

NASA 2007 Occupational Health Conference



NASA Sponsored EHR Project: Lessons Learned

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Why We Need to Know the Best Practices

- ✓ Computerization of patient health records in NASA is now a reality.
- ✓ With increasing fiscal restraint and a greater demand by all stakeholders for demonstrated value, it is important to ensure that EMR implementations are successful.
- ✓ Currently, failure rates of EMR implementations are consistently high at over 50% - *Source: Health information technology adoption in Massachusetts: costs and timeframe. Centre for Health Policy and Research [Online]. [Accessed Mar 13, 2006].*

Goals and Objectives

Goal

Learn the best practices in implementing an EHR Project

Objectives:

1. Learn the EHR implementation process and challenges
2. Learn EHR implementation strategies and avoid pitfalls
3. Share technology deployment model for integrated EHR system

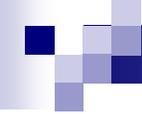


Presentation Outline

- Introduction
- Program Planning
- Implementation Process
- Lessons Learned
- Best Practices Shared
- Questions and Answers



Introduction

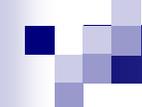


Who We Are

Congress created the National Technology Transfer Center in 1989 to...

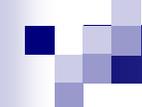
Track and monitor federal R&D activities in more than 700 laboratories and 100 universities.

Provide U.S. organizations access to technologies developed in US laboratories and assist them in finding technical solutions and new technologies at these same labs.



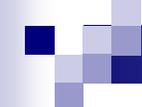
What We Do

- **Technology Evaluation and Market Assessment**
Determine possible markets and commercial potential for Government-funded technologies and Government uses for private-sector innovations
- **Partnership Development and Licensing Arrangements**
Target industrial partners, creating start-ups and building relationships with qualified companies, resulting in win-win licensing or cooperative research agreements
- **Computer Information Services**
Offer information technology support for knowledge management, learning and training products and services, web services, and application hosting
- **Strategic Technical Services**
Integrate solutions for collection, analysis, and distribution of information for government agency/public service needs



Who Are Our Clients

- National Aeronautics and Space Administration (NASA)
- Mine Safety and Health Administration (MSHA)
- Missile Defense Agency (MDA)
- National Institute for Occupational Safety and Health (NIOSH)



Congressional Directives

U.S. Congress has directed the *Robert C. Byrd* National Technology Transfer Center at Wheeling Jesuit University to transfer and adapt the Walter Reed Army Medical Center's HealthForces program into medically underserved rural areas.

