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**Determining Improvements to IT Systems through Business Service Management while
Calculating, Through Time Savings (or Fractional Employee Reduction), the Business Value of
IT Investments**

Matthew Hernandez

University of North Carolina – Wilmington

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Approved by

Advisory Committee

_____ Dr. Thomas Janicki _____

_____ Dr. Devon Simmonds _____

_____ Avery Cloud – CIO _____
New Hanover Regional Medical Center

_____ Dr. Bryan Reinicke _____

Chair

Abstract

Determining Improvements to IT Systems through Business Service Management while Calculating, Through Time Savings (or Fractional Employee Reduction), the Business Value of IT Investments. Hernandez, Matthew, 2009, Capstone Paper, University of North Carolina Wilmington.

This paper outlines the definitions of Business Service Management (BSM), and their potential impact on a business. During the investigation, the author assisted in the implementation of a business service management software called Vantage Service Manager by Compuware. The system was implemented in a health care organization with the development of proof of concept dashboards for BSM. As a result of the project, several dashboards for monitoring the performance of an emergency department were developed. The dashboards represent the impact of BSM on a business as they display the performance of a business process through linking all of the components that make up said business process.

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1 Introduction

Business Service Management (BSM) is a fairly new term, which is being used by IT organizations and businesses to describe a new way to organize, operate, and manage IT Services. (Marquis, 2008) BSM allows an IT organization to properly align critical business services to the underlying IT Infrastructure that provides the service. (www.compuware.com)

New Hanover Regional Medical Center (NHRMC) in Wilmington, NC is currently in the process of creating a Project Management Office to effectively roll-out several Information Technology Infrastructure Library (ITIL) best practices, within their IT organization. Avery Cloud, CIO at NHRMC, has two long term goals in mind for the IT organization:

- 1.) To operate more efficiently. Manage based on the organizations' needs, and make IT investments based on metrics and returns that show the business value of said investments.
- 2.) To continue to implement several ITIL best practices. Implement them as repeatable processes that produce quality, Quality is defined as meeting the customers' needs, delivering high customer satisfaction, with no errors or failures, and meeting cost/time objectives.

The newest component of NHRMC's IT organization's transformation is a Business Service Management tool named Vantage and supplied by Compuware. This tool was installed and configured to provide end-user monitoring, network and systems monitoring, applications analytics, and continual service quality improvement measures. (Dunn, 2007) Vantage promoted BSM to the IT organization at NHRMC as a way to map specific parts of the IT infrastructure to specific organizational business processes which those specific infrastructures provide. It is this alignment of IT infrastructure to specific business processes, that allows the IT organization to

more effectively prioritize their IT investments and measure said investments impact and business value.

To learn more about BSM and ITIL implementation best practices this capstone project has monitored and assisted in the implementation of the Service Management Module of the Vantage system at NHRMC. This Service Management module gathers the technical metrics that the other Vantage modules collect, and maps them to the specific business processes that NHRMC has. As a part of the implementation, these specific business service “maps” have been defined and built into the Vantage Service Management Module. The technical metrics include, but are not limited to; CPU load times and percentages, network load, lost packet count and round trip times, hard disk drive load, and page view counts of individual web pages.

This project has monitors and documents events and findings throughout the implementation. My involvement included providing technical knowledge on Business Service Management and the ITIL framework to the project team at NHRMC. I also provided insight for developing the business service maps (or metrics) and assist in configuring them into the Vantage system. This project also attempted to investigate the use of Fractional Full Time Employee (FTE) reduction (time-savings) as an additional measure of the business value and impact an IT investment has on the organization.

2.1 Background – Business Service Management

The Information Technology Infrastructure Library (www.itil-officialsite.com) was first published by the British Office of Government Commerce in the early 1990’s, and became widely adopted in the mid 1990’s. According to a study by Dimension Data, 85 percent of American CIOs stated that IT service management practices will allow increased optimization of IT “best practices,”

with 60 percent stating they were focused on implementing the ITIL framework.(Dubie, 2008)

With ITIL version 3 being published in May 2007, ITIL concepts are now focused on developing the quality services that IT organizations provide to the business versus just managing and maintaining the business's IT infrastructure and technology. ITIL V3 introduces the idea of the service life cycle, as shown in Figure 1.

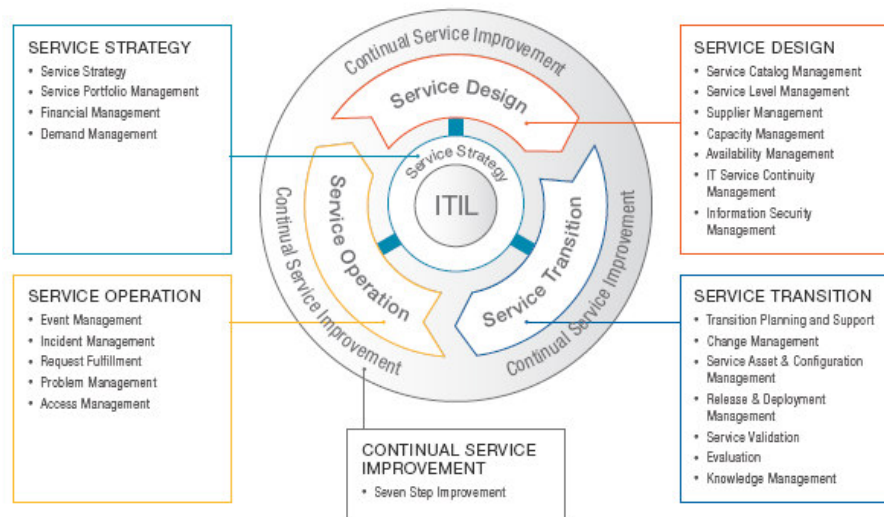


Figure 1 (Ho, 2007)

As defined in the ITIL V3 Volumes, the service life cycle consists of five main phases;

- Service Strategy
 - a. Guidance, policies, and processes which assist in developing Service Management polices to govern Service Design, Service transition, Service Operation and Continual Service Improvement. (Office of Government Commerce, 2007)
- Service Design
 - a. Guidance on developing processes that manage how changes and improvements are made to increase and maintain the business value of a service over the life cycle of said services. (Office of Government Commerce, 2007)

- Service Transition
 - a. Guidance on the “development and improvement of capabilities for transitioning new and changed services into operations.” (Office of Government Commerce, 2007)

- Service Operation
 - a. Guidance on “achieving effectiveness and efficiency in the delivery and support of services so as to ensure value for the customer and the service provider.” (Office of Government Commerce, 2007) It is through Service Operation where the real value of a service change or a new service implementation is realized.

- Continual Service Improvement
 - a. Guidance on “creating and maintaining value for customers through better design, transition and operation of services.” (Office of Government Commerce, 2007)

Dunn and Ho (2007) recommend that one of the ways to implement this service life cycle framework is through the concept of Business Service Management (BSM). In the 21st century Information Technology and the organizations that provide these services enable the business, and in doing so must be fully integrated into the business (Dunn, 2007). BSM is promoted as an idea to achieve this integration. Definitions of BSM include

“Business Service Management (BSM) is a strategy and an approach to enable IT components to be linked to the goals of the business. This way the impact of technology on the business and how business change may impact technology can both be predicted. “(p49 Office of Government Commerce, 2007)

BSM is also sometimes defined as:

“...a category of IT operations management software products that link the availability and performance status of underlying IT infrastructure and applications components to business-oriented IT services that enable business processes.” (p1 Dunn, 2007)

According to the first definition, Business Service Management provides an IT organization with a framework to link the technical hardware and software components that provide a specific

business function to the “end-to-end” business processes that an organization has to conduct business. These links between technology and business processes allow organizations to clearly see the value of their IT investments. (Marquis, 2008) The implementation process for BSM can be broken down into 4 steps: (Marquis, 2008)

- 1.) Define IT services and validate business cases – “to manage by service requires the service be defined.”
- 2.) Analyze service value and prioritize to balance demand – “value(ing) is used to rank the services in terms of IT focus.”
- 3.) Measure quality to choose improvement opportunities – “Measuring quality externally from the organization indicates those services that are not performing as required – from the point of view of the service consumer.”
- 4.) Authorize and allocate resources – “..every IT improvement program should be instantiated as a formal project.”

The Vantage Service Management Module mentioned before is an operational management software that provides an IT department with a powerful tool that manages BSM to a business. It is the goal of NHRMC for the VSM module to provide the metrics, reports and recommendations necessary to implement the BSM quality standards.

2.2 Background – Information Services NHRMC

Beginning in January of 2007, Avery Cloud, CIO at NHRMC hired external consultants to analyze the internal processes and procedures of the IS department. Out of this analysis came the recommendation for a departmental reorganization to:

- 1.) Reassign resources to internal teams with high demand and work load.
- 2.) Create a Project Management Office (PMO) to formally develop and implement several ITIL “best practices”

3.) Organize resources in a way to manage ITIL processes

At the start of fiscal year 2008 (FY08 – Oct '07 to Sep '08) the reorganization of the IS department took place. Several internal staff members were reassigned. The Project Management Office was also christened. According to the reorganization, the PMO would consist of one manager and one Project Lead II. The PMO was initially tasked with developing and documenting a project management methodology. Eventually the PMO would move on to develop additional ITIL best practices. Finally after all the initial internal IT processes are in place, the PMO would monitor, maintain, and improve these processes as necessary.

The IS department, during FY08 managed 100 projects with 66 project FTE's on staff. The evaluation of the FY08 project hours that were completed showed that for 66 FTE's, approximately 76 FTE's worth of work was performed, meaning based on hours, that the IS Department was operating at a capacity of 10.8 FTE's in overtime. These 66 FTE's performed approximately 10.8 FTE's worth of overtime. Without the overtime included, the 66 FTE's performed approximately 70.4 FTE's worth of work.

The IS department has operated highly efficiently and effectively within the last ten years, considering there have been no additional FTE's hired to accommodate the increase in workload and demand, which is prevalent due to the yearly increases in IT operating budget. However, there were several incidences in the last year at NHRMC that affected the department's planned work efforts and customer satisfaction. As a result of an internal study:

- 1.) 16 projects with issues discovered during go-live.
 - * excluding 15 projects still in progress
 - * excluding 3 projects postponed
- 2.) 15 pop-up projects
 - * Projects that were not originally budgeted for in terms of dollars and resources

3.) 2 projects over-budget

** Data was accessible on 70 out of 100 projects

Through ITIL best practices and Business Service Management , Mr. Cloud feels a significant reduction in these incidences can be achieved, increasing the overall effectiveness of the IS department among the business processes at NHRMC. Goals have been established for reducing all of the incidents above.

During the fall of 2008, the PMO developed and trained IS staff on the Project Management policies and procedures. The PMO's focus for the spring of 2009 consisted of developing policies and procedures and training IS staff on the following areas: Knowledge Management, Change Management, and Service Management. The PMO uses software called Changepoint (www.compuware.com), another product from Compuware, to manage these internal policies and procedures. Changepoint assists in managing these policies and procedures through custom workflows that are built into the system.

