STRATEGIC ALIGNMENT AND EFFECTIVENESS OF GOVERNANCE IN HEALTHCARE INFORMATICS

By

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CERTIFICATE OF APPROVAL

This is to certify that the Master's Capstone Project of

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"*Strategic Alignment and Effectiveness of Governance in Healthcare Informatics*"

Has been approved

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ABSTRACT

Background: Informatics governance should be informed by overall organizational strategy, but also by metrics that should be able to measure the success of that governance. (1) Alignment with the organization's goals should be a given, and in order to accomplish that, integration and communication with the organization's administrative structures are critical. This includes the ability to demonstrate the need for what informatics can contribute, as well as the success of its activities. Furthermore, Informatics can and must be a contributor and resource to the organization as it makes its plans to move forward. Three primary functions of governance for informatics exist in any healthcare situation: strategic guidance and alignment; successful implementations of any informatics projects that have been decided upon; and the ability to quantify the success or lack of success of those projects. (1) At this time, in most organizations it seems that Informatics has been consigned to perform the role of project management and support, leaving the other two functions either partly or totally unattended.

Objectives: The goal of this project was to evaluate in depth what actions have been taken, or might have been taken in the past, so as to promote opportunities going forward to improve both the strategic planning and coordination with the health care organization it works in, and for developing , and optimizing their capability for planning and evaluating their own EHR implementations. Specific questions were developed to address these issues covering areas including: Informatics integration with their organization's governance, and how that is aligned; what is the process for decision making and prioritization of informatics activities; how does the organization allocate resources, and how is informatics involved in making those decisions; have informatics leaders focused attention on efficiency and end user satisfaction within their organization; and what metrics have been used or considered to measure the effectiveness and outcomes of what informatics has accomplished.

Methods: A qualitative study was performed incorporating interviews conducted with a targeted panel of key informants and informatics leaders from local healthcare organizations in the Portland area and Pacific Northwest. Using a standard interview guide with impromptu probing questions, interviews were recorded and transcribed, and the transcripts were entered into nVivo™ for analysis. Thematic development was used in an iterative fashion to address the issues that were raised. This study was done under the approval and supervision of the OHSU IRB.

Results: A total of 12 interviews were conducted 8 senior leaders (C-Suite) and 4 high level leaders (CMIO/CNIO). Time spent in informatics ranged from 9 years through 23 years, with a median of 10 years, although many were either new to their role, or had recently left a similar role elsewhere (at least 5 in the current study). There was a high level of transitioning noted among those interviewed. There was a good deal of overlap in reporting and responsibilities, and reporting lines were varied and diverse. Many of the

positions had evolved by history and necessity rather than intentionally. Implementation planning and alignment with the strategic goals of the organization were not well developed in most of the organizations, and integration of Informatics within the organizational structure was often not well defined. Problems with communication of goals, needs, and requirements were common. Programs and systems for distribution or resources were likewise not well developed, and barriers to sufficient resourcing were common. There seemed to be a lack of attention to the efficiencies or, more commonly, the inefficiencies of providers and to end user satisfaction. When pressed, the respondents were able to identify 15 potential channels for measuring what informatics was doing and which could provide the basis for additional study. Some metrics were already known, others were potential, and some were possible only in research programs at the present time, however all were deemed possible, and potentially important for measuring what mattered. A matrix of those metrics was developed in order to facilitate thinking about those metrics, and to create a framework for moving this effort forward for the future. The matrix consists of two axes. On one axis resides the concepts of how broad the metric can be utilized: for testing on an individual level, a departmental level or an organization-wide level. The second axis regards the type of metric, categorized as something that benefits the organization, that serves the quality or safety of the care provided, or something that measures individual activities or perceptions.
Conclusions: Aligning informatics activities with the greater organization is a necessary and critical function, however attaining such alignment is often problematic, both as a result of lack of communication upstream, as well as a lack of metrics that could demonstrate the value of those activities. Development of robust governance structures that are deeply embedded in the organization is critical. The results of this study suggest that the development of an integrated structure might be possible. How this might work, with integration of informatics leaders at all levels of the organization, and creation of mechanisms for engagement with other leaders and departments was described. Creation of an appropriate means of measuring what Informatics has accomplished, and the ability to demonstrate how it creates value for the health and strategies of the institution are critical. This is fundamentally important, as additional barriers are created if parts of the organization do not understand the value that Informatics provides. A matrix of potential metrics was developed in order to facilitate thinking about those metrics, as well as to create a framework for moving this effort forward for the future. As the practice of Informatics matures, it has become imperative that it become integrated into the life stream of the organization it works within, at all levels. Structures will need to be developed to allow that to happen in a meaningful way. There is a growing recognition that the ability to have metrics which can demonstrate the results of what is accomplished and prove its importance, not only to the organization, but to the patients that it serves. This recognition must lead to a more concerted effort on the part of informatics.