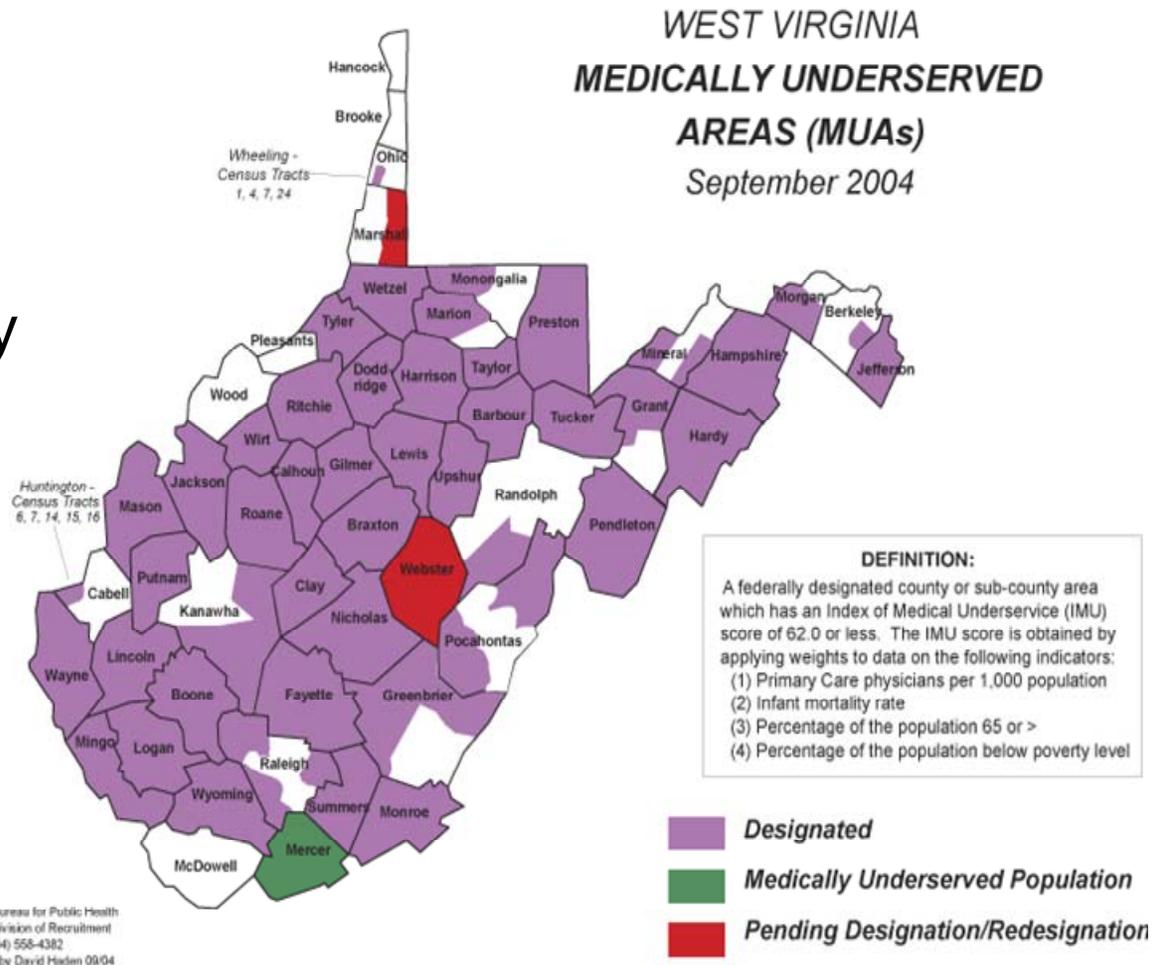
NASA Research Grant

- Grant No.: NNG05GR65G
- Research Entitle: HEALTHeSTATES
- Amount: \$992,000

The first outcome of the HEALTHeSTATES is HEALTHeWV, the pilot program of a planned national initiative.

Why West Virginia was adapted for the Congressional Program

- West Virginia is the second oldest rural state in the country.
- 85% of the 55 counties are federally designated as medically underserved areas.
- Named the program HEALTHeWV



What is HEALTHeWV?

- HEALTHeWV is an electronic health records-based disease management and health promotion program designed to improve health care quality, patient outcomes, and patient safety.
- It is a Web-based electronic medical records system built upon the Army's award-winning HEALTHeFORCES program which has been adapted for use in medically underserved, rural communities in West Virginia.

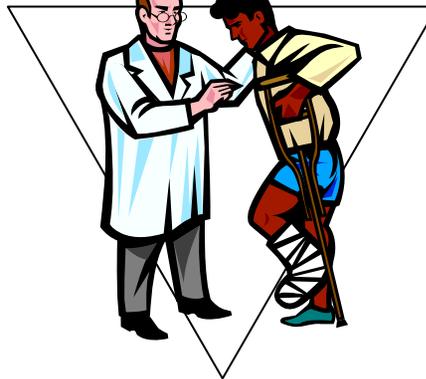
HEALTHeWV Core Modules

eSURVEYS

Patient Input
Electronic Access
Hard Copy Output

eCARDS

Clinical Practice Guidelines
Provider Communication
Patient Education



eNOTES

Better Documentation
Better Provider Communication
Improved Coding Accuracy
Better Patient Care

Program Benefits

- Provides care based on best available scientific knowledge
- Redesigns healthcare processes based on best practices
- Customizes care based on patient needs and preferences
- Coaches and encourages patient involvement in healthcare decisions
- Uses information technologies to improve access to clinical information, support clinical-decision making, and measures performance, quality and outcomes.

HEALTHeWV Partners

- **National Technology Transfer Center**

- EHR implementation, technology deployment, and data hosting

- **Air Force Surgeon General**

- Software customization, upgrades, patches

- **Marshall University School of Medicine**

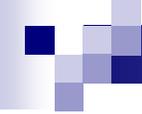
- Clinical consultants

- Beta testing and evaluation

HEALTHeWV Sponsors

- HEALTHeWV is a congressionally sponsored program funded through:
 - National Aeronautics and Space Administration (NASA)
 - Department of Defense



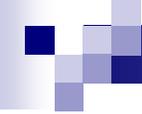


Program Objectives

Meet the congressional directives to improve the health of rural communities by linking national advancements with local expertise to meet community health care needs.

Program Deliverables

- Modify the core Army EHR system to accommodate the civilian health sector
- Design, develop, and implement EHR in five pilot clinic sites
- Share the best practices



Who We Serve

- Federally Qualified Health Centers (FQHC)
- Free Clinics or Health Rights
- School-Based Health Centers

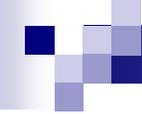
What We Offer

- Not just a technology, but a program for health improvement
- Affordable, full-featured electronic health records system that maintains and creates electronic patient records and improves provider-patient communications
- Enhance ability of West Virginia rural health care providers to deliver improved care at lower costs with better results.
- Rapid access to the latest in evidence-based medicine guidelines
- Enhanced care for those suffering from chronic disease conditions such as: diabetes, cancer, asthma, heart and lung disease
- Increased patient safety by reducing medical error and redundancy and increasing legibility and clinical alerts



Program Planning

Failing to plan is planning to fail!



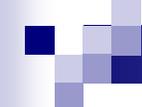
Governance

The HEALTHeWV program was started with the formation of a “Clinical Advisory Group” (steering committee) consisting of physicians, healthcare executives, and public health officials to guide the development.



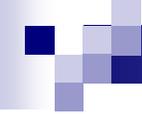
Clinical Advisory Group Purpose

- Advise the development of HEALTHeWV software application.
- Ensure the HEALTHeWV Program is patient-centric, population-based and meets the needs of health care practitioners.
- Advise program officials on clinical issues that may arise in the program implementation phase.
- Provide expertise in enhancing the application with additional disease modules and features.
- Assist in setting priorities for the development of new features and participate in acceptance-testing prior to new version releases.



Clinical Advisory Group Task Groups

- Business Development Group – This group is responsible for marketing, promotion, and self-supportive.
- Application Enhancements Group – This group is responsible for guiding the software application development.
- Outcomes Research Group – This group is responsible for guiding the health outcomes – program success measurements.