3 Next Steps for NHRMC's Information Services Department

Compuware demonstrated another product that they offer, Vantage, to NHRMC. The Vantage suite of software provides several benefits to NHRMC and has been purchased for installation during the FY09 fiscal year. Per Compuware (Shields, 2008), the benefits to an IT organization are:

- 1.) Problem Identification
 - a. Monitor End-User experience – create an accurate picture of what the end-user experiences
 - b. Atomization of each business service provided by IS
- 2.) Pre-Failure Warnings through trending and historical analysis

- 3.) "Finger-pointing" Prevention
 - a. With all transactions being monitored and cataloged, an entire end-to-end picture of all the layers of the system is available, so the correct persons can be contacted and held responsible for resolving the issue.
- 4.) Vendor Accountability
 - a. Have the ability to stop the vendor from "Finger-pointing"
 - b. Can provide the vendor with the data collected to give them a clear picture and evidence that an issue lies in a certain layer of the system.
- 5.) Dashboards & Alerts
 - a. Vantage provides a dashboard builder function where dashboards can be customized to the audience
 - b. Custom Alerts alarm as soon as any threshold is crossed, alerting IS staff to potential issues, possibly before end-users are aware there is an issue.
- 6.) "Single Pane of Glass"
 - a. Changepoint and Vantage integration allows IT staff to communicate, collaborate, organize, manage, plan, maintain and troubleshoot systems, all from one piece of software.

Out of these potential benefits, Avery Cloud has focused on these specific goals for the Vantage Suite Implementation at NHRMC:

- 1.) Allow the IT organization at NHRMC to perform "predictive monitoring," essentially allowing staff to reduce the chances of un-planned system wide outages through end-user monitoring and historical trending.
- 2.) Provide IT Management with quantitatively measures and reports, which show the business impact of an un-planned system outage, providing lost revenue numbers for IT Managers to more effectively lobby for budget dollars to increase system availability and stability.
- 3.) Allow IT Staff to more rapidly diagnose system issues, using the Vantage Suite to reveal at which layer within the IT Infrastructure the issue might exist.

4 What is Vantage Service Manager?

Vantage Service Manager (VSM) is an IT operational software that provides a structure for gaining value from BSM to an IT organization. VSM fits into the category of software mentioned in the second definition (software that links the business-process to the performance status of the IT Infrastructure that supports it) of Business Service Management. VSM monitors and records all layers, whether it is the hardware, application, or network layer of an IT environment. Vantage provides end-user monitoring, network and systems monitoring, applications analytics, and continual service quality improvement measures (Dunn, 2007).

With VSM, an organization can map its' business services with a top-down approach, mapping the service down to the IT components that the service depends on. (Compuware, 2008) An example of this at NHRMC would be linking the business process of producing a patient bill and the IT infrastructure that produces that bill together; the charge capture and final billing software.

The core of VSM is the Service Model. It functions as the engine that maps incoming data to the relevant business process it impacts. (Compuware, 2008) Once the business service is defined and the IT components that provide this service are mapped out, data can be collected and dashboards can be built to display this data in different ways where it is meaningful to the different end-users looking at it, whether it be IT Personnel or the rest of the Business, which in turn allows informed decisions to be made based on current and historical data (Compuware, 2008).

5 VSM Project Implementation Plan

As of late fall 2008, only a handful of decisions had been made as related to the implementation of the VSM product at NHRMC. Avery Cloud estimated that the project kick off in the early spring of 2009. He actively built the implementation project team to install the software and develop the first iterative set of business services in a time frame of approximately 90 days. After this initial implementation was complete (late spring 2009), a second team took over, performing and providing continual improvement to the business service metrics originally defined, as well as making recommendations toward the prioritization of future IT projects and investments.

6 Planned Capstone Deliverables

This section will define my involvement and contribution to the implementation of the Vantage Service Management module to NHRMC. My overall objectives were to gain knowledge of BSM processes and be an integral part with the development of the initial metrics and dashboards that are determined to be important to the IT department and the business organization at NHRMC.

- 1.) Develop an understanding of the ITIL v3 frame work and how it relates to Business Service Management by monitoring and documenting the project implementation.
- 2.) Assist in developing the Implementation Plan for NHRMC to implement Vantage Service Management as their Business Service Management software
- 3.) Assist in developing Business Service Management metrics and the configuration of Vantage Service Management based on these metrics
- 4.) Collect data from the Vantage Service Management software to develop some base-line metrics
- 5.) Investigate, recommend, and possibly implement changes to improve a specific Business Service Management metric

- 6.) Document and log issues that evolve from the project and recommend changes and improvements for future implementations of Vantage Service Management.
- 7.) Investigate the development of a metric that measures IT investments business value in terms of fractional FTE reduction (time-savings).

7 Estimated Timeline for Capstone Deliverables

Task	Sep 08	Oct 08	Nov 08	Dec 08	Jan 09	Feb 09	Mar 09	Apr 09	May 09	Jun 09
Develop Understanding of ITIL v3 framework and BSM	X	X	X	X						
Develop Implementation Plan for NHRMC's VSM Project					X	X				
Develop BSM metrics and configure VSM						X	X	X		
Collect data from VSM to set base-line								X	X	
Investigate possible improvements									X	X
Document and log project issues				X	X	X	X	X	X	X
Investigate IT investments' business value in terms of FTE reduction								X	X	X

8 Deliverable Outcomes Summary

Throughout the execution of the project the seven goals laid out in the initial proposal were kept in mind. The following section lays out the results of the project and the knowledge gained in the following manner. First will be a discussion in detail the knowledge gained as a result of the initial study and the project. This will include a discussion of the knowledge gained in the theory of business service management, followed by the knowledge gained in a real world implementation of a business service management software, Vantage Service Manager (VSM).

Also a discussion of the knowledge gained in pattern based software development, which was found to be extremely useful in the implementation of a repeatable business service management implementation.

The next major section will provide a detailed overview of the actual project implementation of VSM at NHRMC; starting with the project team and roles, and followed by the review of NHRMC project goals and project plan. Next will be a discussion of the outcomes, what worked well and what did not.

The final section we will draw conclusions on future work and discuss the current state and future plans for the project at NHRMC.

9.1 Knowledge Gained - Business Service Management

Individual business services are built out of many different processes, policies, functions, systems, and customer interactions. An analysis of a business process provides an overview of all the different moving parts and how they relate to each other. The next step is to link and define interactions between customer, service provider, and IT systems. The ability to model these moving parts into a single monitoring system is the real value of BSM as the team gains insight into the business service, end to end.

Figure 2, which follows, represents a philosophy of what a business service model is built upon.

In the bottom two layers there are component performance and systems performance respectively. These two layers are strictly IT service management, measured via two key IT metrics. Component performance is monitored via a metric called a component performance indicator (CPI). These range from measurements of network speed, to CPU utilization, to RAM

utilization and represent Capacity Management. The measurements are strictly looking at the performance of the individual pieces of hardware that make up an IT system.

The next level is systems performance, measured via metrics called service level agreements (SLA). Service level agreements are based on measurements like transaction or response times, and define the acceptable levels of performance for these metrics, and lay out the penalties for failing to meet these performance targets. Another important way to define an SLA, specifically in the BSM model, is a measurement or aggregation of a grouping of component performance indicators. Systems performance looks strictly at groupings of component performance indicators with an end-user perception or view. SLA's are also a measurement used for Availability Management.

The next layer is what really defines BSM. When modeling a line of business, or service, that a company provides, there are generally clearly defined steps the customer progresses, from entering the door to payment and leaving. Metrics that define this level of performance are called key performance indicators (KPI). KPI's are generally built upon SLA's plus additional interaction measurements between the managed service and the customer. An example of this would be the amount of time it takes (a KPI) for an employee to capture and enter a new customers contact information. This time will be measured from the time the employee started entering the information to the time the system has returned a complete message back to the employee, acknowledging that the information was captured accurately. Included in this time measurement would be any additional interaction time between the customer and the employee, as the measurement starts as soon as the employee opens the new customer screen as well as the performance of the IT system performing the transaction, previously defined as an

SLA. Thus, line of business performance is measured in KPI's, which are an aggregation of SLA's and interaction times.

VSM is a tool that allows a business to capture all of this information in one place, building the tree relationships described above. With all of this information in one place the organization can then build very powerful dashboards to allow insight into where the business may be having a performance issue or could improve.

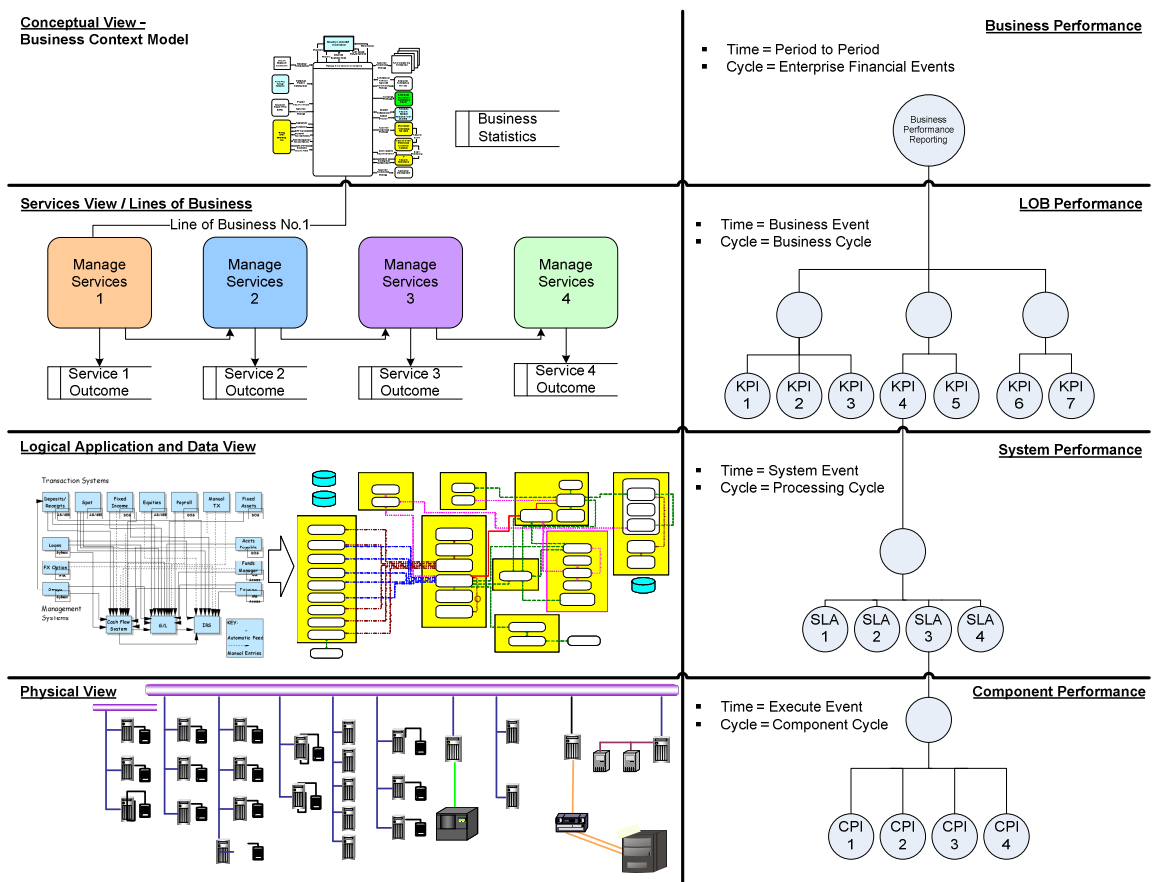


Figure 2 - Beard 2009

Our plan at NHRMC, which was brought in by one of the early Compuware consultants, was to develop a progression of models, each built upon the previous, representing the layers in the diagram above. Conceptually, we would start designing these models at the line of business layer, and work down, essentially in a top-down approach.

