Visualizing an Electronic Record System: A Case Study for BAs from the VHA

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iRise
#1 Issue Facing CIOs Today

Dramatically cutting application development cost
How Do CIOs Get There? (part one)

Rationalization & consolidation of business software
How Do CIOs Get There? (part two)

Accelerating global sourcing programs
Business Software is Supposed to Help Meet These Challenges

But...
The Way That Business Software is Designed, Developed & Delivered is Fundamentally Broken

"In the last year, 70% of projects failed to meet deadlines, & 50% of projects failed to meet the needs of the business; 80% of the issues stem from poor requirements."

Standish Group Chaos Report, 2007
Business Users Don’t Know What They Want Until They See & Interact With It
Business Users Can’t Interpret Text Specs., Use Cases, Screen Shots, etc.
The Impact is Dramatic

- Long cycle times
- Late stage rework
- Poor adoption
- Risky global sourcing
- Blown business plans
- Strained relationships
The Solution: iRise Visualization
iRise Visualization Transforms Business & IT Communication
270 Customers Tell Us: Visualization Delivers

- Get to market twice as fast
- Cut 30% of project cost
- Virtually eliminate rework
- Outsource more strategic development
- Improve customer experience
- Discover new innovations
What Can You Visualize With iRise?

- New custom applications
- Enhancements to existing systems
- SAP, IBM, Oracle extensions
- Mobile applications (e.g. iPhone)
- Web 2.0 & rich Internet applications
Our Vision

By 2020 ALL business software will be visualized prior to development, the same way that visualization is a common practice in the design of every car, airplane & semiconductor today.
This case study shares lessons learned and best practices using the iRise Studio tool based upon workflow analysis and human-computer interaction optimization work Business Intelligence, Inc. (www.bii-va.com) performed under contract GS-35F-0195T to the Veterans Health Administration’s Emerging Health Technologies office during 2007-2009.

This case study was presented online on March 25, 2009 by Mr. Rick Verrill, Sr. Project Manager, Business Intelligence, Inc. and Ms. Nicolette Driggers, Sr. Analyst at Business Intelligence, Inc. in conjunction with Mr. Mitch Bishop, Chief Marketing Officer, iRise.

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About Business Intelligence, Inc.

Business Intelligence, Inc. (BI) located in Fairfax, VA is a Service Disabled Veteran Owned Small Business (SDVOB) founded in 2006 and provides subject matter expertise and professional services to support transformation of enterprise data into actionable information. BI provides expertise and solutions for some of the critical issues in business intelligence that include IT Governance, Contract/Program Oversight and Large Scale System operations and maintenance.

Company Specialties
- Healthcare
- IT
- Workflow Analysis
- Data Integration
- Program Management
- Information Quality
- ITIL
- IT Governance
- Enterprise Level Business Intelligence
- Earned Value Management
- Enterprise Data Transparency
- Actionable Business Intelligence
- Service-Oriented Architecture

Focused on:
- U.S. Federal Government
- Program and Project Management
- Healthcare

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Let’s start with: What did we achieve?

Using simulation and visualization tools enabled our team to create a work context that helped overcome clinician skepticism and reluctance to participate (buy-in). iRise Studio was so easy to use that it was transparent to our users and enabled our analysts to focus on what the users were saying and the needs they were expressing.

Anticipated Benefits -Workflow efficiencies
• Save clinicians time by limiting the time needed to interact with the system.
• Improve user experience for frequently performed tasks

Summary of Study Findings
• Workflow Impact -34 recommendations regarding 8 high-value, frequently performed tasks
• Time Savings -Potential to save 28 minutes per day per clinician
• Keystroke Reduction -Achieved keystroke reduction across all 8 high-value, frequently performed tasks

Overall Clinical Impact
Implementing the recommendations has the potential of improving clinician interaction with VistA, allowing the clinician more time for patient interaction and improved patient care. In some instances it also allows for the reduction of potential medication errors.

Our Results

• Visualization increased participant buy-in

• Analysis identified:
  – 34 specific recommendations to change the 8 EHR-S high value tasks examined

• The recommendations if implemented would yield:
  – Potential to save each clinician 28 minutes a day
  – Potential for improving healthcare service delivery
  – Changes that would increase user satisfaction scores
What was our task?