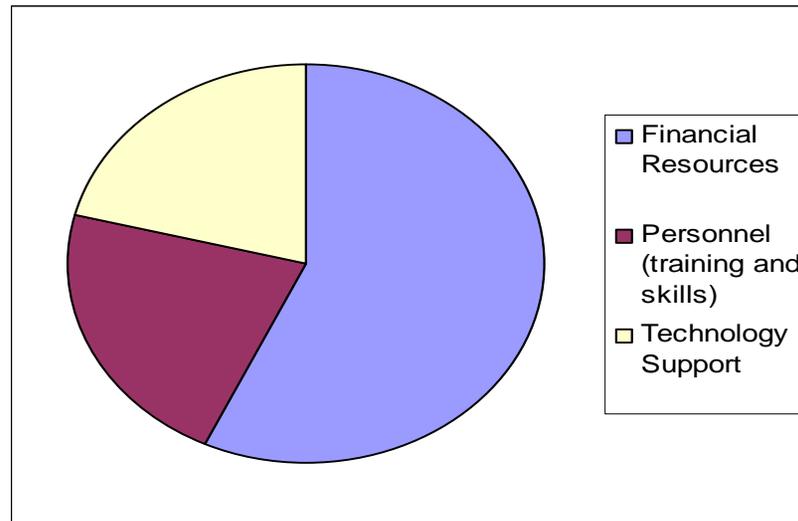
Assessed Needs– Rural Health

- Geographic isolation.
- Transportation barriers
- Shortages of financial, human, and capital resources
- High incidence of chronic diseases
- Scarcity of local medical resources
- Access to specialty care

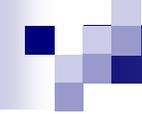
Identified Challenges – Obstacles to EHR Adoption

Personnel
(training/skill)
22%

Financial Resources
57% (Hardware and
Software)



Technology Support
21% (IT staff)



Explored Options

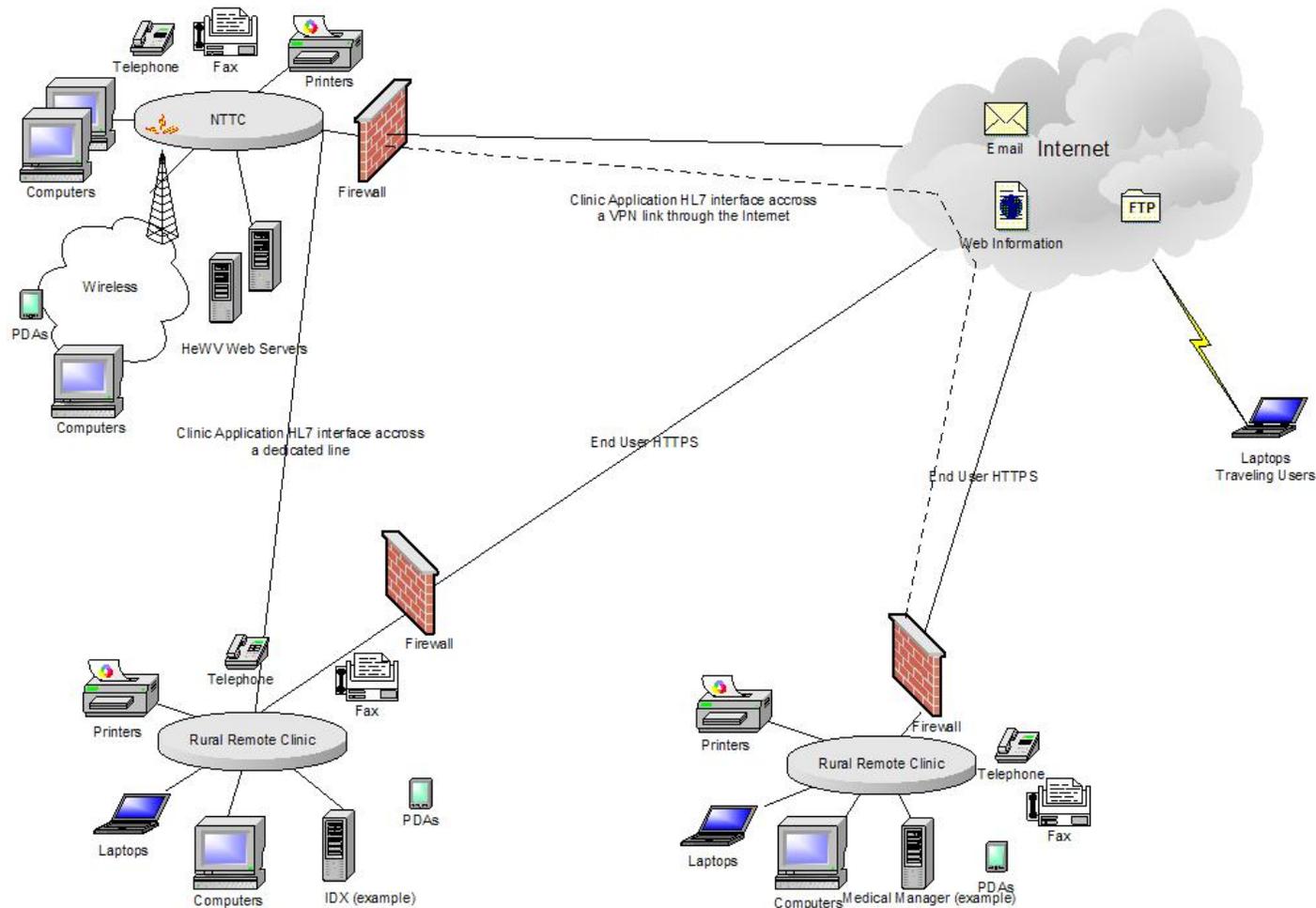
Technology Deployment Models

- Traditional Client-Server Model
- Application Service Provider (ASP) Model

Adopted – ASP Solution

- The Application Service Provider (ASP) model is a new approach to using the Internet to deliver applications.
- This allows clients to utilize powerful applications that historically were only available as client-server applications that required significant maintenance and expertise to get up and running.
- Application service providers (ASP) host, manage, and deliver applications to multiple entities (users) from a remote data center across a wide area network.
- With this model another organization assumes full responsibility for supporting the application and related hardware relieving the physician offices of IT maintenance and IT support.
- This model helped overcome the barriers of cost and technology support faced by West Virginia physicians' offices in adopting Electronic Medical Records.