9.2 Knowledge Gained - Vantage Service Manager

All of these different layers and models in one system are represented via a tree. VSM is a sophisticated modeling engine in which business service models are built via trees. The first step is to define each layer of the tree as a service or node. Figure 3 is an example of a service tree definition. Each layer of the tree has a node which represents a service. In the tree to the right, there is a top node or service defined as KPI. What this means is that, at the highest level, the data is organized by the KPI service definition, meaning, when looking at that level of the tree, one sees values which represent a complete roll up of all of the other service layers of the tree.

In the tree to the right, the next service layer down from KPI, Location, represent valued of the KPI, but separated by the Location service definition. This goes on until the base of the tree is reached, but what it allows the business to do is really segment the data in a tree to look at it from different views. Additionally, the tree could be organized in a different fashion moving services above other services to aggregate the data another way. For instance, if the goal is to know overall Acuity, or sickness level, performance, one could build the tree by placing the Acuity service definition above KPI, which the team actually did in VSM to provide dashboards which would provide that view. Doing so allows one to build a conceptual model, not linked to the specific data that may come into the tree at each layer.

This is an important separation of model and data, allowing the model (as in the figure to the right) to be defined only once versus needing adjustment each time data changes. This means that as additional nodes, horizontally at a specific level of the model are

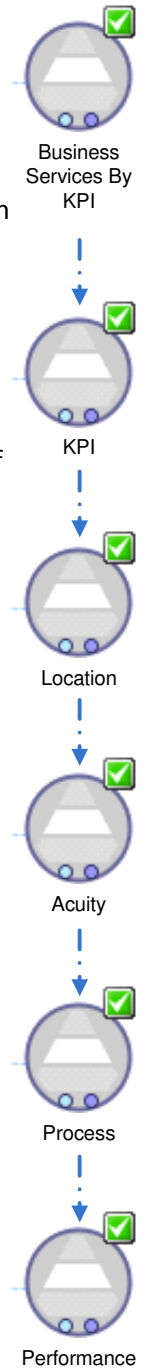


Figure 3 – NHRMC

added into the system, we do not have to adjust the model definition. We are able to represent one leg of the entire tree found in Figure 3 into one branch as shown in Figure 4. This is the tree that is built out from the model to the right, and we are able to draw out the horizontal nodes as we are familiar with the data. Now, if the data were to change, say we develop an Acuity 6 – the VSM system would easily just build a node once that data was fed into the system due to the separation of service model and tree. It would take that new Acuity, realize it was different and that there already was not a node, and add it to the tree. This ability is inherent to the system, and this is how the trees are built when the system is initially turned on. The VSM system can also be set to remove nodes from a tree if data for a node is not present during a data load.

Figure 3 represents what the NHRMC project team developed as the model to measure the business service management performance of their emergency departments. The top layer, or service; represent the KPI's defined at each step in the emergency department's business process. Below are the four additional service nodes were defined:

1. **KPI** – Key Performance Indicators for this tree are the actual business process definitions, such as Quick Reg to Triage, which is the time it takes for a patient to go through the quick registration process, which starts once patient demographic information is entered into the system and ends when the triage process begins. Each KPI is the next step in the ED process in this service model
2. **Location** – as NHRMC has multiple ED departments
3. **Acuity** – as patients that come into an NHRMC ED are assigned an acuity level or degree of illness
4. **Process** – due to the performance measures being calculated, patients could be divided into different process levels within each KPI – For this example the process levels are In Process or Completed. A patient is in process if they have a start timestamp for a KPI, but no end timestamp.
5. **Performance** - At this layer the different calculations that NHRMC decided to measure are fed into the model. In this model we are measuring two performance metrics, the number of patients in the business process, and the average wait time for those patients in this business process. Each base node would represent the complete

segregation of data we were looking for, and as one moved up the tree; the patient counts and average wait times would aggregate to give another view. Meaning, at the Acuity level, one would see the total number of patients and the average wait time across all of the nodes below Acuity.

Figure 4 represents what one entire leg of the tree would look like once data is entered into the system. The base of the tree, when fully populated, ended up being 300 nodes across. As one can see, once data is fed into the system, the tree grows horizontally at each layer of the service model. As messages come into the system, built via the data feed, the messages are compared to the model template. The model template is basically a waterfall filter, which determines where the message (the data) fits into the tree. Once the message is fit into a template, it is compared to the other data that has already been fed and fits that template. If the node already exists, it is updated, if the node does not exist, a new node is created. The system then moves on to the next data set: building the message, running the message through the waterfall template filter, and fitting the data into the tree.

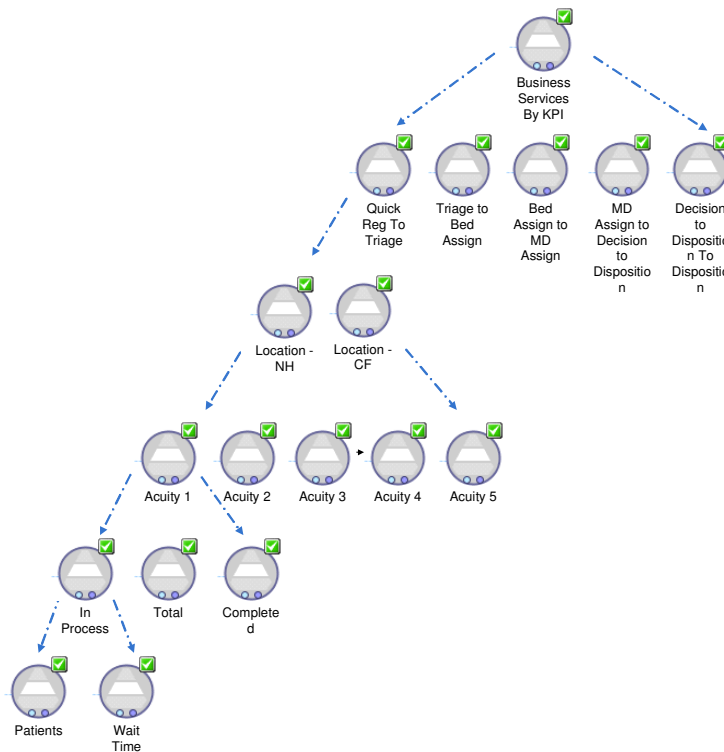


Figure 4 NHRMC 2009

9.3 Knowledge Gained - Pattern Based Software Development in JavaScript

Now that the model has been built conceptually at each layer, the data needs to be entered into the system. NHRMC is feeding data into the VSM messaging engine via a delimited ASCII file. Using java script, a program was written to read each row of the delimited file, parsing out each layer of the model, grouping the performance metrics across the known nodes at each layer, and calculating the average wait time and patient count. The java script then feeds all 300 messages into the system. This process is executed via a batch process.

In working with Tim Larkin, Compuware VSM expert and software developer, the NHRMC team discovered repeatable patterns within the key performance indicator measurements we wanted to build across business lines. Generally KPI's would always consist of some sort of turnaround time measurement and a count per unit of time. Armed with this knowledge Tim Larkin was tasked with developing a pattern based solution that would separate out the design of the model, the calculations that would represent performance, and the definition of the data files – all tasks that were hard coded specifically to parse, calculate and build the ED Tracking Board model. His findings are represented in Appendix C.

Upon completion Tim Larkin provided NHRMC with a report which details the operation and configuration of the solution, attached in Appendix C. NHRMC implemented the new code and validated it against the model and performance measurements from the original model with much success. In Appendix C, the details show the pattern based solution works off of several driver files which the application would parse to build the definition of the model, parse the data provided, calculate the performance metrics, and pass the messages into the VSM modeling engine. NHRMC went on to validate its pattern based solution against another model, one where the data was being fed in on an irregular basis, and the calculations were different.

The pattern based solution proved to be easy to expand to build additional trees, as well as scalable as we easily added additional calculation functions.

10 Project Execution

The implementation of VSM at NHRMC started with my assignment as project leader by Avery Cloud. NHRMC engaged Compuware and were initially assigned two consultants from Canada. We started with two lengthy conference calls, discussing at an academic level Avery Cloud's goals for the implementation and the Compuware consultants' outlook on the implementation. Throughout these meetings I started building the project charter and project plan. The groups were initially disconnected in terms of NHRMC's goals to implement the project as a proof of concept and Compuware's want to include the entire administration in the development process. Compuware came to Wilmington for a one day summary of their implementation plan. We discussed and developed a weighted criterion for what would make an acceptable business process to focus on. During this process it was decided that we would focus on dashboards to monitor four business processes:

- 1. NHRMC Registration System** – Develop an end-to-end business process dashboard that would alert administration to the health of its patient registration processes.
- 2. NHRMC Bed Control Application** – Develop an end-to-end business process dashboard that would alert administration to the health of its inpatient placement process.
- 3. NHRMC Lab Orders & Results** – Develop an end-to-end business process dashboard that would alert administration to the health of its lab results turnaround time.
- 4. NHRMC Billing - Develop an end-to-end business process dashboard** that would alert administration to the health of its account closure to billing turnaround time.

During this meeting we came to agreement on who would be involved, and NHRMC and Compuware scheduled a two day workshop to focus on the first business workflow: the NHRMC Registration System. This was chosen as IT has intimate knowledge of these business processes. In addition, out of all of the business processes, this was one that already had a fairly clear definition. Finally, before the workshop took place, the stakeholders signed off on the project charter.

As the workshop was scheduled, NHRMC would bring to the table a group of IT experts who were familiar with the registration process to begin diagramming the business workflow, from the top down, which was in accordance with the Compuware consultants' development plans. As the discussions started we found that the overall registration business process was different for specific sets of patient criteria. Based on this, scope was reduced to specifically the emergency department. End-to-End, we would monitor the patient throughput of the emergency departments. Out of the two day workshop, came the Appendix B solutions document from Compuware as well as a plan for implementing the solution in VSM.

As implementation was starting to take place, a disconnect between the project goals and Compuware became apparent. The implementation plan called for the data feeding the VSM dashboard to come from another application used in the emergency department called the ED Tracking Board. This operations system contained the patient data needed as well as all of the timestamps to build the business key performance indicators. Compuware was calling for the data to feed into another Vantage module called Server Vantage, which would then relay the information into the VSM module. In evaluating the hours Compuware was proposing for this implementation, there would be no additional project hours left to develop any additional dashboards. As project leader, I initiated several conversations with the Compuware project

team to inform them that this was not acceptable, and that the expectation had already been reduced from five business processes, down to two. After several debates, it was decided that we would feed the information directly into VSM, and that only one Compuware employee was needed to implement the solution versus six with the initial plan.

It was decided that Tim Larkin would come onsite to Wilmington and assist in implementing the solution. The initial engagement was for three days and the goals were to:

- Develop an initial script to feed data into VSM
- Develop the initial Service Templates to build the model
- Leave NHRMC with the skills to further the implementation until Tim could return and review with NHRMC how the dashboard xml manipulation works.

Within the first day we were able to build a script to feed information from the ASCII files that we were getting from the ED tracking board system into VSM. We were able to perform the calculations necessary and script the messages that would build the service management tree. By the end of the three days we had a 3 layer deep tree that we would expand to the 5 layer tree shown above in the next few weeks.

