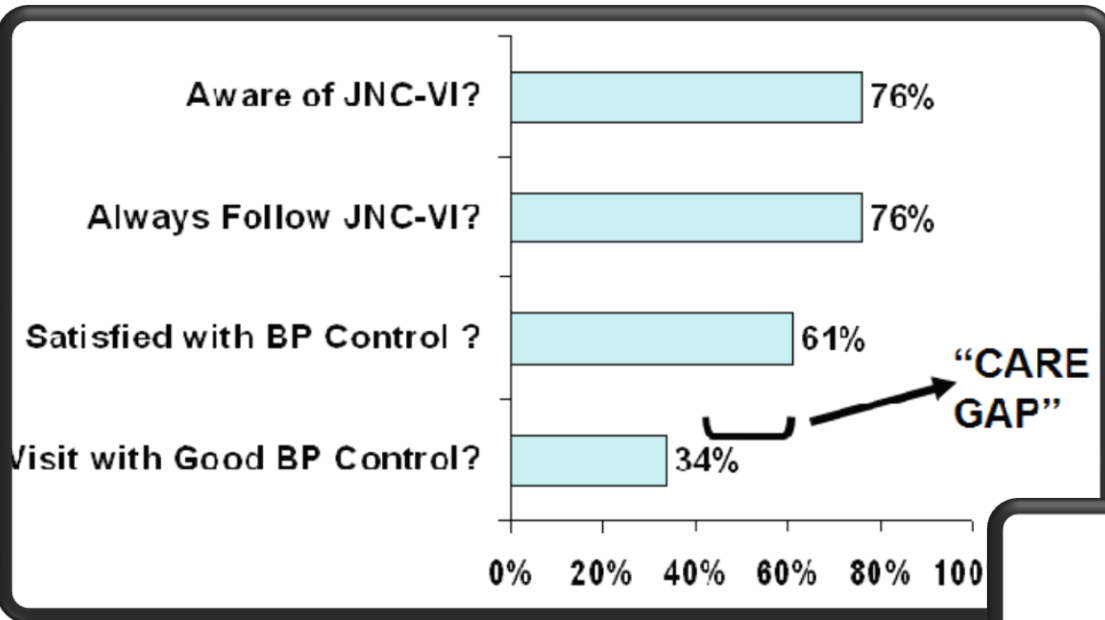


Increased
Productivity

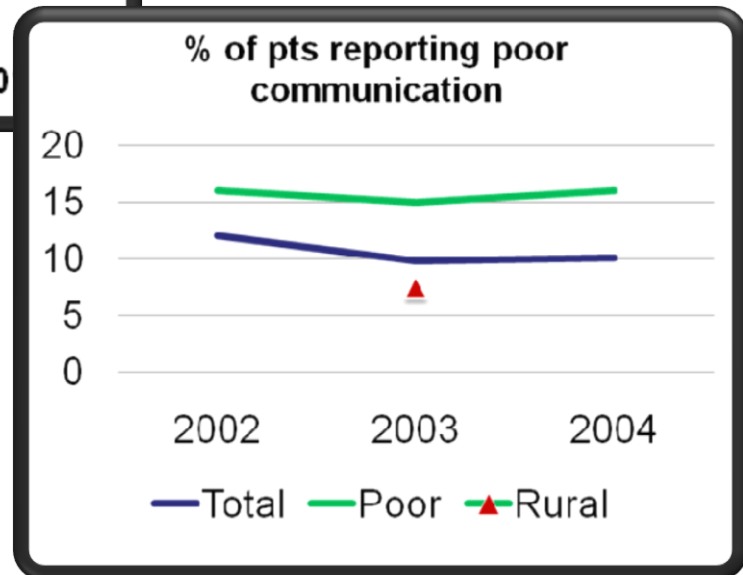
Developing a Next-Generation HIT Application