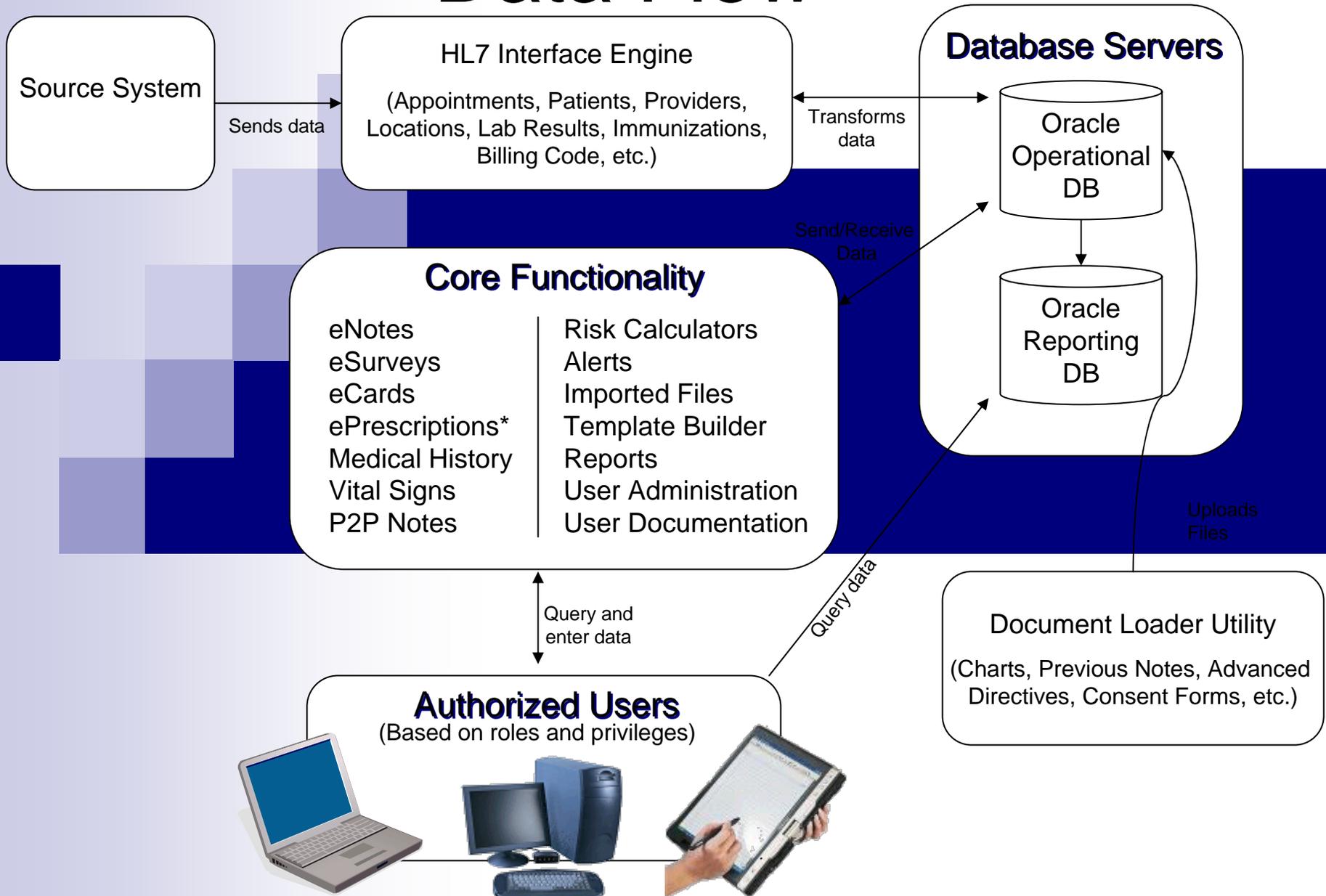
Technology Architecture



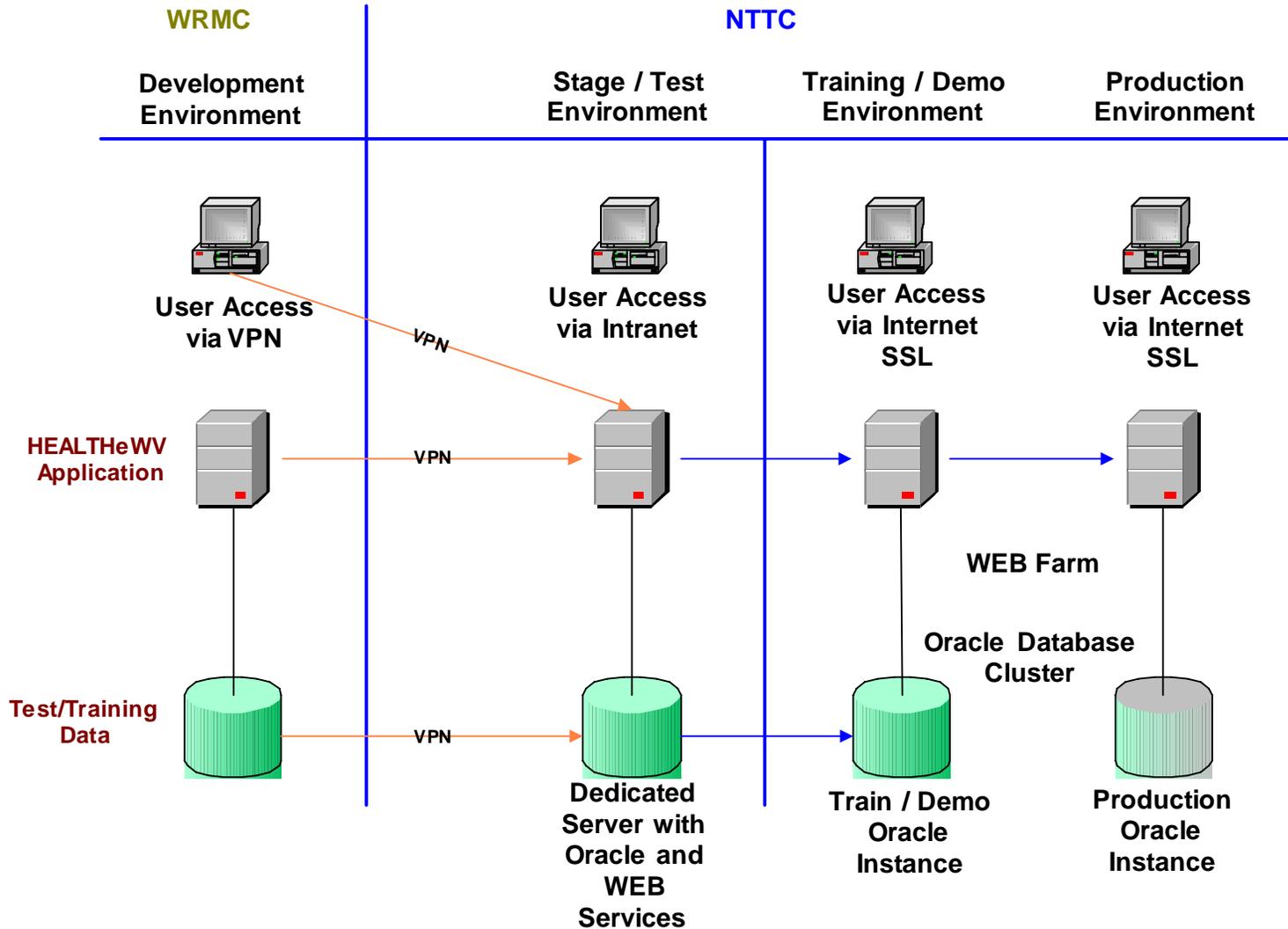
Data Model

- HeWV utilizes Oracle 9 Enterprise Edition as the back end database for the centralized storage of data.
- HeWV utilizes clustered database servers and software which provides a real time, automatic switch to a second server in case of hardware or software problems.
- HeWV utilizes Virtual Private Databases (VPD) that allow multiple clinics to use the system and store their data in this single Oracle instance, without having to worry about other clinics seeing their patient information.
- Cross section or summary reports can be generated by pulling statistical data from all the VPD's (de-identified).
- ❖ **Summary: Oracle is a high scalable database allowing for the easy addition of multiple new clinics without concern for data or database restructuring.**

