An Information System for Health Care Quality Measures

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SELP 695 Integrative Project
Advisor: Dr. Frederick Brown
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Agenda

- Executive Summary & Background
- Problem Statement
- Lean Analysis
- Project Management
- Stakeholder Identification
- Stakeholder Needs Identification
- Stakeholder Requirements Definition Process
- Requirements Analysis Process
- Risk Management
- Ethical Considerations for the System
- Alternative Solutions
- Architectural Design Process
- Prototype Demonstration
- Verification & Validation
- Conclusion & Lessons Learned
- Next Steps
Executive Summary

A health care quality measure information system was designed and prototyped to solve a customer need.

Information Systems:
- Support business processes and operations.
- Ensure the quality of work & make work efficient.
- Help management tackle issues.

The system can recommend, via automatically generated reports, health care quality measures specific to different categories of medical care (Ex. Cardiology, Orthopedics).
The Affordable Care Act provided a significant push toward value-based medical care[1].

- See More Patients
- Order More Tests
- Do More Procedures
- Underlying Causes Ignored

- Quality / Cost
- Appropriate & Effective
- Enduring Results
- Reasonable Cost
- Informed Patient Choices
- Focus on Prevention
Background

Why is value-based care necessary?

- U.S. health expenditures exceed $3.0 trillion [2]
- This is approximately 17.5% of the gross domestic product [2]
- U.S. Health Care is the most expensive of the top 11 wealthiest nations [3]
- The U.S. ranks behind in many measures (outcomes, quality of care, efficiency) [3]
- Troublesome for Medicare and Medicaid (36% of total national health care expenditures) [4]
- The government will fund 47% of all national health care spending by 2024 [5]
**Background**

**Value-Based Program Examples**

- **HVBP**: Provides hospital incentives for quality of care to Medicare patients[6].

- **HRR**: Provides incentives for reducing unnecessary and costly readmissions[7].

- **HACRP**: Reduces pay to hospitals for lapses in patient safety[8].

- **VM/PVBM**: Provides a differential payment to physicians based on the value of care provided[9].

- **PAMA**: Provides incentive payments for the quality of care given to Medicare patients[10,11].

- **MACRA**: Moves 50% of Medicare payments into the value-based model[12,13].
Background

What are quality measures?
Agreed-upon criteria by which to measure the achievement of health care.

Why do we need measures?

- Value can be interpreted differently among various stakeholders.

- Value-based care can’t be monitored or improved without data, thus the need for quality indicators.
Quality Measures Utilized

ACO (Accountable Care Organization)
Determine an ACO’s right to participate in shared savings.

CMS (Center for Medicare/Medicaid)
A core set of Medicare measures.

Five Star
Compares nursing home quality.

HEDIS
Utilized by 90% of health plans.

Hospital Compare
Informs patients about the quality and performance of hospitals.

Physician Compare
Focuses on the quality of care provided by Medicare physicians.
The complexity of modern medicine exceeds the inherent limitations of the unaided human mind.” – David Eddy

The overall process of selecting quality measures and generating recommendations (reports) is labor intensive, costly, and error prone.

- Quality measures are stored on 13 government and non-profit web pages.
- Data is archived in various different formats: web, printed paper, and Excel sheets.
- It takes 1.5 hours to identify a single measure.
- It takes >1.5 hours to compile a set of measures into a report.

**Top Level Requirement:**
The system shall reduce the cost and improve the quality of the health care quality measure selection and report generation processes.
Lean Analysis: Waste

- Work funnels through one critical person. Customers and associates wait.

- Individuals need to move from office to office to search for data.

- New measures are emailed, perpetuating over-dissemination or data pushing.

- Printed papers cover desk space.