INTRODUCTION AND BACKGROUND

Informatics governance should be informed by overall organizational strategy, but also by metrics that should be able to measure the success of that governance.(1) Strategic alignment with the organization's governance should be a given, and a significant aspect of this alignment will need to be communication with the organization's administration to explain the need for informatics' activities, as well as to demonstrate the success of those activities. Three primary functions of governance for informatics exist in any healthcare situation: strategic guidance and alignment; successful implementations of any informatics projects that have been decided upon; and the ability to quantify the success or lack of success of those projects. (1)

In most healthcare organizations, the second aspect has been at the forefront, and has been the most successful part of informatics governance.(2) However, that function has largely fallen under the realm of project management, which, while important, does not eliminate the need for the first or third functions.(1) It is of note that there is a fair amount of research available in the business world regarding governance.(3,4) But despite what would seem to be an issue of such overriding importance in the domain of healthcare informatics, there has been surprisingly little available research on this topic.(5) Even when studies have been done, the focus often appears to center on the business functions of informatics rather than on the clinical functions within the organization.(6)

PRELIMINARY STUDIES ON THIS TOPIC

A previous (preliminary) qualitative study (2) undertaken to assist in the design of a subsequent national survey did not identify consistent beliefs regarding involvement of strategic concerns among the respondents. This concern regarding strategic alignment was not specifically targeted in that initial project. The research did, however, identify a number of potential channels (at least six) for evaluation of the effectiveness of the informatics activities including: Evaluation by financial metrics; Evaluation by clinical success; Evaluation by complaints/tickets; Evaluation by direct user surveys or interviews; Usability evaluations in any form; and electronic monitoring of metrics available internally through EPIC. Although these were identified, it was not clear how often or how well they were utilized.

The subsequent national survey was completed (7) and despite the suggested importance of both strategic alignment and the ability to measure effectiveness, it seemed that these

issues have not been adequately addressed by the organizations represented by the respondents to the survey. Regarding governance practices(7), consistently less than 20% of respondents felt that: their efforts were substantially aligned with overall organizational strategy; that they had successfully communicated their needs and benefits to their non IT leadership; that they had devoted sufficient time to optimize their EHR implementations; or that they had sufficient metrics or the means to evaluate those metrics for demonstrating the success (or not) of their activities.

Although overall organizational success is a stated goal, the survey's findings suggested that informatics governance and EHR implementations have not reliably taken these informing factors into account. Furthermore, given the current national focus on issues of burnout, safety, usability, and the consideration of the effects (burdens) that informatics implementations may have on this aspect of healthcare, (8;9;10;11;12) measurement of the effects of such implementations demand even further scrutiny and analysis. Specifically, the study concluded that:

> "Although experienced in EHR system implementation, the HCOs surveyed allocated most of their staffing resources to reactive and "lights-on" activities that maintain EHR systems, and fewer resources to proactive activities that could help them strategically optimize those systems. Informatics and IT leaders in these organizations lacked concrete EHR-specific goals and metrics, and the value of EHR systems was not understood by their executive peers.
>
> "Without strategic EHR roadmaps supported by specific goals and metrics related directly to their organizations' goals, it will continue to be difficult for EHR leaders to make effective resource allocation decisions, to demonstrate the value of their systems, and to obtain the operating and investment resources necessary to evolve them." (7, page 31)

The goal of this project was to evaluate in depth what actions have been taken, or might have been taken in the past, so as to promote opportunities going forward to improve both the strategic planning and coordination with the health care organization it works in, and for developing , and optimizing their capability for planning and evaluating their own EHR implementations. Given these considerations, the following research questions were developed.