Data Flow

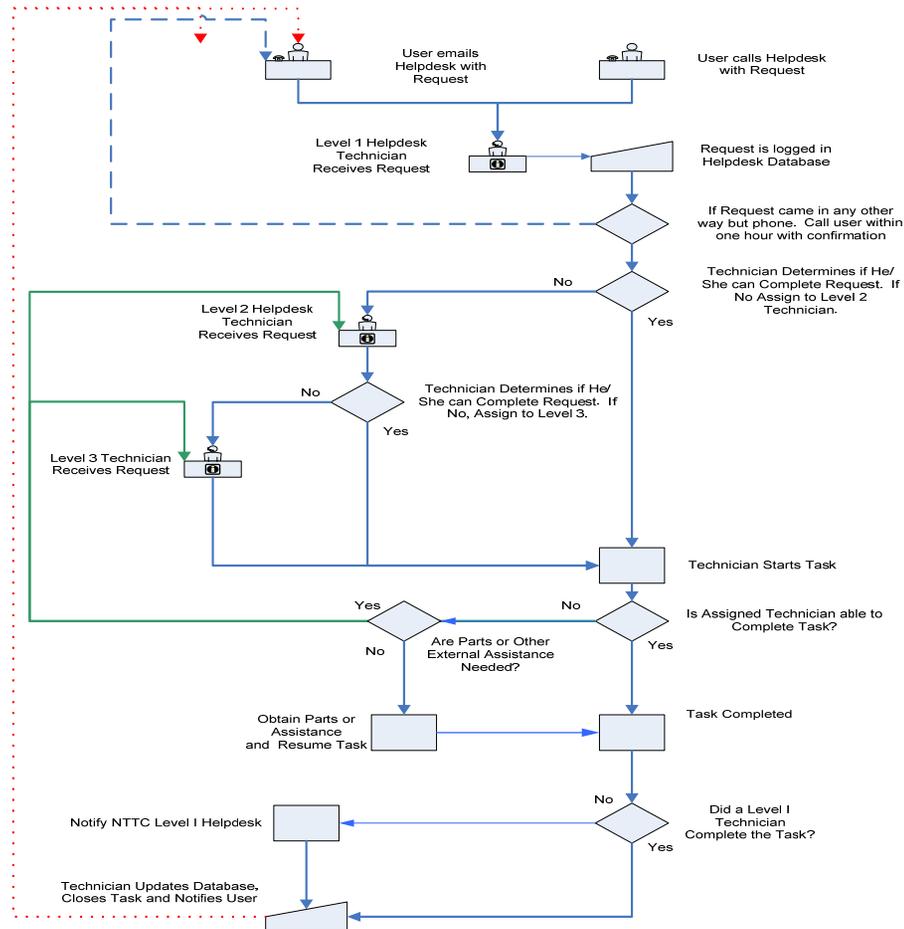


Operations Model



Helpdesk Process Flow

HeWV Helpdesk Process Flow



HeWV Interoperability Standards

1. HL7 – Messaging Standard for Patient Care Delivery Coordination
2. HL7 – Vocabulary Standard for Demographic Information
3. HL7 – Vocabulary Standard for Units of Measure
4. HL7 – Vocabulary Standard for Immunisations
5. HL7 – Vocabulary Standard for Clinical Encounters
6. HL7 CDA – Document Standard for Text-based Reports
7. NCPDP – Messaging Standard for Drug Ordering
8. LOINC – Vocabulary Standards for Laboratory Result Names
9. LOINC – Vocabulary Standards for Laboratory Result Names
10. SNOMED CT - Vocabulary Standards for Laboratory Result Contents
11. SNOMED CT - Vocabulary Standards for Anatomy
12. SNOMED CT - Vocabulary Standards for Diagnosis
13. SNOMED CT - Vocabulary Standards for Nursing
14. HIPAA – Messaging/Vocabulary Standard for Billing and Administration
15. RxNORM/NDF-RT – Vocabulary Standards for Clinical Drug Description & Drug Classification

Test at Beta Site – Marshall University School of Medicine

➤ **Clinical evaluation**

- Clinical workflow assessment
- Software transparency, reliability, and simplicity
- Efficiency and response time
- Report formatting, and layout

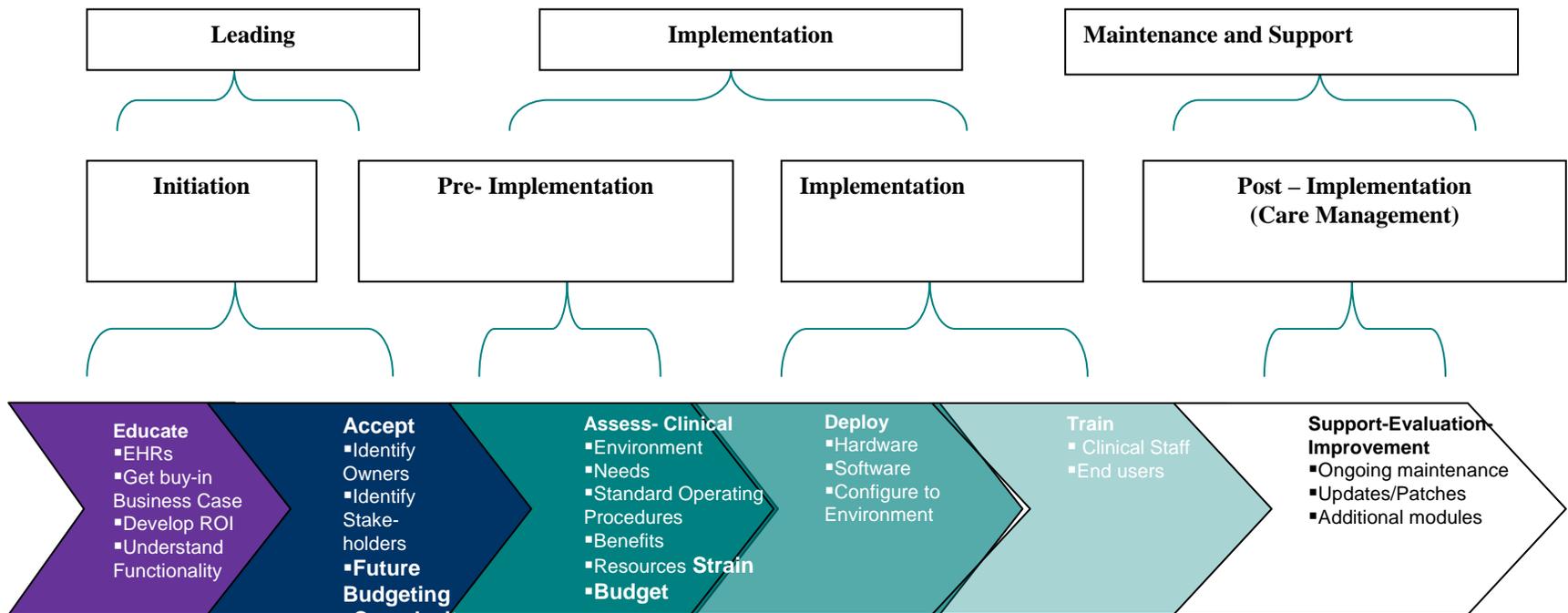
➤ **Technical evaluation**

- Loading, configuring, evaluating, and testing the beta software
- Test interfaces between the host billing and administrative systems and HeWV
- Test connectivity, network performance, and security controls.