- Typed data has transfer errors due to illegible handwriting.
Lean Analysis: VSM

Current Value Stream

Customer Needs are Assessed → Information Relayed to Consulting Physician → Search for Metrics → Selected Metrics are Compiled into a Report → Discussion of Returned Information

Process Time (Business Hrs)
(x)
Waiting (Business Hrs)
[x]
Number of People
(x)

Future Value Stream

System Empowers Users to Generate Own Report → Metrics Automatically Found & Compiled → Self Education on the Pull Principle

(x)
## Lean Analysis: Results

<table>
<thead>
<tr>
<th>Current</th>
<th>Future</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labor</strong></td>
<td><img src="image" alt="32.5 Hours" /></td>
</tr>
<tr>
<td><strong>Labor Cost</strong></td>
<td><img src="image" alt="$1,200 – $3,400" /></td>
</tr>
<tr>
<td><strong>Lead Time</strong></td>
<td><img src="image" alt="10.1 Days" /></td>
</tr>
<tr>
<td><strong>People</strong></td>
<td><img src="image" alt="10 People" /></td>
</tr>
<tr>
<td><strong>Critical work tasks filter through one person.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Quality</strong></td>
<td><img src="image" alt="Transfer Errors" /></td>
</tr>
<tr>
<td><strong>Morale</strong></td>
<td><img src="image" alt="Workers are Frustrated" /></td>
</tr>
</tbody>
</table>

**Simple Payback Period (SPP) = $1,230 / $565 = 2.2 Days**
Project Management: PERT

Earliest Start Time | Earliest Finish Time
Activity ID | Duration
Latest Start Time | Latest Finish Time

<table>
<thead>
<tr>
<th>Activities</th>
<th>Activity Name</th>
<th>Optimistic Time (Days)</th>
<th>Most Likely Time (Days)</th>
<th>Pessimistic Time (Days)</th>
<th>Expected Duration (Days)</th>
<th>Variance (Days)</th>
<th>Slack (Days)</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>Examine Problem</td>
<td>10.0</td>
<td>14.0</td>
<td>19.0</td>
<td>14.2</td>
<td>2.3</td>
<td>0.0</td>
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<tr>
<td>B</td>
<td>Lean Analysis</td>
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<td>2.0</td>
<td>2.5</td>
<td>2.0</td>
<td>0.0</td>
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<tr>
<td>C</td>
<td>Stakeholder ID</td>
<td>1.0</td>
<td>2.5</td>
<td>3.0</td>
<td>2.3</td>
<td>0.1</td>
<td>9.2</td>
</tr>
<tr>
<td>D</td>
<td>Stakeholder Needs</td>
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<td>7.0</td>
<td>9.0</td>
<td>6.8</td>
<td>0.7</td>
<td>9.2</td>
</tr>
<tr>
<td>E</td>
<td>Stakeholder Requirements</td>
<td>1.0</td>
<td>2.0</td>
<td>3.0</td>
<td>2.0</td>
<td>0.1</td>
<td>9.2</td>
</tr>
<tr>
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<td>2.0</td>
<td>3.0</td>
<td>2.0</td>
<td>0.1</td>
<td>31.7</td>
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<tr>
<td>G</td>
<td>Risk</td>
<td>1.0</td>
<td>2.0</td>
<td>3.0</td>
<td>2.0</td>
<td>0.1</td>
<td>42.8</td>
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<tr>
<td>H</td>
<td>Trade Study</td>
<td>1.0</td>
<td>2.0</td>
<td>3.0</td>
<td>2.0</td>
<td>0.1</td>
<td>9.2</td>
</tr>
<tr>
<td>I</td>
<td>Architectural Diagrams</td>
<td>11.0</td>
<td>14.0</td>
<td>21.0</td>
<td>14.7</td>
<td>2.8</td>
<td>9.2</td>
</tr>
<tr>
<td>J</td>
<td>Data Structure</td>
<td>7.0</td>
<td>14.0</td>
<td>21.0</td>
<td>14.0</td>
<td>5.4</td>
<td>9.8</td>
</tr>
<tr>
<td>K</td>
<td>Software</td>
<td>7.0</td>
<td>14.0</td>
<td>21.0</td>
<td>14.0</td>
<td>5.4</td>
<td>9.8</td>
</tr>
<tr>
<td>L</td>
<td>Verify and Validate</td>
<td>5.0</td>
<td>7.0</td>
<td>14.0</td>
<td>7.8</td>
<td>2.3</td>
<td>9.2</td>
</tr>
<tr>
<td>M</td>
<td>Write Paper</td>
<td>35.0</td>
<td>44.0</td>
<td>58.0</td>
<td>44.5</td>
<td>14.7</td>
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<tr>
<td>N</td>
<td>Final Paper Review</td>
<td>7.0</td>
<td>10.0</td>
<td>14.0</td>
<td>10.2</td>
<td>1.4</td>
<td>0.0</td>
</tr>
<tr>
<td>O</td>
<td>Create Presentation</td>
<td>7.0</td>
<td>14.0</td>
<td>21.0</td>
<td>14.0</td>
<td>5.4</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Mean: 83.2 Days  Target: 99 Days
Variance: 23.8 Days  Probability: 99.94% (Probability <= 99 Days)
## Stakeholder Identification