The VHA sought to identify clinical workflow and response time improvement opportunities to the electronic health record system - Veterans Health Information Systems and Technology Architecture (VistA) Computerized Patient Record System (CPRS) using simulation technologies.

Inspired by work done at Massachusetts General Hospital and concerned about their software applications, some are over 25 years old, maybe outmoded and inefficient the VHA tasked BI to:

- Identify high value, frequently performed VistA CPRS functions directly related to patient care;
- Identify repetitious interactions, evaluate the interactions for inefficiencies and make recommendations for solutions to minimize or eliminate the inefficiencies;
- Establish measurable performance metrics for high-value, priority functions;
- Validate the recommendations by using a simulated model to gather performance metric data and clinician feedback; and,
- Identify changes in the existing VistA CPRS user experience that would:
  - Save 15 minutes per day per clinician
  - Increase user satisfaction with VistA CPRS

To increase the likelihood that the recommendations would be implemented and to minimize development costs, the VHA specified that BI had to:

- Restrict changes to current functionality/capabilities
- Retain the current look/feel of the HCI
Who was our client?

BI is under contract to provide professional services to the Veterans Health Administration (VHA) Emerging Health Technologies (EHT) office. During the course of this webinar, we describe some of the work we’ve done for them focusing on how we used iRise to examine one of their IT systems and how it is used – looking for potential keystroke reductions and time-savings.

This is not to imply that the Department of Veterans Affairs endorses iRise, Business Intelligence, Inc. or the information presented today.

The mission of the Veterans Healthcare System is to serve the needs of America’s veterans by providing primary care, specialized care, and related medical and social support services. The Office of Emerging Health Technologies is tasked to sense and extend VHA’s information technology horizon through the application and introduction of technologies and practices.

The VHA is a large, complex, federal agency and operates the largest integrated healthcare system in the U.S. Numbers tell the story:

- 23.4 Million US Veterans (2008)
- 5.5 Million unique patients (2008)
- 46.5 Million visits (2002)
- 60,000 physicians, nurses, and related caregivers
- 1,500 care sites – in nearly every community in the nation
- $98.7 Billion in annual obligations
- 84,000 caregivers trained each year
- 107 of the 132 medical schools in the US
- Largest integrated healthcare system in the US
- Developed VistA – EHR-S
How did we craft a shared space for innovation and dialog?

To meet the objectives of this task, the BI Team engaged in a study of physician and nursing interactions with CPRS as they fulfilled their roles and responsibilities for the care of veterans. The BI Team identified eight high-value, frequently performed tasks and evaluated them for potential efficiency improvements.

To guide our work, the BI Team followed a six-step process:
1. Identified high-value, frequently performed tasks at four VAMC locations (STRAWMAN)
2. Shadowed clinicians at each site, observing the task workflow and interaction with CPRS (AS-IS)
3. Analyzed the findings, documenting cross-cutting issues
4. Devised candidate alternative solutions (TO-BE)
5. Validated candidate solutions with clinicians using simulated CPRS screens
6. Documented functional requirements for recommended changes

High value, frequently performed tasks were defined as: CPRS activities that are directly related to patient care and are repetitive in nature for each patient. They possess critical data elements that are required in the clinical workflow process and hold the potential, when reengineered, to increase the efficiency of CPRS.

The approach focused on obtaining real-life CPRS observational data from 34 clinicians at four VA medical centers (VAMC) over two rounds of site visits.

The initial round of site visits first involved discussions with clinicians about their ideas for changes to CPRS that would facilitate improvements in their daily tasks. Second, the BI Team observed clinicians in their environments and daily routines and recorded their observations to determine if there were any tasks that could be made more efficient.

The BI Team analyzed the data and modeled the candidate changes in a simulation tool. The second round of site visits involved the presentation of and clinician interaction with the modeled proposed changes. This was followed by clinician feedback sessions to validate the changes and collect any additional insights. Concurrently, the BI Team asked clinicians to rank order the tasks related to their day-to-day activities.

Additionally, the BI Team developed scenarios that establish parameters for performing baseline process timings of the high-value, frequently performed tasks. The BI Team then executed a timings study to determine if any there were any efficiency gains or losses between the “As-Is” state, executed against the site’s CPRS training system, and “To-Be” model executed against the simulated screens on a standalone laptop.
How did we select iRise over other tools or approaches?