Implementation Process

Implementation Process



Initiation

- Educate the clinic on the program and its benefits and get their acceptance
 - Educate the clinic on HEALTHeWV HER
 - Identify stakeholders and get buy-in
 - Identify Subject Matter Experts in each area considered
 - Understand the clinic environment (high level only)
 - Description of organization/Services provided/Legacy Systems in place
 - Develop Business Case that includes preliminary scope requirements

Pre-implementation – Assessment Phase

➤ **Organizational Readiness**

- ❖ Technical (IT infrastructure)
- ❖ Operational (Clinical operations)
- ❖ Leadership (Management)
- ❖ Cultural

Pre-implementation

➤ Planning

- ❖ Develop a project charter (scope/goals/objectives/priorities)
- ❖ Create communication plan
- ❖ Workflow redesign (patient flow/point-of-care documentation)
- ❖ Create roll-out plan (incremental/big-bang)
- ❖ Develop migration path (clear direction moving from paper to paperless)

Pre-implementation

- Establish a Budget
 - ❖ Hardware/Software
 - ❖ Services
 - ❖ Maintenance

- Create Project Team
 - ❖ Clinical Leadership
 - ❖ Executive Leadership

Implementation

➤ **Fitting the System to the Practice**

- Workflow review
- Template building
- Interface specifications
- Hardware installation and testing
- System configuration
- Test infrastructure connectivity

➤ **Training the Practice on the System**

- Create training documentation
- Create training schedule
- Deliver training

Implementation

➤ **Go-Live**

- Rollout the system to site(s)
- Shadow staff operations
- Debrief, trouble-shoot and fine tune
- Transition to support
- Implementation evaluation (lessons learned)

Post-Implementation (Care Management)

- **Evaluation** – assess the production of electronic clinical information (ECI) and conduct post-live review of:
 - Practice goals being met
 - Training needs
 - Workflow
 - Data capture
 - Reports

- **Improvement** – assess the use of electronic clinical information and assist the practices to:
 - Track patients' follow-up activities, compliance and progress
 - Track patient health maintenance
 - Support patient self management
 - Increase patient education with online tools
 - Improve continuity of care and timeliness of diagnosis and treatment

Implementation Issues

- Lack of technology infrastructure
- Lack of physical infrastructure
- Application slowness: application is utilizing too much bandwidth.
- Project structure and accountability
- Cultural change – slow to adopt the change in the work flow process
- Personnel training and skills
- Customization – every clinic is unique and one system does not fit all



Lessons Learned

Project Management

- Organizational commitment
- Empower project leaders
- Identify physician champion
- Adapt multi-disciplinary approach
- Manage change and expectations
- Assess clinic readiness
- Organizational policies should reinforce the behavior

System Deployment and Roll-Out

- Roll-out Strategy Needs to be Individually Designed
- Making Physicians, Nurses and Other Healthcare Professionals Members of IT team is Essential to System Deployment and Roll-out
- Design, Implementation and Support of Infrastructure Matters
- Pilot and Improve, Deploy and Improve
- Use Feedback from End Users to Improve System

System Deployment and Roll-out Con't.

- Phased Implementation was very effective
- Application Service Provider model worked well for small practices
- Post-Implementation is critical

Software Application

- Transparency, reliability, and simplicity are important
- Efficiency and Quick Response Time – a Prerequisite
- Report formatting, layout, and content important for efficiency and effectiveness
- Designation of a Team for Application Enhancement
Improved Software Efficiency
- Reporting Database Separate from Transactional Database Enhances Organizational Performance
- End Users Determine the Success or Failure of Content

Training - Critical

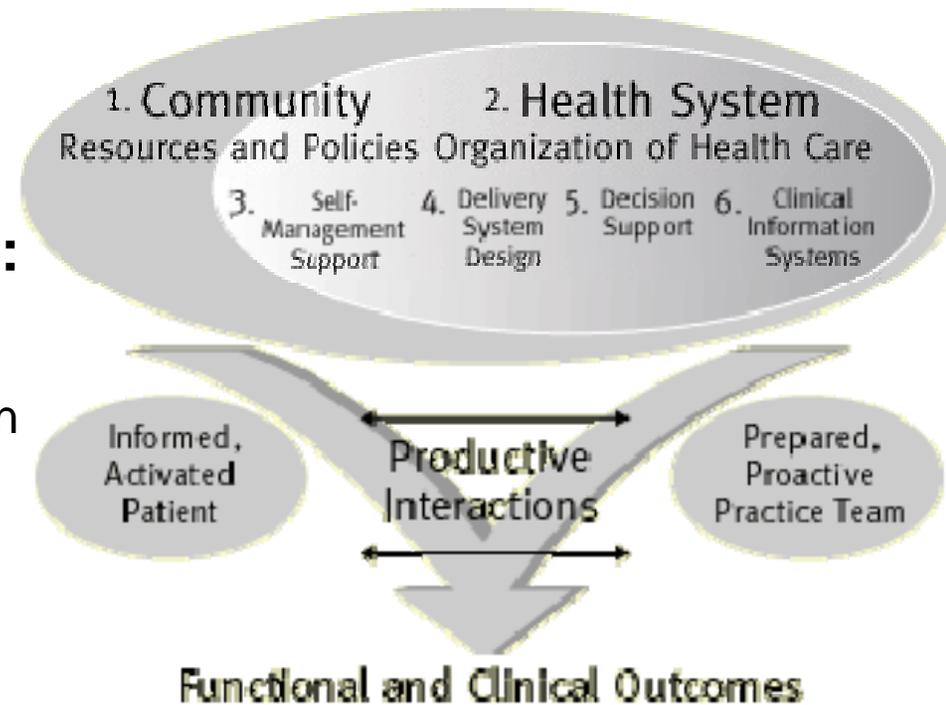
- Train As Necessary
- Role Based Training Has Proven To Be Very Effective
- Train Systems Administrators/Super Users First
- Develop and Implement a Train-the-Trainer Program for Clinic Staff
- Explore Distance Learning Technologies and Asynchronous Delivery Methods for On-going Training
- Use your Users as Beta-Testers