The setup was amazingly simple, but the code was not as efficient as it should be. As we expanded the tree, we worked on simplifying the code. During the next visit by Tim, as we looked at an additional business process we decided to develop a pattern based solution. Tim, as a software developer for over twenty years, provided a summary of the solution available in Appendix C. Basically, by separating out the data from the different functions needed to parse and feed data into the VSM system, we were able to abstract the solution, making it quickly applicable to disparate data sources. Additionally, the solution is quickly expandable as we are able to add additional functionality simply by writing a new function.

The solution is manipulated through driver files, which tell the solution what data to parse, the setup of the data, the data we want to store, the functions we want to perform on the data, and finally the messages we want to feed into VSM. Once that is laid out all we have to do is build the templates which will accept the messages and build the tree. We have proven the solution works and can be adapted quickly as we have built additional trees to augment the ED Tracking Board dashboards with ITSM.

Additionally, we have built an HL7 listener to receive streams of HL7 messages which we are able to parse through and feed data into a VSM tree dynamically. HL7 is a messaging standard that most systems in healthcare use to interface to one another. This messaging standard makes it easier for disparate systems to communicate as they output and input messages when necessary using a standardized method and format. With our listener we will strictly receive HL7 messages which represent admission, discharge, and transfer information from the sending system which controls these processes.

11 Summary

At this time NHRMC possesses several working dashboards which represent ED throughput. They are pictured below, with descriptions.

Executive Summary

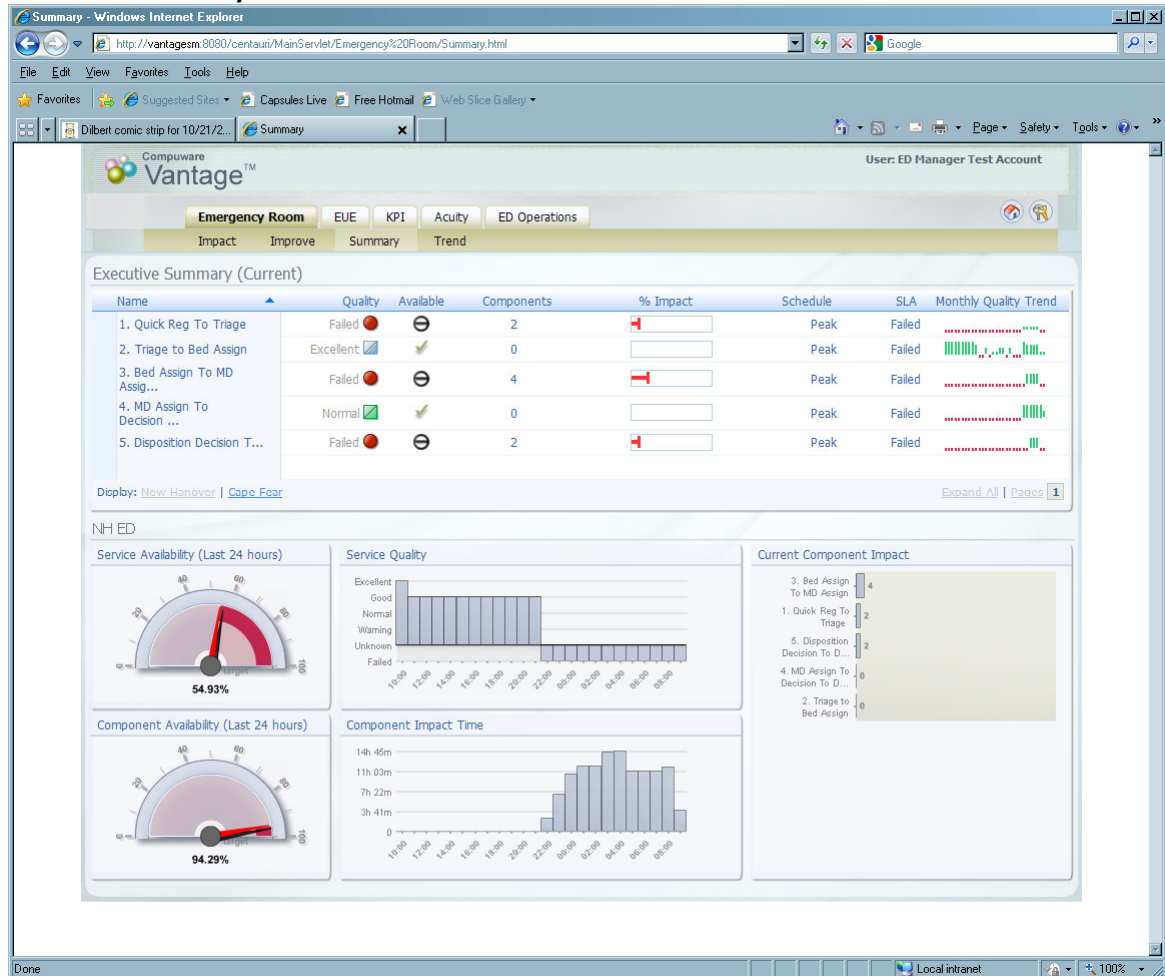


Figure 5

The above screenshot is of the ED throughput summary screen. The five KPI's are displayed at the top, their current Quality, Availability, Impacted Components, SLA status, and finally Monthly Quality Trend. At the bottom there is a gauge of Service and Component Availability. The bar graphs show, on the top, the SLA status for each hour for the last 24 hours. The bottom bar graph shows the sum of time per hour times the number of impacted components as an aggregated amount of service impact per hour. In other words, if two components showed down for the entire hour, time impact on the graph would be two hours over the last hour. This is similar to saying two people are unable to work over the last hour, so the organization has lost

two man hours over the last hour. Finally, you see a breakdown, by KPI, of the impacted nodes each has.

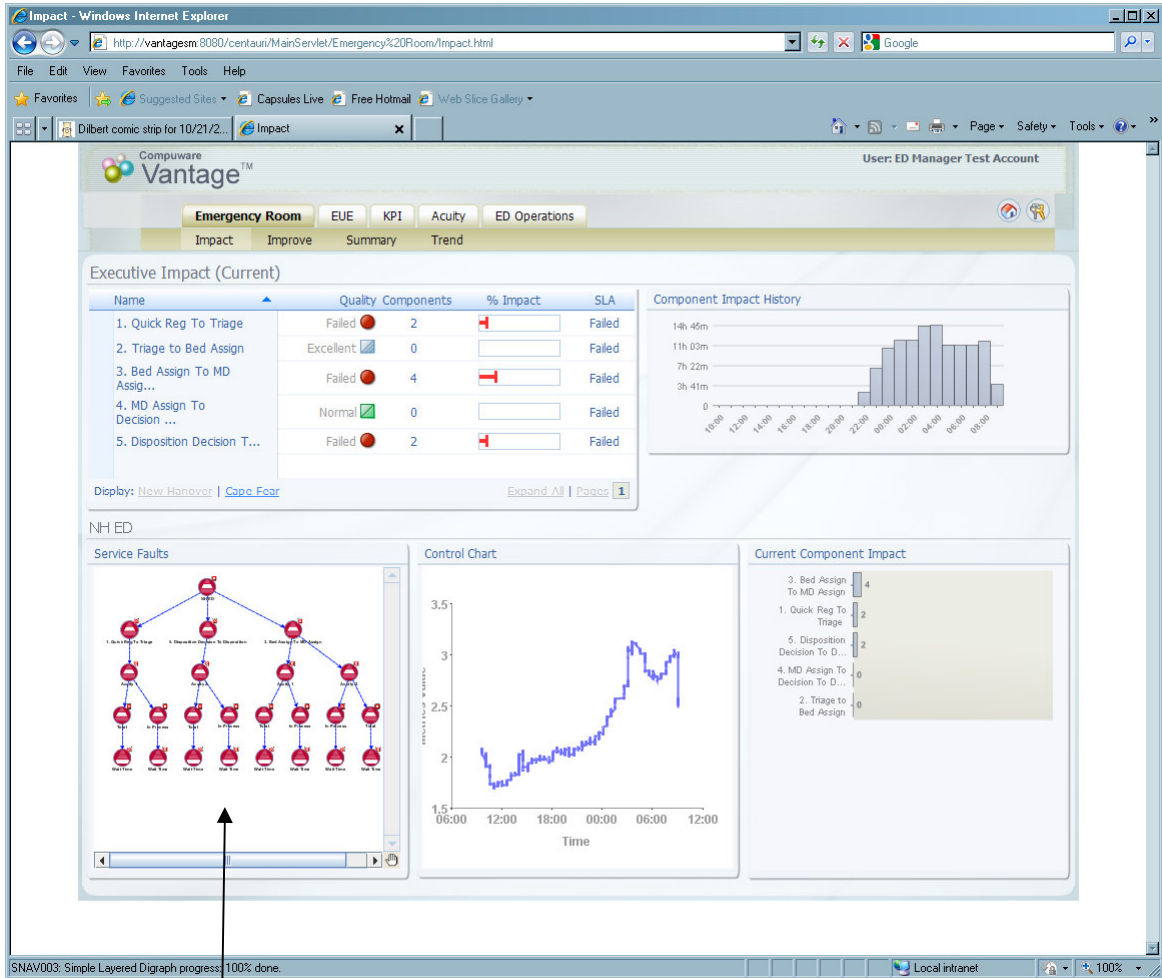


Figure 6

This screen has several of the same components as the previous screen, the KPI quality and SLA, the Component Impact and Current Component Impact. What is good on this screen is the Service Faults Tree on the lower left. This box displays the tree, however not in its entirety. The tree is showing only which nodes are in a failed or fault status. One can zoom, and drill into the nodes and quickly make business decisions to impact where the business is performing poorly.