### Example

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Description</th>
<th>Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center for Medicare and Medicaid Services (CMS)</td>
<td>A regulatory body within the Department of Health and Human Services that is responsible for enforcing the Affordable Care Act.</td>
<td>Desire for health care organizations to adopt ACO, CMS, Hospital Compare, Physician Compare, and Five Star Measures to improve quality of care and reduce costs.</td>
</tr>
</tbody>
</table>
Stakeholder Identification

External stakeholders benefit from the system, but do not directly interact with the system.

UC [Package] Stakeholder Diagram

- Patients
- Society
- Government/Private Insurer
- NCQA
- CMS

Users and Operators

- Consulting Physician
- Health Care Organization
- Support Staff
- Associates
Stakeholder needs were identified through interviews, discussions, observation, and research.

Example

N1. Support Staff

- There is a need to prevent unauthorized users from modifying the quality measure data.
- Only authorized individuals should be allowed to enter new measures into the system.
- There are 3 different types of users (Read, Write, Administrator).
Stakeholder requirements were derived from the stakeholder needs:

<table>
<thead>
<tr>
<th>Stakeholder Requirement ID</th>
<th>Need Fulfilled</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>N1</td>
<td>The system shall provide three security access levels to safeguard data integrity.</td>
</tr>
</tbody>
</table>

Measures of effectiveness were determined for each need:

<table>
<thead>
<tr>
<th>MOE</th>
<th>Need</th>
<th>Measure of Effectiveness</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOE1</td>
<td>N1</td>
<td>Ability of non-authorized users to modify data outside of their access level.</td>
<td>Pass/Fail</td>
</tr>
</tbody>
</table>
## Requirement Categories:

- Functional
- Performance
- Reliability & Availability
- Maintainability
- Security
- Portability

### Example

<table>
<thead>
<tr>
<th>Security</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ID</strong></td>
</tr>
<tr>
<td>R1</td>
</tr>
<tr>
<td>R2</td>
</tr>
<tr>
<td>R3</td>
</tr>
<tr>
<td>R4</td>
</tr>
</tbody>
</table>
Concept of Operations
Measures of performance ensure that the system has the capability to achieve its operational objectives.

<table>
<thead>
<tr>
<th>MOP</th>
<th>Requirement</th>
<th>Measure of Performance</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOP1</td>
<td>R1</td>
<td>Ability of the system to protect from unauthorized data deletion.</td>
<td>Pass/Fail</td>
</tr>
<tr>
<td>MOP2</td>
<td>R2</td>
<td>Ability of the system to protect data via encryption.</td>
<td>Pass/Fail</td>
</tr>
<tr>
<td>MOP3</td>
<td>R3</td>
<td>Number of times access to an unauthorized user level was gained over 25 test attempts.</td>
<td>Number of User Level Access Errors</td>
</tr>
<tr>
<td>MOP4</td>
<td>R4</td>
<td>Ability of the system administrator to define user info, passwords, and access levels.</td>
<td>Pass/Fail</td>
</tr>
</tbody>
</table>
CR1. Hardware Cost
If newer hardware needs to be purchased by the customer due to poor system performance with the existing architecture then the hardware budget objective ($0) of the project will not be met.

CR2. Database Software Cost
If new database software needs to be purchased due to unknown/undiscovered limitations of currently owned options then the thesis software budget ($200 of personal funds) may be over-run.