As part of our due diligence BI:
• Identified key functional requirements and criteria to be used to identify and assess candidate tools – including the selection of a high-value task for use in evaluating products
• Conducted a literature search to identify simulation best practices, risks/issues, and products in wide use
• Assembled a list of candidate tools to evaluate
• Contacted vendors and reviewed publicly-available documentation

Selection criteria we used:
• Replicate the VistA CPRS user interface
• Incorporate real-time system processing delays into the simulation
• Support task and workflow modeling and data collection
• Ease of use (end user and developer)
• Ability to be deployed on a standard MS Windows-based laptop without a network connection

BI’s product testing/assessment consisted of:
• Populating an initial evaluation matrix that documented product functions/capability against simulation functional requirements and criteria
• Making an initial cut to identify 2 - 3 tools to evaluate in more detail
• Capturing screenshots from the EHR-S based on the target high-value task for use in constructing the simulations
• Constructing multiple simulations to obtain hands-on experience working with the finalist tools
• Validation of system functionality
• Each simulation was briefed to the BI Task leads and the BI Project Manager for feedback. Based on feedback from these briefings, additional research was conducted to answer questions/concerns
• Simulations were then briefed to the VHA PM for comment and feedback prior to use

Why iRise?

• Clinician involvement was critical to task
• Needed to create a shared space for innovation
• Needed a tool that facilitated creating the space and met our constraints
• iRise enabled us to quickly create the shared space
• iRise was transparent
  – Team was able to focus on the task goals; not how to use the tool
  – Clinicians focused on models and not on tool functions
So why iRise?
• Ability to capture & leverage existing system images
• Ability to rapidly mockup revised screens
• Ability to modify models in real-time while interacting with the clinicians
• Ease of use building models
• Ability to use without a network connection
• Realistic ability to simulate system behavior

Using iRise Studio, the BI team was able to rapidly and visually communicate screen changes and restructured task workflows to the VHA staff.
Using iRise Studio, we’ll walk you through three of the high value tasks we examined showing the current (AS-IS) version and the final revised version (TO-BE) the BI Team developed with the clinicians. We’ll describe the current workflow, the changes that the clinicians recommended and the team identified, and show you the revised screens and how they will be used. We’ll conclude each task with a summary of how we created the screen in iRise along with any tips/lessons learned.

Our overall challenge: Having a full understanding of both the users and the technology (i.e. being able to think like a clinician and yet being clear that the computer won’t make coffee). Also, being able to address not only how the users use the system now but the potential for how it can be used.
Medication Reconciliation:
What BI did:
- Created a split screen where each side sorted simultaneously on the same criteria (e.g. name) for easy side by side comparison
- Created a situation where “matches” became obvious

Challenges:
- Understanding the iRise sort process (how to send data to a sort function then retrieve it again)
- Understanding the iRise choice paradigm to know which criteria a variable needed to go through to return expected results
- Realizing that using the sort process on the Medication reconciliation page changed the sort on other pages (this became more important when sort on other pages caused the sort on one side of the Medication Reconciliation screen to be opposite the other side)
- Trying to both sort and highlight

Lessons Learned:
This kind of visualization is key. It is very hard to explain on paper in a way that didn’t confuse people or lead to unrealistic expectations of what the new system might be capable of. The screen produced very different reactions. For people who had to deal with the cumbersome “As-Is” method of reconciliation medications the reaction was always extremely positive and often very excited. Those that didn’t deal with the medication reconciliation process often thought the function was neat but quickly lost interest.

Alert & Status Dashboard
What BI did:
- Create a space where multiple patient data can be seen at one-glance
- Propose multiple ways of prioritizing patients

Challenges:
- Determining what data to show and how to show it (see lessons learned)
- Choosing data examples that did not distract the clinicians from the functionality of the screen (clinicians would start diagnosing the patient vitals and results instead of looking at what the screen was doing)
- Finding a balance between using jpegs of “data” or creating tables
- Not having the ability to resize tables in “real time” (i.e. during scenarios)