KPI

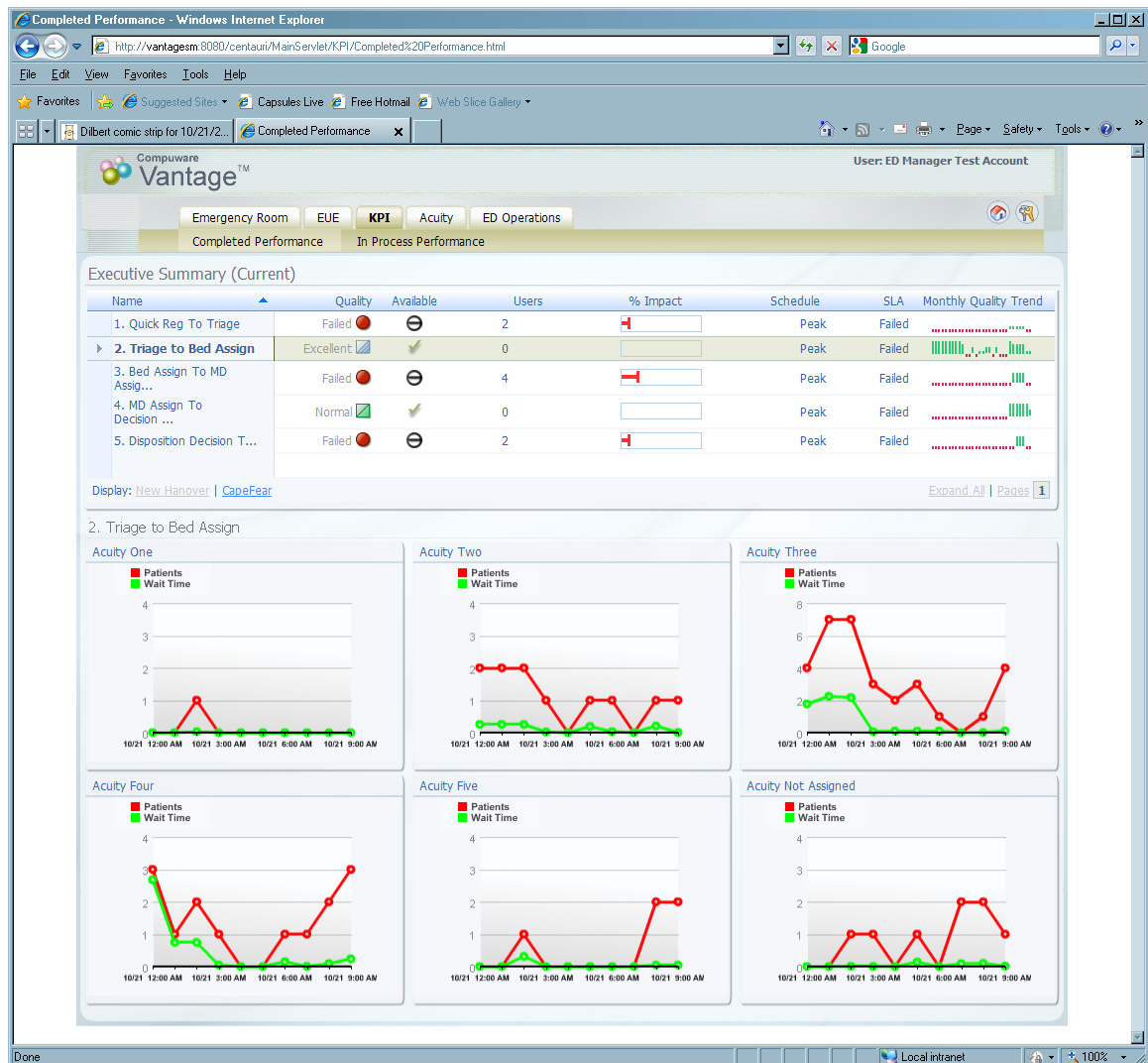


Figure 7

This screenshot is of the first graphs we built with the ED tree. Selecting the KPI at the top displays 6 graphs, one for each acuity or sickness rating, and the line graphs so, hourly, the number of patients and the wait times incurred. What this represents is a correlation between wait times and the number of patients – one would expect that as the number of patients increases, the wait times should too.

Acuity

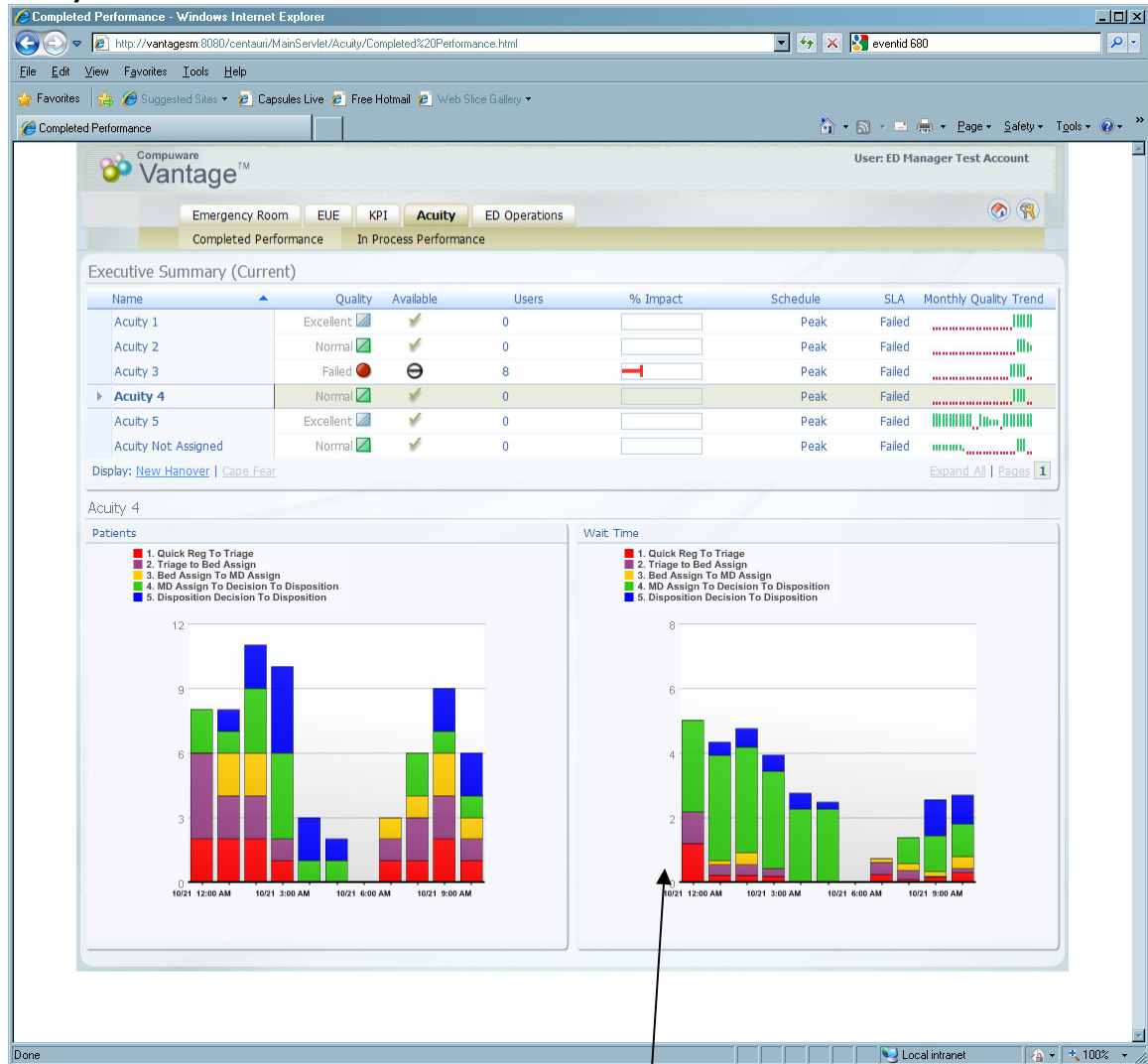


Figure 8

This screenshot represents the second dashboard that we built, which shows KPI's that have a start and end time. In other words, it shows patients that have completed steps in the ED business process. On this screen one selects the Acuity, which then displays the stacked bar graphs for each hour. Each graph displays stacked KPI's in their respective performance measures. The most interesting is the wait time, as the stacked bar graph height represents an approximate patient wait time through the entire ED business process.

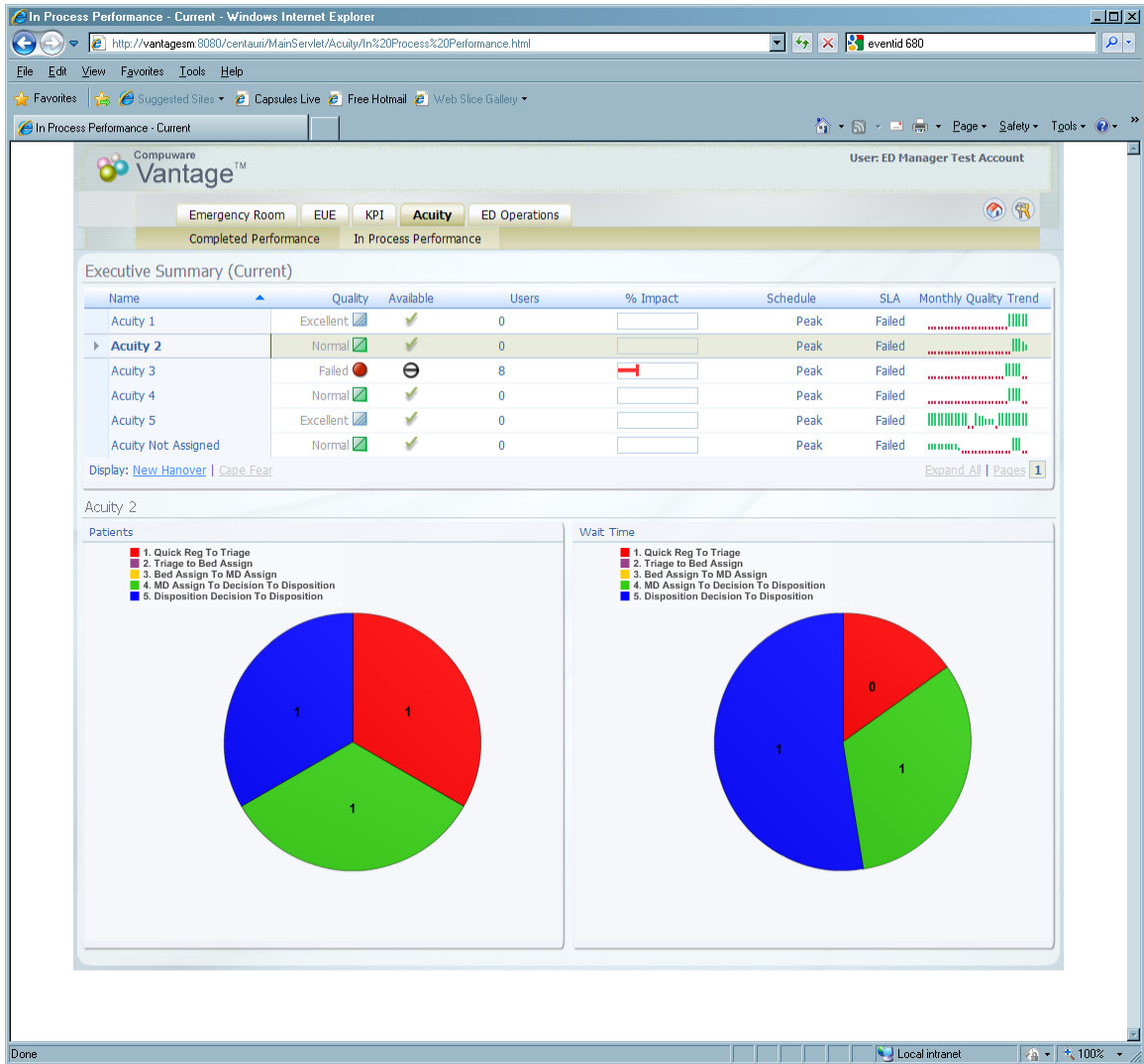


Figure 9

This dashboard is of patients, where the wait time – end time is null, meaning patients have started an ED business process and are still waiting in that business process. The project team decided to produce this in a pie chart, with the number of patients on the left, corresponding to their wait times on the right. The idea was for the board to refresh every fifteen minutes, with the last hour’s information, giving the ED operational managers insight as to where patient wait times are currently going up. This insight would allow ED management to move staff around, real-time, to alleviate wait times, placing staff where they are truly needed.