Market Drivers

Failure to consistently follow



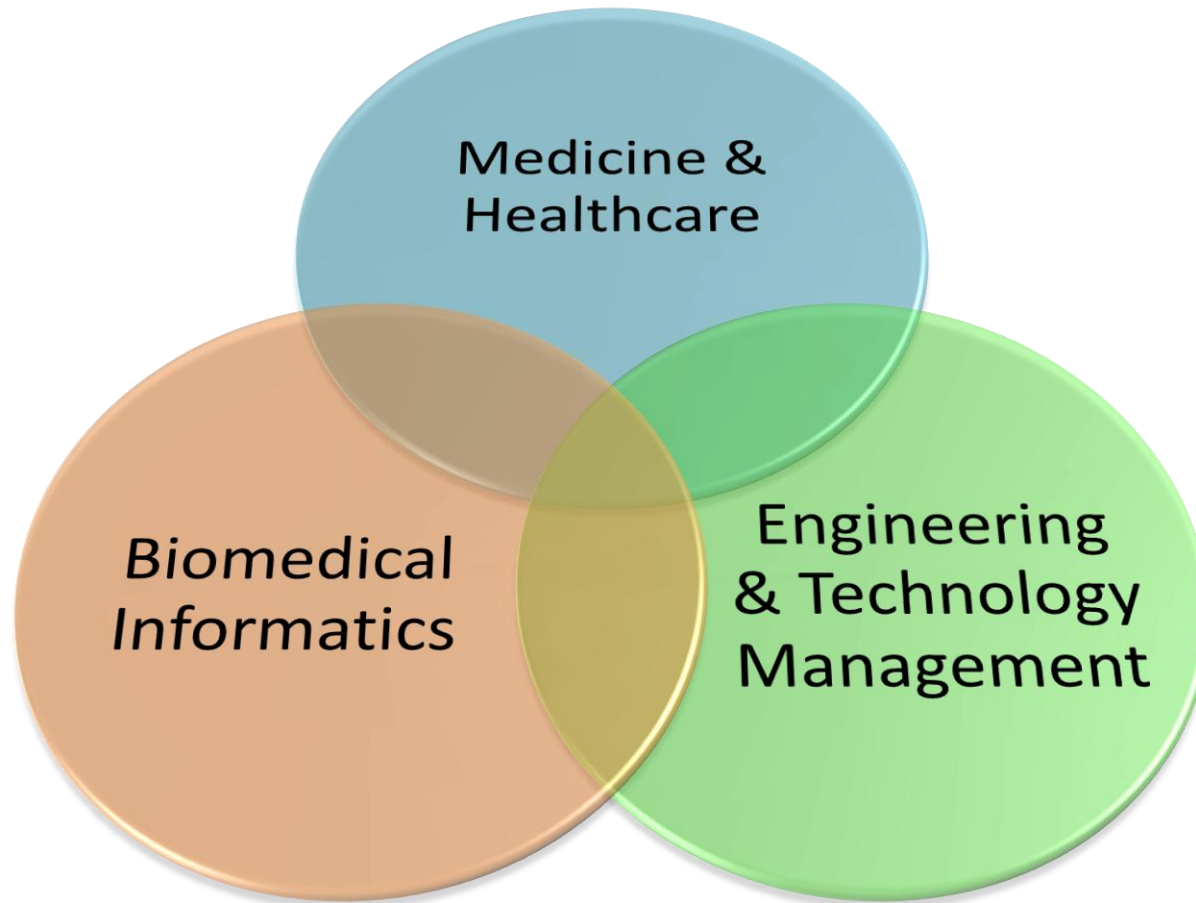
Failure to consider patient needs



Innovation Process Gap Analysis

- Understanding User Needs
- More effective New Product Development
- Innovation Dissemination Strategies
- Sustainable Business Models

Multidisciplinary Approach Needed



Applying Engineering & Technology Management Concepts

Engineering & Technology Management Practices Applied

- Technology Road Maps
- User-Centered Innovation
- System Dynamics
- Technology Transfer

Technology Road Maps (TRM)