Best Practices Shared with Community

- Chronic Disease Quality of Care Initiative (Disease data sharing HeWV/CDEMS)
- E-Health Access (HeWV/Individual Practice Association (IPA) partnership)

The Chronic Disease Electronic Management System (CDEMS)

- CDEMS Developed by the Washington State DPCP. Modified by OHSR
- **Addressing the Care Model:**
 - Progress Note compiles info.
 - Clinic-wide summary reports on health outcomes and progress in meeting quality improvement goals
 - Lists of patients overdue for a visit, lab, other specialty service
 - Reminders letters for overdue visits, labs, services
 - Recommended guidelines / graphs used in patient education
 - Facilitation of individual patient care planning



CDEMS Partners

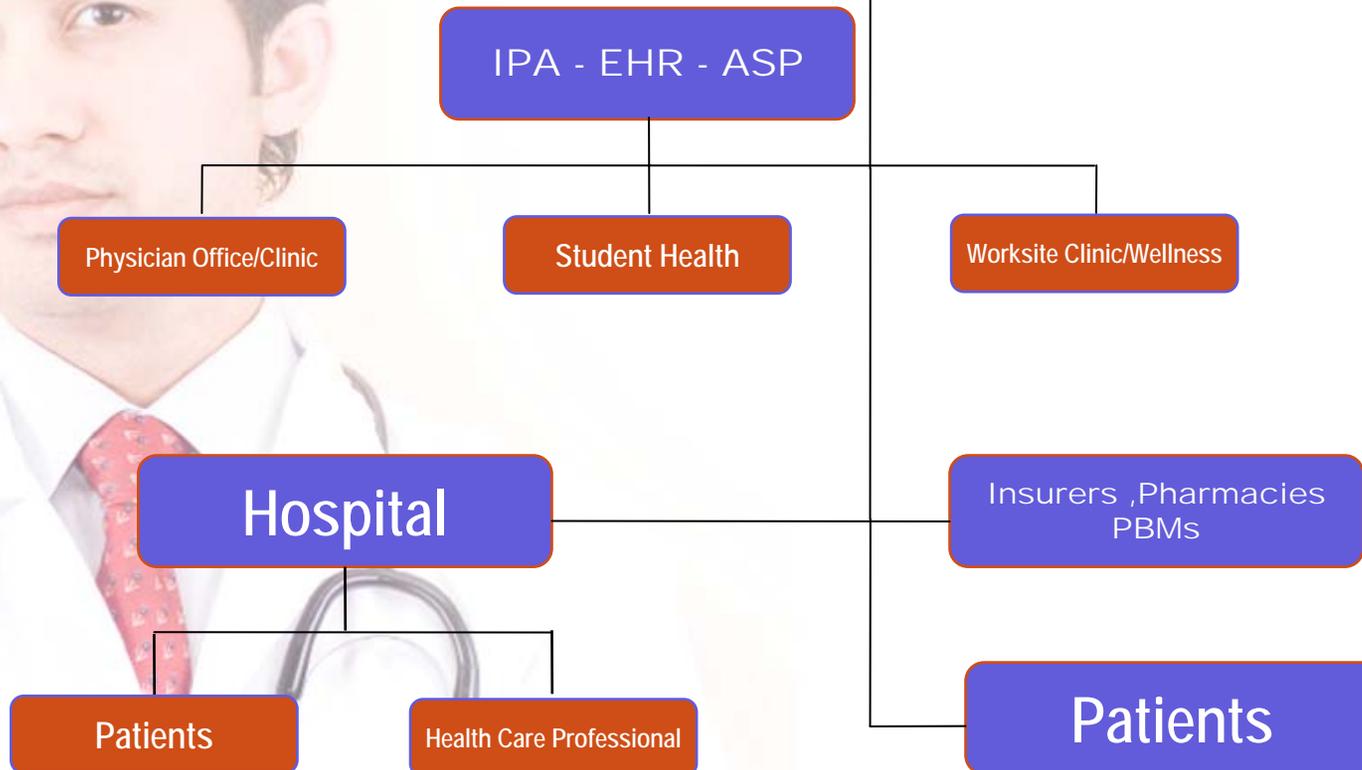
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E-Health Access of The Upper Ohio Valley

Connecting Patients, Professionals and Institutions for Better Health Care

E-Health Access



E-Health Access Partners

The Upper Ohio Valley IPA

MISYS



Robert C. Byrd
National Technology Transfer Center
at Wheeling Jesuit University

Summary

- Factors for EHR Implementation
 - ✓ Clear Project Goals
 - ✓ Organizational Commitment
 - ✓ Physician Leadership

Summary

- Critical Factors for EHR Adoption
 - ✓ Change Management

What really makes an EHR implementation Successful?

It is a process rather than technology.

Moving from Paper to an Electronic Health Records is all about change



The really hard and painful work is organizational process change.



That's where the benefits really come from. And it's difficult and takes time.



“We must become the change we want to see”

Mahatma Gandhi



Questions & Answers