Operations

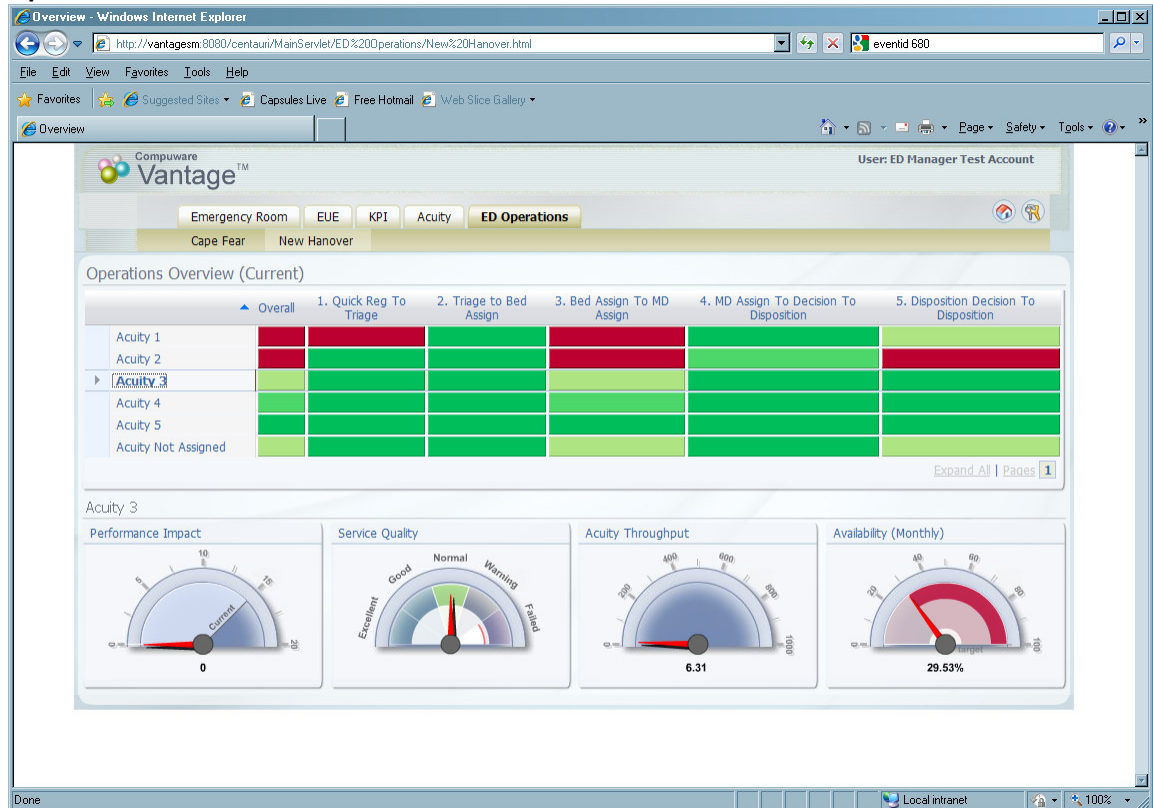


Figure 10

The operations tab shows another view of the overall throughput of the ED business processes, again, by acuity. One can see which KPI's are impacting the overall gauges at the bottom. The most interesting gauge here is the Acuity Throughput gauge –this is the number of hours, on average, it takes a patient of a specific acuity level to get through the selected ED location.

EUE (End User Experience)

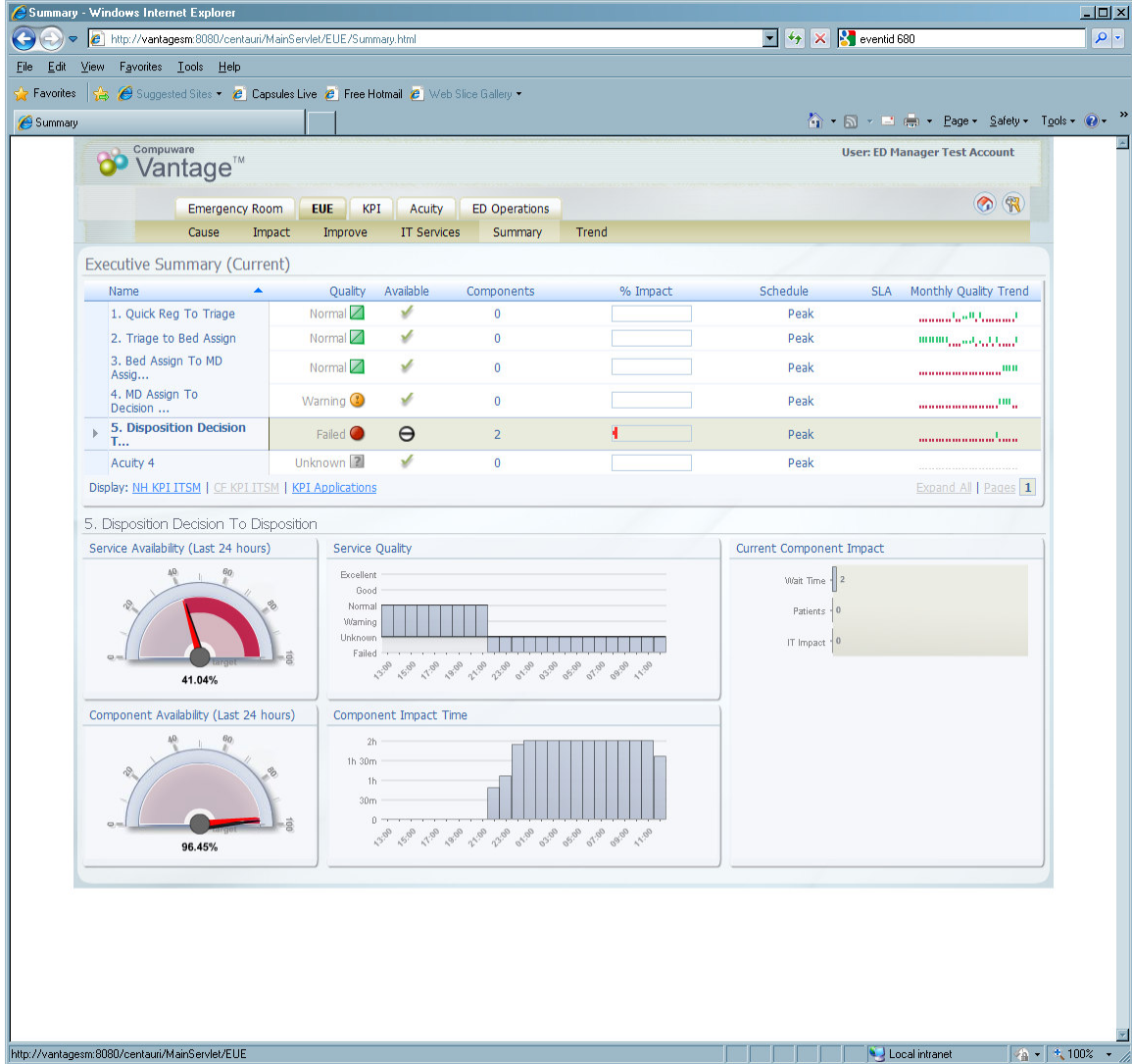


Figure 11

This is the summary tab of the end user experience dashboard. One sees the KPI's at the top, followed by the service and component availability gauges, service quality and component impact bar graphs; just like the emergency room summary screenshot before. What is different here is the component impact on the bottom left. At the base of the tree that this dashboard runs off, we have tied in IT Impact along with the business KPI measures of wait time and patients. What this represents is a quick executive view to see how IT is impacting the business.

12 Outcomes

At this time the solution is collecting data everyday and continues to run. However, at this time, neither the ED dashboards nor the HL7 dashboards are in production use. A development system has been built to continue development as marketing is beginning to take place between IS administration and the business. We are anticipating requests to tweak the dashboard, as the true end-users of the solution have not been able to provide input as of yet.

13.1 Future Work - CMDB & Automated Discovery Tool

For NHRMC and this capstone project, I would say that we have had a huge success. We have implemented, in a real world environment, a dashboard that allows the administrators at NHRMC to know the current performance of their emergency departments on an hourly basis. For this capstone project, the success has been huge for those same reasons.

Throughout the research and discovery, the documentation has supported the use of a Configuration Management Database (CMDB) as a foundation to standardize the components of IT systems and infrastructure. A CMDB is a database which contains all components of an IT infrastructure and their relationships. The CMDB acts as a single source of truth form which an IT organization can manage their entire IT system. For BSM, the CMDB is the foundation, as the components of an IT system, and their performance, link all the way up to the business lines the components support. When we began the project at NHRMC, we knew we had a gap in terms of a CMDB and would have to build the components for ITSM manually, which has been working well, except for when an undocumented change takes place.

During the project Compuware, at a company level, has since partnered with an automated discovery tool software developer: Tideway. Tideway is a software package that, once given

different types of authentication rights, will scour an organizations network and identify components present on your network. Tideway will also map out the different communication, by protocol, which goes on between the different components on the network. Communication protocols that would potentially be discovered are TCP/IP Socket communications, such as SQL, Oracle, HTTP, etc. What it provides is a single point of reference for all of the components in a system as well as the communication and type of communication that goes on between those components. Compuware has built into VSM a connector to feed this component information into VSM, standardizing and automatically mapping systems. Once the model are connected with the performance data being gathered in the other Vantage modules, the model is complete; standardizing the mapping of an IT system and its performance.

Now a discovery tool is not a CMDB, but it provides the foundation for an organization to map the discovered components to a CMDB which contains several other pieces of logical information. The discovery tool provides an automated feed into a CMDB to be matched with manually entered, logical, information about an IT system. At this time, Compuware does not provide a complete CMDB solution. However, NHRMC is confident that with the discovery tool, we could create the foundation to partner with Compuware in the development of a CMDB “light” as a Phase I implementation. NHRMC has held conference calls with another company that has developed their own CMDB by customizing the Compuware toolset. Their CMDB, however, uses all manual input with some automation through the insertion of data through ASCII files.

13.2 Future Work - HL7 Analytics Focus

Currently NHRMC is working on discovering further potential dashboards it could develop with the information available in the HL7 messages. Through research and information available

online NHRMC, will expand the analytic potential of this HL7 connector that has been built during this project.

One KPI already being developed with this HL7 listener are strictly just message volumes. The idea is that if one can track volumes and trend across hours, days, weeks, months, one could detect, at a high level, business service issues as volumes fluctuate away from a trend.

NHRMC feels that the next area it may attack with the HL7 messaging is lab result turnaround times, which is a business service mentioned in the original project charter (Appendix D). Since messages are sent when labs are ordered and messages are sent when labs results are returned, VSM could match up messages and report on turnaround times. Additionally this tree could be expanded to break down the data by requesting department. The impact of this could be, let's say the ED is requesting labs, and ED wait times start going up on the already created VSM dashboard. If we tie in the ED requests lab wait times, we could drill down on the ED wait times tree and see the supporting and interlocking, lab business service is impacting ED wait times. One can see how, as the new models are built for individual business services, you can begin to build the interlocking dependencies across internally dependent business services.

13.3 Future Work - VSM 11 Enhancements

VSM 11 has just been released by Compuware and NHRMC has already held several conference calls to discover the potential of the new and expanded features. In the new version, the largest feature upgrade is the VSM modeling engine itself. The "trees" have now become more abstract, removing the rigid, top node to bottom node hierarchy. One can now build a more logical tree, where nodes are logically defined, as well as the relationships between those nodes. In comparison to the current VSM version, each node was just defined as a top level, mid level, or base level node, with a standard parent/child relationship. In VSM 11, nodes, for

example, can be defined as a servers or applications, with the relationships between them specifically defined.