CR3. Modeling Software Cost
If the design schedule over runs due to any of the various schedule risks (slide 24) then a license extension on SysML/UML modeling software may need to be purchased at a cost of $60.
TR1. Slow Performance due to Network Limitations
If system transaction times are slow due to unexpected network traffic then the system will not meet its performance requirements.

TR2. Rapidly Changing Customer Needs
If the selected system solution becomes insufficient due to changing customer needs then the proposed architecture may not be able to achieve positive results.

TR3. Software Limitations or Incorrect Assumptions
If product features can’t be provided due to unknown limitations of the solution or incorrect assumptions then use cases will not be met.

TR4. Unexpected Increase in Data File Size or Quantity
If support files (files uploaded to provide educational reference) can’t all be uploaded due to an unexpected increase in the number of files or file sizes then important requirements will not be met.

TR5. Data Corruption or Loss due to Defects
If data is lost or corrupted due to unknown software bugs in early use then user inputs may be lost.
SR1. Work Conflicts
If productivity decreases due to unexpected work conflicts then the rate of project progress may decline.

SR2. Mentor Availability
If meetings have to be re-scheduled due to last minute project mentor conflicts then the project deliverables may fall behind schedule.

SR3. Scope Creep
If the system development time increases due to scope creep then the project may fall behind schedule.

SR4. Rework Based on Feedback
If user interfaces need to be rebuilt due to negative user feedback then work may need to be re-done.

SR5. Rework Due to Unexpected Changes
If the data structures need to be re-made due to changing customer needs then portions of the database may need to be reworked.
Ethical Considerations

Utilitarianism vs. Cost Benefit

Utilitarianism: “We ought to provide the most good for the most people, giving equal consideration to everyone affected [24].”

Cost Benefit: Humans tend to look at decision making in the context of cost benefit analysis, where good and bad consequences are valued by their respective costs [24].

➢ Health care organizations should evaluate the cost and benefits to everyone affected by the program, weighing interests equally.
Ethical Considerations

Rights Ethics

Liberty Rights: An individual’s right to life and equality before the law \[^{24}\].

Welfare Rights: Rights to a benefit that an individual requires for a decent human life, where a community has the capability to provide them and the individual cannot earn the benefits himself or herself \[^{24}\].

- Poor and low-income patients receive worse care than higher income patients for about 60% of quality measures \[^{25}\].

It’s become increasingly more important that we focus on disparity gaps in health care.

- Middle-income patients receive worse care for 50% of quality measures than high income patients \[^{25}\].
"There is an entire realm of quality that is being almost entirely ignored by quality measurement programs." – Dr. Matt Wynia, AMA [26]

Ethical Standards are Highly Valued by Patients[27]:

- Privacy
- Informed Consent
- Patient Centered Care
- Equitable Treatment

Rather than living up to just excellent customer service or technical quality, quality programs should determine if someone is living up to ethical standards of care.
Alternative Solutions

1. Status Quo
2. Excel File
3. Microsoft SQL Database
4. Microsoft Access Database
5. MySQL Database
Alternative 1: Status Quo

- Relies on data stored in various different printed and electronic formats.
- Organizing and searching takes 1.5 hours per metric.
- Report generation is a time consuming process.

**PROS**

- Does not require any customized software.
- Does not cost any money to implement.

**CONS**

- Inefficient and wasteful processes exist.
- Customers are constantly waiting.
## Alternative 2: Excel

- Quality measures would be entered into Excel.
- Sorting would be conducted using pivot tables.
- Reports generated with VBA code.

### PROS

- Built in sorting functions exist.
- Does not require the purchase of software.

### CONS

- Locking occurs at the file level. Only one person can use the file at a time.
- Extensive VBA code is required to generate reports.
- Not designed to be utilized as a file storage system.
Alternative 3: Microsoft SQL

- Microsoft SQL Server is a relational database management system.
- Data would be stored on a server running Microsoft SQL Server.
- A front end interface would be created using MS Access.

**PROS**

- Data can be edited by multiple users with record locking.
- Support files can be stored.
- SQL Server provides real-time operational analytics.
- Data can be protected by encryption.