RESEARCH QUESTIONS

To what degree have regional informatics leaders developed a structured approach to aligning their governance with the general strategic directions of the overall

healthcare administration? To what extent have IT leaders identified this as an issue?

Has healthcare IT governance developed a robust accountability to the overall administrative mission and strategies of their organization, including providing feedback of the successes or failures of various aspects of the informatics programs?

Given current concerns regarding decreased efficiency and burnout on the part of end users (clinicians), what metrics or evaluations can or should be implemented to improve optimization, and reduce those burdens that have been noted?

How have regional informatics leaders considered and attempted to ameliorate issues of usability, end user satisfaction, as issues to be measured or to be improved?

Has Informatics leadership determined best practices for evaluating the effectiveness of EHRs and other programs that they have implemented?

In an ideal world, what metrics or practices should or would be utilized?

In what ways have regional informatics leaders considered defining metrics to evaluate and measure their efforts, both towards the ends of improved demonstration of the value of healthcare informatics as well as improving the actual outcomes of those efforts?

RESEARCH METHODS

Using a standard interview guide (Appendix 1) with impromptu probing questions, qualitative interviews were conducted with a targeted panel of key informants and informatics leaders from local healthcare organizations in the Portland area and Pacific Northwest. This list of informants included, as possible, those interviewed during the preliminary project (2) in order to maintain some degree of continuity. 15 interviews were planned, with a minimum of ten interviews required. Informants from the prior study represented organizations including OHSU, Legacy, Kaiser, Providence and OCHIN and all of these were contacted. Interviews were preferentially done in person; however, telephone interviews were considered acceptable. All interviews were accomplished by the sole lead researcher (BN) and recorded electronically, and transcribed using a medical transcription service.

IRB APPROVAL

This study was reviewed and approved as a low risk human research project by the Oregon Health & Sciences University Institutional Review Board (study 20109).

EVALUATION OF INTERVIEWS

When the full transcript became available, interviews were imported into nVivo™. Each interview was evaluated line by line for details and thematic development. Specific attention for the purpose of this study was directed to any mention of strategy, alignment, "evaluation," effectiveness, success factors, or measurement. After finding all mentions that could be attributed towards those factors, they were sorted as thematic nodes, and counted as well. Other aspects of the reviewed themes were developed in an iterative manner, and additional themes and issues were explored as they arose.

RESULTS

DESCRIPTION OF SUBJECTS

Although a total of 20 individuals were approached, only twelve informatics leaders in total were available for interviews. Of those, 8 were at a senior executive level (Vice president or Director), and 4 were at a high mid-level position (Chief Medical Informatics Officer, Chief Nursing Informatics Officer, Medical Director of Informatics). Senior level leaders were considered as such as they sat at a C-suite level, and answered to the President, or were independent of other leadership roles. High level leaders were those that answered to other senior leaders, either at the C-suite level, or to Chief Medical or Nursing Officers. A larger system may have had similar level leaders either in different functions, or in different regional or hospital roles.

There was a high level of transitioning noted among those interviewed. As in a prior project [11], many were either new to their role, or had recently left a similar role elsewhere (at least 5 in the current study). Time spent in informatics, though was fairly long, and ranged from 9 years through 23 years, with a median of 10 years.

REPORTING LINES, RESPONSIBILITIES

There was a good deal of overlap in reporting and responsibilities, as some at a senior level reported only to the President, and others were either matrixed, or reported through differing structures, such as both operational (Chief Medical Officer) as well as administrative (Directly to Chief Health Information Officer).

Reporting lines were varied and diverse. In one instance for example, the role was to oversee regional informatics, and that person answered to informatics with a dotted line to CMO for the region. Another answered to their Information Technology department, with a dotted line to the CNO. There were several who were in matrixed position-answering to multiple leads (executives/CMO's/CIO's).

Two of the senior level executives had been able to assist in creating not only their own roles, but also in facilitating the administrative mechanisms to allow informatics a direct seat at the executive committee level. Either by putting themselves directly in such a senior executive role, or by creating institution wide working groups where they could interact at the highest level, they were placed with similar level executives at times when planning was done. Thus, they made themselves part of the planning process so as to

maximize their ability to influence processes that might require informatics participation or input.