As of fall 2009 NHRMC is developing plans to:

- 1.) Implement the discovery tool, Tideway.
- 2.) Upgrade VSM to the next version, VSM 11, which provides several new features to allow the integration with Tideway.
- 3.) Further refine the End-User-Experience modeling with the Vantage suite of tools
- 4.) Further develop, with the input of the business, several other Business Service Management Dashboards.

14 Conclusion

In conclusion, the project team feels they have been successful. Although we feel successful, there are a few lessons that we have learned and hope to apply to future work expanding the tool's functionality:

1. Additional monies more appropriately budgeted for an implementation such as this. We now have a better understanding of this entire process, from documenting the business process to designing and building meaningful dashboards.
2. Additional resources applied to develop and maintain this solution is key. The development and ongoing maintenance are very time intensive tasks which require focus, especially in a rapidly evolving environment like NHRMC.
3. Input from the business lines that work the business processes each day, I feel is the more critical change in the implementation that I would make. If we pull in the end users that operate in the business service or process every day, the model will be more accurate conceptually.
4. Including the business service managers as the KPI's are discussed and developed on the dashboards would be ideal, as these are things that the business service managers may already be tracking. Showing them an advantage to the system should be easy, as VSM provides a real-time view, versus a weekly report.

5. Finally, if business lines begin to more realistically operate in an organized fashion with clear business processes, the dash boarding and maintenance costs will decrease. This solution is really for process driven business lines in which their management is already looking for ways to improve through process improvement.
6. We believe we will find time savings through the use of the business service management tools, however at this time, the key performance indicators that have been developed so far represent business performance through the perception of the customer. Through this perception we are unable at this time to directly evaluate the amount of time certain process changes save employees. However, we do believe that performance indicators built to monitor time savings would easily be displayed in the Vantage tool.

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Appendix A

Interview 1 with Avery Cloud – CIO – New Hanover Regional Medical Center

Question 1.) Any ideas for what I could accomplish as my capstone project?

Answer 1.) Rolling out – Vantage Service Manager product in the early spring, which will allow us to proactively monitor our systems as well as map the impact of a system outage to the business process that is affected.

Question 2.) What other ideas might you have?

Answer 2.) Could also further investigate and idea and paper that I started about a metric to value an IT investment. What does IT provide the business? – Time savings, although this time savings is not always easily equal to a dollar amount, such as the amount of time saved is equal to an entire full time employee (FTE). So you try to fractionalize the amount of savings by taking the time that is saved per business transaction, times the employee's hourly rate. This allows you to put a dollar amount to a fractional FTE reduction, adding an additional metric to quantify business value of an IT investment.

Action Items out of this Interview:

- 1.) Investigate the Vantage Service Manager Module
- 2.) Avery will forward the beginning of the Fractional FTE Reduction paper

Interview 2 with Avery Cloud – CIO – New Hanover Regional Medical Center

Question 1.) I would like to get several metrics/statistics on the projects for 2008.

Answer 1.) Work with the PMO, Managers, and Accountant to get the necessary numbers you are looking for

Question 2.) What is your vision for Vantage Service Manager?

Answer 2.) Predictive monitoring to stop problems before they develop, know the business impact of a problem when it occurs, be able to diagnose problems more rapidly

Question 3.) What is the Implementation Plan for NHRMC IS for Vantage Service Manager?

Answer 3.) 90 day implementation plan, initial team will install, configure, and develop initial set of high priority metrics, after that a secondary team will take over and manage and continually improve and expand the product

Question 4.) What are your long term goals for NHRMC IS?

Answer 4.) We would like to operate more efficiently, manage based on the organizations' needs, and make IT investments based on metrics and returns that show the business value of said investments. We would also like to continue to implement several ITIL best practices, implement them as repeatable processes that produce quality.

Question 5.) How would you define a quality repeatable process?

Answer 5.) Define quality as meeting the customers' needs, delivering high customer satisfaction, with no errors or failures, and meeting cost/time objectives.

Appendix B – Keith Beard Document – Removed

Appendix C – Tim Larkin Document – Removed

Appendix D



Project Charter

Project Name: Vantage Service Manager

Prepared By: Matt Hernandez

Date: 3.20.2009

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PROJECT CHARTER PURPOSE

The project charter defines the scope, objectives, and overall approach for the work to be completed. It is a critical element for initiating, planning, executing, controlling, and assessing the project. It should be the single point of reference on the project for project goals and objectives, scope, organization and estimates. In addition, it serves as a contract between the Project Team and the Project Sponsors, stating what will be delivered according to the budget, time constraints, risks, resources and standards agreed upon for the project.

PROJECT DESCRIPTION

Vantage Service Manager (VSM) is a module of the Vantage Suite of Infrastructure Monitoring Tools which allows “maps” to be built which connect IT infrastructure to the Business Processes that infrastructure supports. Dashboards can then be built, one that shows an IS Employee the specifically affected IT infrastructure, and one for the Business Manager, that shows which business process is impacted.

PROJECT SCOPE

- Install & configure Vantage Service Manager to enable a working demonstrable system,
- Define, install and configure Vantage Service Manager and all necessary components such as adaptors, agents, robots, tools and scripts to support a functioning solution. Please refer to other documents for a complete description such as the Engagement Approach and Deliverables Section from Compuware's Statement of Work.
- Define, create and implement Vantage dashboards (number not determined but reduced in scope such as 5 dashboards) and associated reports for NHRMC's Patient Care applications. The dashboards and reports are defined in the Engagement Approach and Deliverables Section within Compuware's Statement of Work.
 - Limited to 5 dashboards
- The project is a collaborative team based approach where work is divided between NHRMC and Compuware. Compuware will provide training, planning assistance, deliverable delivery, mentoring, and knowledge transfer on best practices for installation, configuration, and deployment of the Vantage Solution.
 - Training will consist of one classroom session for up to 10 individuals,
 - It is intended that workshops will be used throughout to facilitate learning and speed of tasks,
- Compuware will contribute as agreed to the delivery of documentation to assist in ongoing management of Vantage deployment.
- Compuware will review NHRMC's adoption of Vantage Service Manager and make recommendations for continued value realization.

Candidate Lines of Business / Applications

There are several candidate business areas or applications that foster the right opportunity for VSM adaption. The following represents criteria for selecting a candidate business process. Ideally, the candidate business process will be low risk and low visibility with NHRMC to enable the greater team to provide the solution as a learning experience, before wide scale adoption by enterprise based business processes. The following is the criteria:

Business Process Evaluation Worksheet

App or Business Process 2

Metric	Weight (0-10)	Score (0-10)	Value
Predictable – consistent business outcomes	10	10	100
Stable – runs well	10	3	30
Non-mission critical	10	3	30
Not Politically sensitive	10	3	30
Systems dependent within constructs (Metrics easier to obtain)	10	10	100
Less Human intervention	10	3	30
Consistent work patterns/flow	10	3	30
Easily Measurable – statistics as a part of outcome	10	3	30
Low risk score – measured risk	10	10	100
Excellent Executive relationship	10	10	100
Excellent Executive sponsorship/I.T.	10	3	30
Positive Impact to the Business – WOW factor	10	3	30
Non-propriety – might need db access	10	3	30
Organizational Structure is aligned and looking at the red	10	10	100
Sub-Totals	140	77	770
Total Value		55.00	

VSM is intended as a tool that monitors all levels of an infrastructure such that business and IT can achieve visibility to the same business and system events. Monitoring is successful if metrics and indicators of business flow is measured and reported. The following are examples of ‘points’ within the infrastructure that can be measured:

- Security Functionality – Reporting on the Failed Logins/Access Denied or any other security related metric which is available
- Transactions – Reporting on the average response, current response of these transactions
- Prescriptions – Reporting on the number of prescriptions, orders and results
- Radiology Scans – Reporting on the number of images, viewed and scanned, and the health of the radiology machines; i.e. Response time and ability to monitor the performance from an end user perspective.
- Value lost by number of users getting slow response
- Time lost by number of affected users
- Performance Metrics on our Claims/Billing systems

Timeframe

- Will be supplied by Compuware and adjusted to include our internal project tasks

Below are potential systems that score high on the evaluation sheet above. During workshops we will decide in detail the feasibility of producing a dashboard to bring visibility to the business processes below, either to the entire business process or a subset. There are constraints in the details of each system that may affect the feasibility of producing a dashboard for each process as well as time constraints. The stakeholders will be continually updated on progress to ensure accurate expectations.

High Candidate system – Registration System

- NHRMC wishes to monitor business events and progress within the Bed Registration System,
- VSM shall bring visibility to the end to end process of managing these assets,
- The team has established that there are sufficient points in the end to end system to enable visibility into the overall performance,
- The team has yet to determine the points of touch, the tools and the overall architecture to deliver this system – this project is intended to deliver these imperatives,
- The working system will have a combination of system constructs to enable it to function – the objective is to establish a working system in a shortened timeframe,

High Candidate system – Newage System

- NHRMC wishes to monitor business events and progress within the Newage Bed Control System,
- VSM shall monitor the end to end Bed Request and Assignment process within the Newage system to enable visibility into the overall performance,
- The team has yet to determine the points of touch, the tools and the overall architecture to deliver this system – this project is intended to deliver these imperatives,
- The working system will have a combination of system constructs to enable it to function – the objective is to establish a working system in a shortened timeframe,

High Candidate system – Lab Orders & Results

- NHRMC wishes to monitor business events and progress within the Lab Ordering and Results System(s)
- VSM shall monitor the end to end Lab order and results process within the Lab Ordering and Results System(s) to enable visibility into the overall performance,
- The team has yet to determine the points of touch, the tools and the overall architecture to deliver this system – this project is intended to deliver these imperatives,
- The working system will have a combination of system constructs to enable it to function – the objective is to establish a working system in a shortened timeframe,

High Candidate system –Account Coded to Final Billed - Patient Discharged, Not Final Billed

- NHRMC wishes to monitor business events and progress within the Discharge, Coding, and Billing business processe(s)
- VSM shall monitor the end to end process within this business process to enable visibility into the overall performance,
- The team has yet to determine the points of touch, the tools and the overall architecture to deliver this system – this project is intended to deliver these imperatives,
- The working system will have a combination of system constructs to enable it to function – the objective is to establish a working system in a shortened timeframe,

BENEFITS

There are numerous business and infrastructure benefits to this initiative. The following are intended as examples of benefits expected by the team in advance of this undertaking:

- Better decision making for infrastructure support from the data supplied
- Faster MTTR from data received,
- More Timely recognition of true impact to the business
- Communicate more effectively with the business – discussions start at the same point of reference,
- Predictive Monitoring
- Improve IS image / communicate more effectively
- Prevention of financial loss and potential patient safety hazards through reduced downtime
- Unite / Tie-in IS monitoring tools and coordinate integration across the department and the business units
- Prove the worth of monitoring in a measured and risk mitigated environment,
- Provide the opportunity of learning and implementing a new technology in an environment that is stable, well known, and measurable,
- Provide the opportunity to work collaboratively with Compuware to extract the highest learning curve not usually available to NHRMC,
- Opportunity to establish a repeatable process to engineering VSM solutions with Compuware to position NHRMC to be self sufficient and effective as VSM monitoring is extended to other more critical business processes.