**CONS**

- The SQL package can cost $931 plus an additional $209 per user.
- A database server must be maintained.
- Server installation and setup requires some skill.
Alternative 4: Microsoft Access

- Combines a relational database engine with a graphical user interface.
- MS Access is utilized to create a front end GUI & back end database file.

**PROS**

- Access has a free runtime engine, which can be installed onto user computers.
- Easy to setup and install.
- Reports can be formatted and customized with minimal coding.
- Data can be protected by encryption and record locking.
- Access is easy to learn and customer preferred.

**CONS**

- Performance can be slow with many users.
- File uploads are limited to 2GB per table.
- Custom code is required to establish user security levels in the newer versions of Access.
Alternative 5: MySQL

- MySQL is an open source relational database management system.
- Managed by Oracle, but provided free for certain uses.
- Like Microsoft SQL, a front end would be created in Access.

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MySQL is a free solution.</td>
<td>A database server must be maintained.</td>
</tr>
<tr>
<td>Data can be edited by multiple users with record locking.</td>
<td>Server installation and setup requires some skill.</td>
</tr>
<tr>
<td>Data can be protected by encryption.</td>
<td></td>
</tr>
<tr>
<td>Support files can be stored in the database.</td>
<td></td>
</tr>
</tbody>
</table>

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LMU | LA
## Alternative Scoring Matrix

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Excel Sheets</th>
<th>Microsoft SQL</th>
<th>Access Database</th>
<th>My SQL</th>
<th>Status Quo</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weight</td>
<td>Rating</td>
<td>Score</td>
<td>Rating</td>
<td>Score</td>
</tr>
<tr>
<td>MOE 1, Format &amp; Location</td>
<td>4%</td>
<td>4</td>
<td>0.16</td>
<td>5</td>
<td>0.20</td>
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<tr>
<td>MOE 2, Organize by Category</td>
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<td>5</td>
<td>0.20</td>
<td>5</td>
<td>0.20</td>
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<tr>
<td>MOE 3, Generate Report &lt;1 Minute</td>
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<td>5</td>
<td>0.20</td>
<td>5</td>
<td>0.20</td>
</tr>
<tr>
<td>MOE 4, Associate Can Generate Report</td>
<td>4%</td>
<td>1</td>
<td>0.04</td>
<td>4</td>
<td>0.16</td>
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<tr>
<td>MOE 5, File Attachments</td>
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<td>3</td>
<td>0.12</td>
<td>5</td>
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<tr>
<td>MOE 6, Control Input Format</td>
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<td>0.00</td>
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<td>MOE 7, Restrict User Levels</td>
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<td>0.00</td>
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<tr>
<td>MOE 8, Export as Excel</td>
<td>4%</td>
<td>5</td>
<td>0.20</td>
<td>5</td>
<td>0.20</td>
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<tr>
<td>MOE 9, Export Reports for Email</td>
<td>4%</td>
<td>5</td>
<td>0.20</td>
<td>5</td>
<td>0.20</td>
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<tr>
<td>MOE 10, Comprehensive Reports</td>
<td>4%</td>
<td>5</td>
<td>0.20</td>
<td>5</td>
<td>0.20</td>
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<tr>
<td>MOE 11, Educate Health Organizations</td>
<td>4%</td>
<td>5</td>
<td>0.20</td>
<td>5</td>
<td>0.20</td>
</tr>
<tr>
<td>MOE 12, Include Cost Recommendations</td>
<td>4%</td>
<td>5</td>
<td>0.20</td>
<td>5</td>
<td>0.20</td>
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<tr>
<td>Meets Cost Constraints</td>
<td>8%</td>
<td>5</td>
<td>0.40</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Meets Schedule Constraints</td>
<td>8%</td>
<td>5</td>
<td>0.40</td>
<td>0</td>
<td>0.00</td>
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<tr>
<td>Meets Solution Constraints</td>
<td>8%</td>
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<td>0.40</td>
<td>0</td>
<td>0.00</td>
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<tr>
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<td>5</td>
<td>0.20</td>
<td>5</td>
<td>0.20</td>
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<tr>
<td>Leverages Enablers</td>
<td>4%</td>
<td>1</td>
<td>0.04</td>
<td>2</td>
<td>0.08</td>
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<tr>
<td>Easily Maintained by 1 IT Person</td>
<td>8%</td>
<td>5</td>
<td>0.40</td>
<td>4</td>
<td>0.32</td>
</tr>
<tr>
<td>Ease of Use</td>
<td>4%</td>
<td>3</td>
<td>0.12</td>
<td>5</td>
<td>0.20</td>
</tr>
<tr>
<td>Development Ease</td>
<td>8%</td>
<td>5</td>
<td>0.40</td>
<td>2</td>
<td>0.16</td>
</tr>
</tbody>
</table>