Definition	A technology roadmap is a plan that matches short-term and long-term goals with specific technology solutions to help meet those goals. It is a plan that applies to a new product or process, or to an emerging technology.[1]
As Applied by OHSU Team	<ul style="list-style-type: none">• Used TRM to reach consensus about set of needs and technologies required to satisfy them.• Used TRM to forecast technology development in HIT.• Provided framework to help plan technology developments for older adults healthcare.
Lessons Learned	<ul style="list-style-type: none">• Managing eruption of available technology solutions through TRM is critical to team and product success.• TRM enables the team to continuously monitor trends (i.e. economic, policy, etc) and keep them in sync with evolving customer needs.• <i>Behkami N, Dorr DA. "Technology Road-mapping process with Feature- based Analysis and Cluster-based Grouping in Healthcare." INFORMS, Washington, DC. 2008.</i>

User-Centered Innovation

Definition	<p>In participatory design end-users (putative, potential or future) are invited to cooperate with researchers and developers during an innovation process. Potentially, they participate during several stages of an innovation process: they participate during the initial exploration and problem definition both to help define the problem and to focus ideas for solution, and during development, they help evaluate proposed solutions.</p>
As Applied by OHSU Team	<ul style="list-style-type: none">• End-users engaged during inception, development and training phases of product development.• Used Discussion Guides in a semi-structured interview format to collect customer needs (similar to rapid ethnography).• Used a user-centered formal process to extract important customer voices from interviews [1].
Lessons Learned	<ul style="list-style-type: none">• Engaging the customer often and early considerably reduce development costs in the long run.• Focusing on the customers voice alleviates “we already now what the customer needs” syndrome that leads many teams into developing sub-par products for their users.• <i>Behkami N, Dorr DA. “User centered design in complex healthcare workflows: the case of care coordination and care management redesign”, submitted for review AMIA2009 Conference</i>

[1] Rapid Innovation LLC, “Capture and Use the Voice of the Customer for Product Dev”
<http://www.rapidinnovation.com/index.php?/vmchk/Guides/Capture-and-Use-the-Voice-of-the-Customer-for-Product-Developmen/flypage.tpl.html>

System Dynamics

Definition

System dynamics is a powerful methodology and computer simulation modeling technique for framing, understanding, and discussing complex issues and problems. Originally developed in the 1950s to help corporate managers improve their understanding of industrial processes, system dynamics is currently being used throughout the public and private sector for policy analysis and design.[2]

As Applied by OHSU Team

- Applied to predict clinic worker productivity gains over time based on Health IT adoption.
- Forecast dissemination and adoption of care management HIT for older adults in the United States.
- Develop scenarios for diffusion of HIT in the care management domain.

Lessons Learned

- Models can get us closer to correctly predicting future behavior, but many parameters must be considered.
- Demonstrating results through simulation can be a strong factor in Users decision to adopt an innovation.
- The process of building system dynamics model helps the team to truly think about their internal team processes and achievements.
- *Behkami, Dorr, Daim " Modeling Healthcare Information Technology (HIT) Adoption using Systems Dynamics", 2009 CORS/INFORMS Conf, Toronto, CA*