OBJECTIVES of This Project

Objectives
Through predictive monitoring, reduce unplanned downtime
When performance issues occur, the dashboard will display to the customer the impact the business units
Ensure continuity in the interpretation of the systems performance data with the “business interpretation” of the transaction
Establish a working VSM system in a low risk stable business process
Work collaboratively with Compuware to establish methods, skills transfer, consensus on issues and problem identification and resolution
Develop repeatable patterns and best practices that work well for NHRMC
At the conclusion, be able to make recommendations to sponsors on many subjects; skills, next opportunities, best use of technology, investments required.

STAKEHOLDERS

Stakeholder	Title/Department
-------------	------------------

Avery Cloud	CIO/NHRMC IS
John Bloomer	ISOO

ORGANIZATIONAL IMPACT

Organization Unit	Impact to and Participation of Organization Unit
IS Network Engineers	PM, Install, Configure
IS Mednet/Clinical Diagnostics/Business Systems Analysts	Assist in building the adaptors to monitor the metrics decided upon
Specific NHRMC Executives	Assist in defining transactions/metrics

PROJECT ASSUMPTIONS

Assumptions
The project will have timely access to the appropriate personnel to assist in the development of applications specific metrics and business process mapping
All hardware & software on-site and available at the start of the engagement
The project will have access to the disparate systems data necessary to create and measure the specified KPI's, SLA's, and CPI's as they are available
This is an initial launch of this project – future projects are related
Break / Fix require an “all hands on deck” scenario for Problem Management. Such occurrences shall remove the team from this assignment. The assumption is that there will be work gaps in the project recognizing the skills required for Problem Management. The assumption is that such occurrences shall delay the VSM project.
The working VSM solution can comprise many system constructs: robots, agents, adaptors, database, dashboards and scripts to massage data and report thresholds. The assumption is that the environment is one of systems development through prototyping, or release management with configuration management, or another method of NHRMC choosing.
As an initial system construction and implementation effort, the target environment is tolerant of prototyping or ‘trial and error’ attempts at delivery. ‘Trial and error’ is assumed to be a series of tests with delivery in a ‘lab’ environment including the withdrawal (backing out) of the system due to failure or perceived injury to overall performance.
The project shall comply with NHRMC processes, checks, gates, and other approval points consistent with new infrastructure.

PROJECT CONSTRAINTS

The following is a list of conditions that may limit the project team’s options with respect to resources, personnel, or schedule (e.g., predetermined budget or project end date, limit on number of staff that may be assigned to the project.

Constraints
Predetermined Budget
Securing the appropriate Resources due to our current demands
Break Fix shall remove resources form the project for an unspecified period of time
Key staff or resources are redirected due to changing priorities within NHRMC
Disparate systems contain, and we can access, the appropriate data we need to build metrics

IMPLEMENTATION APPROACH

The project will be a hybrid of the implementation steps that Compuware supplies with our internal Project Management Process. The table below shows estimated timeframes and phase order.

PROJECT PHASES/MILESTONES

Phase/Milestone	Estimated Timeframe
Initiation	4 weeks
Project Charter Sign-off (milestone)	1 day
Kickoff workshop(milestone)	1 day
Planning and Architecture – 1. Develop Business Requirements 2. Develop necessary architectures to support solution	2 weeks
Business Analysis & Dashboard Mockup Develop Business Requirements Develop Data Sources	4 weeks
Execution and Control / Core Installation Determine & Establish Delivery Environment Construction	6 weeks
Configuration, Development & Validation Installation & Integration Phase	2 weeks

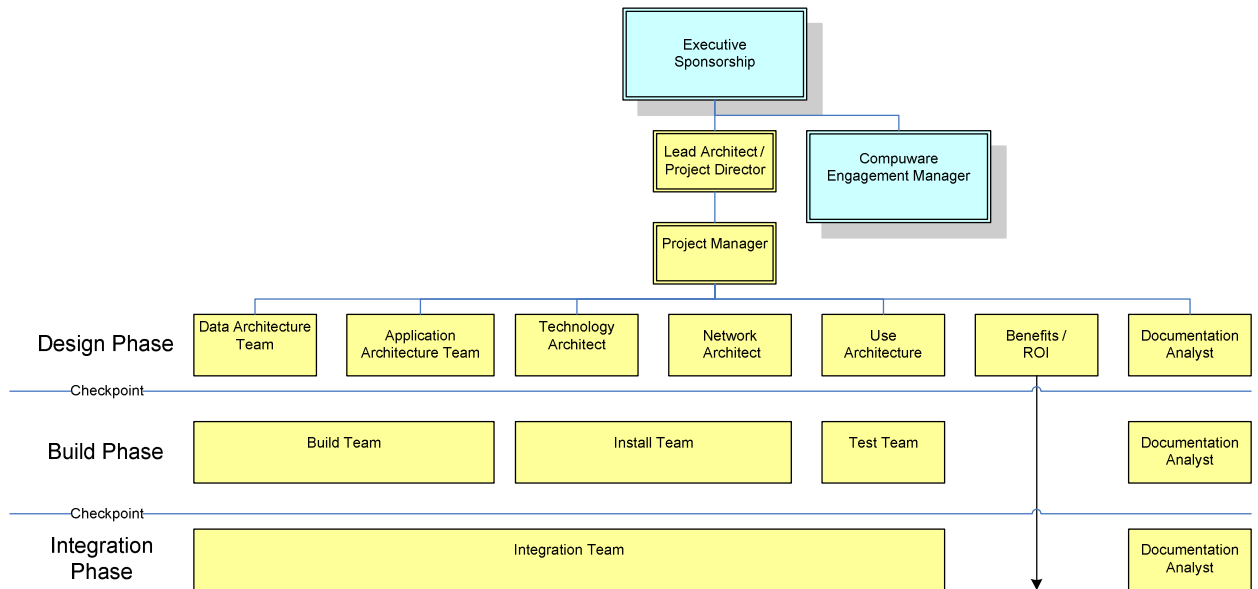
Design and Build Complete (milestone)	1 day
Testing Plan Sign-off (milestone)	1 day
Training	1 day
Go Live (milestone)	1 day
Value Check	2 weeks
Close	2 weeks

RESOURCE REQUIREMENTS

Resource Type	Project Team Member	FTE	Timeframe (Note Ongoing)	Responsibilities
Network Engineer	Matt Hernandez		All Phases	Project Manager, Technical Resource
Network Engineer	Kevin Javorsky		All Phases	Vantage Systems Administrator, Network Engineer Technical Resource
Clinical Diagnostics SA	TBA		Planning & Architecture through Business Analysis & Dashboard Mockup	SME
Mednet SA	TBA		Planning & Architecture through Business Analysis & Dashboard Mockup	SME
Business Apps SA	TBA		Planning & Architecture	SME

Resource Type	Project Team Member	FTE	Timeframe (Note Ongoing)	Responsibilities
			through Business Analysis & Dashboard Mockup	
Integration Engineer	Bucky Poff		All Phases	SME

PROPOSED ORGANIZATIONAL STRUCTURE



The organization model above is proposed as a collaborative functional team for this initiative. It is not final and open to adjustments as NHRMC so wishes.

PROJECT RISKS

A Risk is anything that may cause the project to fail that is beyond the team’s ability to manage internally. A ‘Problem’ is a challenge within the team that the team should be able to manage. If a Problem within the team becomes unsolvable, use of an escalation process shall invite a change request. Risks can be internal to the organization or external influences and are outside of the project team’s control or influence. (e.g., Internal Risk – steep learning curve due to first use of this new technology. External Risk – pending Federal legislation may cause a change in requirements.)

Risk	Likelihood	Risk Owner	Mitigation Plan
Ability to gather necessary data to produce metrics	Moderate	NHRMC IS/ Compuware	Allow appropriate lead time for investigation, leverage business relationships with vendors
Commitment from organization as this is a limited focus, initial implementation	Moderate	NHRMC IS Administration	Engage with specific executives
Securing Necessary Internal Resources	Low	Project Manager	Communicate effectively and as early as possible
Loss of key personnel for reasons or Break/fix	High	Project Manager	Possibly add contractors
Software barriers across many system constructs	Medium	Architects / Compuware	Need time to repair with Compuware Labs
Data synchronization	Medium	Architects / Compuware	Need time for best practice collaboration across active projects
Script testing	Medium	Greater team	Testing methods at NHRMC

SCHEDULE OF DELIVERABLES

The following is a list of proposed deliverables for a High Candidate System; that will support each phase and deliver a successful project.

NHRMC VSM Integration Project - Registration System

Phase	Deliverable	Sign-Off Required	Effort in Person Days	Due Date			
1	NHRMC Project Charter Approval	Project Charter	yes	3			
2	Initiate Project	Project Plan	no	2			
		Issues / Risk Log	no	0.5			
		Org Structure	no	0.5			
		Resource Plan	no	0.5			
		Finalized deliverables	no	2			
		Base artefacts Reg System	no	2			
		Project PRC and Process	no	0.5			
3	Develop Business Requirements Registration System Workshop	Business Process Model	no	0.5			
		KPI's, SLA's, CPI's	no	2			
		Business Dashboard mockup	no	2			
		VP/C dashboard mockup	no	2			
		Technical dashboard mockup	no	2			
		Business events / master sched.	no	2			
		Semantic data model	no	0.5			
		Use case descriptions	no	2			
		Issues and resolutions document	no	1			
		Benefits Framework	no	0.5			
		4	Data Sources and Architectures	Technical Architecture	no	2	
				Application Architecture (tools)	no	2	
Logical data model (sources)	no			2			
Physical Database model (synch)	no			3			
Script requirements and objectives	no			2			
Gaps and Issues to be managed	no			1			
Walk-thru' notes and issues	no			2			
Workflow analysis	no			1			
Strengths and Weakness analysis	no			0.5			
Finalized Use cases	no			0.5			
<i>Checkpoint (gate)</i> Presentation of solution	yes			1			
5	Execution and Control / Core Installation	Delivery Environment	Physical plant technology installed	no	3		
			test environment developed (lab)	no	3		
			Installation of VSM	no	3		
			System documentation	no	3		
			Installation of robots, agents, etc	no	5		
			Establish raw environment	no	5		
			Construction	Build Service Model	no	3	
				Tools (agents, robots etc) configuration	no	5	
				Business Dashboard initial creation	no	3	
				VP/C dashboard initial creation	no	3	
	Technical dashboard initial creation	no		3			
	Scripts description with walkthru notes	no		3			
	Build Scripts, test, SIT	no		10			
	Script documentation	no		3			
	<i>Checkpoint (gate)</i> Final SIT signoff	yes		1			
	User demonstration	no		1			
	Load test, balance, tune	yes	1				
	6	Integration and go live	training curriculum	no	1		
			User test	yes	1		
			test plan sign-off	yes	1		
Live in Prod			yes	1			
				104.5			
7	Value Check	ROI and Benefits completed frameworks		14			
8	Close	Turn over of materials		14			
		Lessons Learned workshop notes					
		Best practices document					
		Methods document					

PROJECT BUDGET

Budget Items	Dollar Amount
Software	
Hardware	
Consulting, Implementation, Training Services	
Total Budget	

APPROVALS

Prepared by _____
Project Manager Date

Approved by _____
IS/IT Manager Date

IS Director Date

Project Sponsor Date

Executive Project Sponsor Date

Chief Information Officer Date

[Glossary of Terms](#)