| Sums: 100%                           | 4.1     | 3.3          | 4.8          | 3.5   | 2.5   |

**Scoring Matrix Favored Result = Access Database**
"In introducing technological and social change, how you do it is often more important than what you do."  

Machine/Machine Considerations:
- Aging Hardware
- Limitations on Network Bandwidth

Man/Machine Considerations:
- Training
- Clear and Easy Guidelines
- Complement Work: Assist Users, Increase Productivity
- Simple Graphical Interface

Man/Man Considerations:
- User Fears: "This system could replace part of my job."
- Satisfy Management: Increased Productivity & Labor Savings
- Relevant Stakeholders Should be Consulted, Opinions Considered
OV-1: “As Is Architecture”
Various Report Options Exist
(ACO, CMS, HEDIS, Hospital Compare,
Physician Compare, Specialty Care)
Read/Write User Use Case Diagram (UML)

Various Report Options Exist
(ACO, CMS, HEDIS, Hospital Compare, Physician Compare, Specialty Care)

Generate Comprehensive Reports

Log In/Out

Research Categories

Read/Write User

Manage Data Sets and Create Links

Generate a Category Report

Domains, Categories, ACO, CMS, HEDIS, Hospital Compare, Physician Compare, Specialty Care
Administrator Use Case Diagram (UML)

- Manage Data Sets and Create Links
- Research Categories
- Update Security Settings
- Manage Users
- Log In/Out
- Generate Comprehensive Reports
- Generate a Category Report
- Various Report Options Exist (ACO, CMS, HEDIS, Hospital Compare, Physician Compare, Specialty Care)
- Domains, Categories, ACO, CMS, HEDIS, Hospital Compare, Physician Compare, Specialty Care
OV-5a (Operational Activity Decomposition Tree)
SV-1 (UML Deployment Diagram)

Package: Deployment Diagram

"Shares" File Server
- Database Back End Tables
- Backup Task Scheduler

Backup Server
- Database Back End Tables

Project Scope:
- Database Front End Client
- Database Back End Tables

User Computer
- Database Front End Client

User Computer
- Database Front End Client

User Computer
- Database Front End Client

Up to 20 User Computers Depending on Network Performance

Ethernet (VPN)
SV-4b UML Activity (Example)
Verification & Validation

Verification

• Verification was conducted on each requirement utilizing either analysis, inspection, demonstration, or test.

• Software testing was critical.
  ✓ White Box Testing
  ✓ Black Box Testing
  ✓ Regression Testing

• Verification efforts demonstrated that the key functionality of the prototype is working as expected.

• Some verification is still required due to site specific hardware conditions.

Validation

• Ensures that the system will meet the operational needs of the stakeholders.

• Ultimately, the customer will need to accept the system and deem it suitable for use.

• Review of the MOE’s is a good way to determine if the system design is on track.
Top Level Requirement:
The system shall reduce the cost and improve the quality of the health care measure selection and report generation processes.

Conclusion

- Reduced Cost: Hours of labor reduced to seconds.
- Predicted cost reduction of 49%, reduced waiting times of 45%.
- The system provides value to its stakeholders.

Lessons Learned

- Turn assumptions into fact.
- Constantly manage risk.
- Do not define the problem by a solution.
Next Steps

The system fulfills a customer need, but there is more work that needs to be done.

☐ Track
☐ Measure
☐ Correct

Systems Engineering Can Help!

Example: Monitoring of health care processes can empower an organization to take corrective action.


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