Lessons Learned:
- Not all people wanted to see same data. Feedback showed that some clinicians wouldn’t find our initial page useful unless it showed other data. The main feedback was that customization was key.
- Do not have too many expectations of potential reactions and listen to the feedback. I felt the screen was helpful and “cool”, but several users felt that the screen was not useful unless it had more functionality (ability to order medications from the screen).
- Find the balance between functionality and procedure/policy. (Clinicians wanted more functionality on the dashboard but created too much potential for mistakes)

Coversheet Screen Change
What BI did:
- Add more functionality to cover screen
- Bring data and function closer to cover screen (minimize clicks)
- Redesign page layout

Challenges:
- Dividing the allotted space to add sections without crowding the existing space
- Trying to get the “New Note” functionality to do what I wanted (it still didn’t work perfectly)
- Balance functionality with technical capabilities (staying within constraints)

Lessons Learned:
- Reinforced the lessons from the prior two functions
- Highlighted the challenge of fitting new functions and data within the existing task footprint
What do we see as iRise's strengths?

- External methods to link designs/scenarios back to requirements and to use case elaborations
- Dynamic wire framing
- Modeling assets can be retained and reused
- iRise supports the simulation of response times based on observational and fictitious performance data
- Visual workflow depiction and manipulation facilitates discussion with users on system interactions and usability
- Simple to build workflow based scenarios reflecting the VistA High Value tasks
What do we see as iRise's strengths?

- Screen elements can easily be reordered based on user inputs in real-time and the simulation re-run to show the potential impact or benefit of a change
- Companion reader software lets business-side customers run the workflow models remotely via a web browser
- Supports real-time collaboration over the Internet (reducing revision cycle times)
- Enforces good model management practices (check-in/check-out of documents and automatic reconciliation of changes)
What do we recommend as best practices?

- Have a realistic idea of what must be shown in the model vs. what can be left to production.
- When a feature is beyond iRise capability be prepared to show two examples (one of each feature) so that the client can see both capabilities and piece it together (e.g. highlighting and sorting).
- Be aware of your variables. All variables are global to the session so be sure to understand which ones are used multiple times/places and when to reset them.
- Test with realistic scenarios and make sure that if a user will be required to do something (such as sign on, or press a button) it is included in the model.
- It may be easier to create a screen from scratch if the data fields are close together (to accommodate iRise data containers).
- If you are simply modeling going from one screen to the next (like in the tolerance testing or a log-on screen) it is by far faster and easier to just throw in screen shots.
- Use a mixture of both simple screen shots and from scratch screens.
- If you are doing several screens that have the same background it is easier to design the background as a template (as opposed to screen captures) then use partial screen captures to fill in the foreground.

How long did it take?

- Simple screens can be done in a few hours, more complex screens and workflows can take over one week (to get the datasets to interact properly with user inputs).
- It also helped to have certain aspects (e.g. tool bar) be a template as well as it made it easier to tweak globally.
- Most of the time was spent defining the scenario/task to be modeled and then documenting the steps involved in the model/screen workflows.
- Model creation took two different paths - 1) Using screen captures and defining overlays for the fields that were to be interactive, or 2) Scratch development of new screens.
  - Path 1) Screen captures - majority of time is spent creating the datasets to be linked to the interactive fields (lookups, dropdowns, source) and then constructing the both the intra-screen (field) and inter-screen workflow linking multiple screens - obviously if a data set is available it speeds up the process otherwise significant time can be spent creating a dataset that supports the scenario being modeled.
  - Using screen captures and existing data, an experienced iRise analyst should be able to model a screen in about 2-4 hrs (including linking data to the fields and testing it).
  - Path 2) Scratch built: The more challenging of the two options - it requires more time up front laying out the screen design - BI was able to use existing CPRS screens as a starting point for field layout and this reduced development time significantly. Working with a SME BI was able to design new screens in 1-2 days and it took another 1-2 days to implement it and get it working satisfactorily.
- As a general rule the more links (to dropdowns/lookups, other screens) there are and more data interactivity the model needs – all increase modeling time.
What were the lessons learned we took away from this work?

• Small changes generated potential for significant outcomes (the butterfly effect)
• Simulation can make a difference in creating the shared space.
  Simulation helps remove the analysis barrier: (how do I envision something I've never seen before)
• Could still do traditional analysis using the tool and have the same problems we've all seen with that approach
Thank you for attending

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Please submit questions now...

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