Interrelations between informatics and reporting structures were most frequently the result of evolution of the roles. In that respect the roles were developed due to the interactions of the current or prior person in that role. Reporting links, while important, mostly developed due to the personal relationships that evolved. To make structures more difficult to ascertain, in several institutions, in addition to the administrative structure and the informatics staff, there was also a robust and separate Information Services or Information Technology structure which was responsible for purchasing, maintaining and/or servicing the computing infrastructure, and in at least one organization was in charge of the EHR software as well. Thus, while informatics was involved in training, optimization, and determining additional informatics (EHR) needs, the actual builds and development work in some systems was done by a different department with its own budgets, staff, and structures.

The difference between being in informatics versus Information Technology Services (what will be referenced throughout as IT) cannot be understated. Although some such departments are integrated, IT often was a separate department- with one handling electronic services, and the other handling the EHR and related training, workflows, etc. In some situations, IT even was responsible for development of the EHR but influenced by Informatics. This frequently required push and pull and was not as functional due to competing demands for training, engineering, governance, sitting on committees, etc. To further complicate the picture, in one organization, Informatics was considered a system "pillar," but it reported in a regional role to separate reporting structures.

Other organizational challenges included the need for managing multiple informatics teams, in- and outpatient, home care, etc. There was a belief that having separate teams required extra effort to break down silos. Thus, their role consisted of breaking down those barriers/silos between different areas of care.

In larger systems, a conflict can also exist between local or regional roles and overall system roles. The problem arises as to how much leeway does a particular system allow for regional differences in needs, vs. standardization across multiple hospitals, regional systems, etc. While standardization improves efficiencies, it may not allow for satisfaction on the part of local parties to do what they want or need to accomplish. Broad areas of responsibility also create issues for leader's roles in coordination between administration and clinical leaders. Oncology was cited as one example. Here Informatics had to coordinate across multiple institutions to arrive at mutually acceptable compromises (the system needed to develop clinical institutes that each governed clinical

programs across an entire multistate system). The diversity of these interrelations has important implications for how most of the subsequent issues are addressed, or not.

IMPLEMENTATION

QUESTION: *To what degree have regional informatics leaders developed a structured approach to aligning their governance with the general strategic directions of the overall healthcare administration? To what extent have IT leaders identified this as an issue?*

Four primary themes were developed during the review of the answers to these questions. Is the decision-making process driven by the system, or the administration of the organization; is it driven primarily by clinical needs, or the needs of end-users? Or by some mixture, or rather by a disjointed process? Finally, there was the question of what process(es) would there be in a perfect world?

System Driven Implementation

a) How System Driven Implementation Gets Done

The concept of some form of senior level governance committee was noted frequently. However, the structures and the mandates varied.

One subject suggested that while organizational strategy may drive choices it is the organizational structure that makes the decisions: things are decided "up on high", and IT has to implement it and is responsible for it. Informatics was told, not asked. That system did, however, establish an Advisory Council in conjunction with partners from administrative operations that also had all the specialty group leaders. There, if the senior leaders see clinical needs, it becomes a push, but it's still not an integrated global governance strategy. Several subjects did stress that it *has* to be a top down process because support has to come from above, and the resources have to be put in so it can succeed. Without that support and sponsorship, things would be unlikely to succeed.

In another system, Informatics developed a mechanism for intake of good ideas. There was a process for prioritizing work: sometimes EPIC makes changes and they just have to be done; small things can just be done; medium things - a change or a project - fall into no man's land; and then strategic shifts have to go to a Healthcare Executive meeting with administrators making decisions and with priority and rankings done with IT input. Then Informatics must try to do what it can. The really big asks need to go through

capital expense process, including everyone from CEO, COO,CMO, CMIO, and so on. It can take a year to go through process. For other work, 40 hours is the decision point (over/under): if less, and the CMIO likes it, it just gets done. If over, then it has to be written up and submitted to an Informatics Governance committee (unclear as to membership) and the committee has to decide what is to be done, what is not done, and prioritize the requests. There was no clear structure, and no evident interaction with the organization's strategic plans.

b) What Gets Done in System Driven Implementation

Multiple respondents noted that Informatics must bridge the technical department (IT) and clinical/operations – where in the past, IT decided what would be done based on cost and availability, now it is being pushed a bit more by clinical needs and health of the organization. However, it was noted that this is just beginning, so it is still a challenge. A lot of this is driven by keeping current with vendor requirements -EPIC gives you stars, or points- more and more you just are pushing forward satisfying EPIC requirements which often receive the highest priority. Another similar issue that arose was that overall strategic changes in implementation were often handed down as mandates, with no resources dedicated, and with senior administration having no idea what requirements were even needed. Informatics was just told they have to do something. Regarding this process, one respondent insisted that "[he] keeps [his] head down when people say they will design governance structures" and that he mostly tries to get things done that need to get done. This statement was mirrored by several others as well.