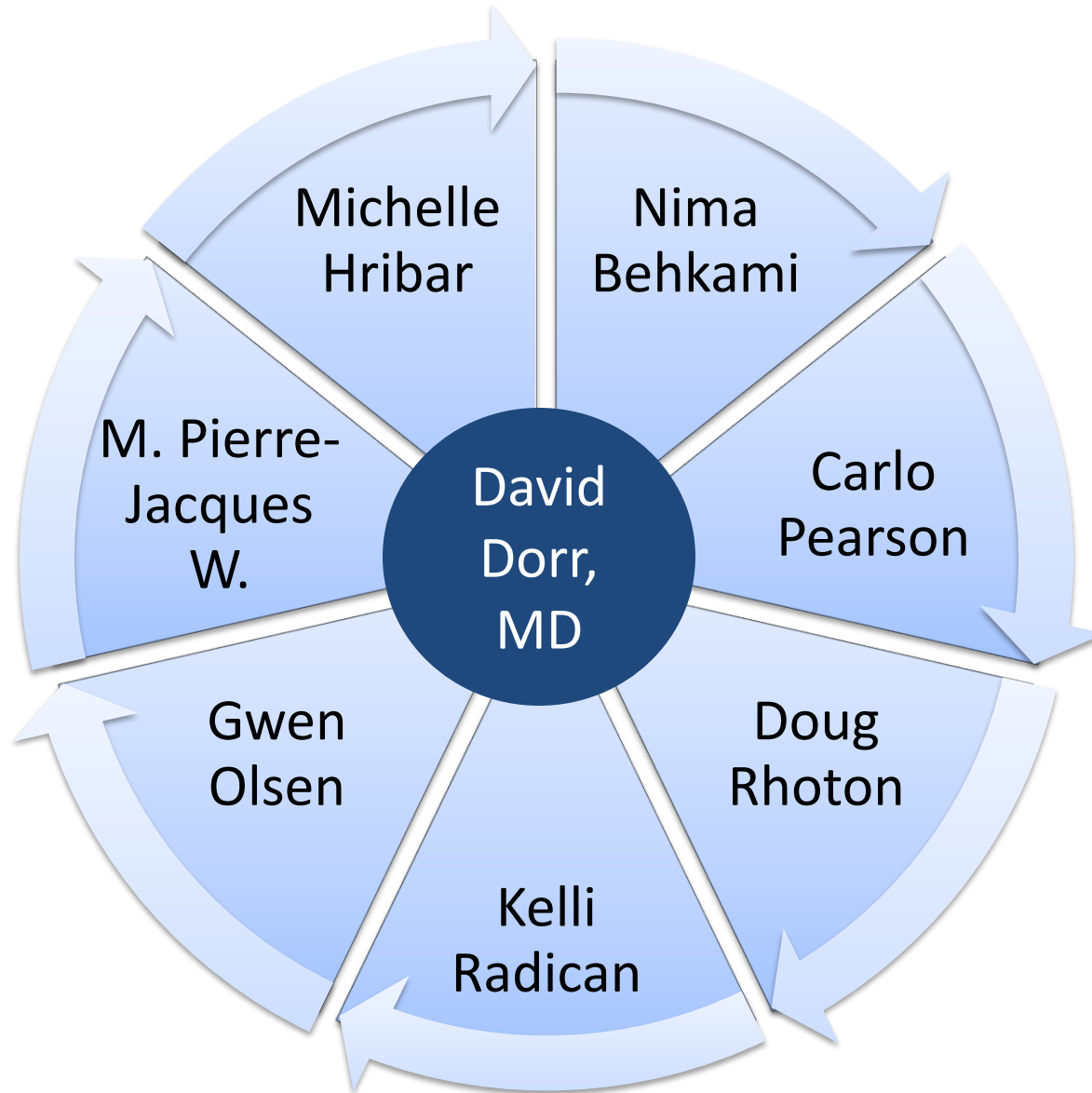
[1] Robert A. Taylor (2008). "Origin of System Dynamics: Jay W. Forrester and the History of System Dynamics". In: U.S. Department of Energy's Introduction to System Dynamics. Retrieved 23 Oktober 2008.

Technology Transfer

Definition	<p>Technology transfer is the process of sharing of skills, knowledge, technologies, methods of manufacturing, samples of manufacturing and facilities among governments and other institutions to ensure that scientific and technological developments are accessible to a wider range of users who can then further develop and exploit the technology into new products, processes, applications, materials or services.</p>
As Applied by OHSU Team	<ul style="list-style-type: none">• The HIT technology and model of care developed at OHSU is available for all interested parties for adoption or extension at no cost.• Product Development Alliances starting to form between OHSU and a handful of private entities.• Co-development resources and personal part of OHSU team.
Lessons Learned	<ul style="list-style-type: none">• Assistance from the universities “Technology Transfer Office” [1] helps facilitate the process.• While the fact that this innovation is disseminated at no cost is very attractive to users, OHSU must ensure to protect its intellectual property.• A process is needed to integrate new and appropriate modifications by the outside world back into the university research stream.

[1] <http://www.ohsu.edu/tech-transfer/>

The ICCIS Team @OHSU



Q/A

Care Management Plus

“Information Technology Tools for the Care of Seniors”

www.caremanagementplus.org

Oregon Health & Science University

“Dept of Medical Informatics”

www.ohsu.edu/dmice/

Portland State University

“Dept of Engineering & Technology Management”

www.etm.pdx.edu