Another theme that arose was how things proceeded over time. The concept was described as being similar to putting in a printer: here it is, then you walk away. It was felt that this was being done with the EHR to an extent. The attitude of the system (administration) was: OK, it's installed, now on to the next project. Also, senior leadership "didn't really find the compelling reasons [to actually] make a providers life better." "There was no testing it, no checking with front lines to see what was needed, how can we make this better." This was compounded by the sense that vendors sold a bill of goods to the administration, followed by requirements from the government, etc. that have informed much of the decision-making process, and not much of that has changed years down the line.

A notable byproduct of the top-down approach, especially when a large portion of the informatics team was volunteer-based, was that informatics implementation often resulted in a people-driven process depending on who was there to do the work. Those who wanted to get stuff done would step up and do it, others were just doing it for a job,

or were not interested in doing things, or innovating, and became happy to do nothing or delegate to those who were.

Informatics Driven Implementation

Other than things from clinically driven, things were generally described as being driven from above. No one indicated that informatics drives anything specifically.

Clinically Driven Implementation

From the standpoint of implementation processes driven purely by clinical needs, responses were varied but infrequent. In one system, decisions had been made at the local or regional medical staff level based on requests and suggestions from front line providers. However, this had subsequently been reorganized into clinical institutes and programs: Clinical Decision Teams. In the purview of these teams, discussions about improved clinical care led to suggestions regarding EHR functionality which now drives implementation. These teams were empowered to offer input to senior level decision makers regarding prioritizing implementations. However ultimate power still resided at the top levels.

It is of note that other than things that are clinically driven, things are generally driven from above. No one indicated that informatics drives anything specifically. One comment though did mention that previously, when informatics was also the clinical champion, if they did something unpopular, they became a target. This sentiment could provide a reason as to why informatics may have receded into the background. Another informant suggested that it should not be informatics' role to set up governance for the clinical decision makers. But informatics is still very much dependent on an intact process and venue if it is will be able to actually deliver for the organization and its priorities.

Implementation as a Disjointed Process

A disjointed implementation process was noted to occurs for numerous reasons. In one organization, projects came from the operational side and from informatics and from IT-push and pull occurs between the three. However, the governance structure was IT oriented often leaving IT with the final say regarding assigning priorities usually based on funding and available resources. Similarly, dis-coordination can be due to requests from multiple sectors, also not often coordinated. Whether the sectors are different

clinical departments, diverse hospitals or regions, or even different system silos, a coordination mechanism should be there, but is not. So, suggestions have to come into the "hopper" and get prioritized compared to all else without proper understanding of the relative benefit or costs to the overall institution or system (even sometimes without an understanding of what the project itself means). In several organizations, once senior governance prioritizes it comes back to a resource management council (on the IT side) and project management has to state how much time is needed, and then it gets done, or not. The problem that then follows, is that many of these IT run projects usually are getting done as stand-alone projects- they provide a possible technological solution but, depending on resources, and which department is assigned to implementation, there is no change management, and other things needed for adoption and acceptance do not get done.

What Would Represent Perfect World Implementation Planning?

Several subjects suggested that organizations with the biggest satisfaction were those that people who used the EHR and other technology are actually involved in governance, design and feedback for the software. Clinicians should be involved at all levels of the process. Therefore, governance should be at the operational level: what does patient care really need? That should be driving force in a perfect world. After operations decides what is needed, then IT would interact with informatics and the system and the decisions to go forward would be based on that,

Another suggestion was that perfect world implementation is now where you are putting in place projects to support your EHR in an ongoing basis. This should start with a user driven project request, then a needs analysis, which then moves up the chain, gets a stakeholder's champion, then goes to a stakeholder committee that can look at the projects, value them and prioritize them against the strategic direction of the organization. This is the bottom up view of alignment. It is framed through the lens of partnership. Sometimes pieces come from changes in the EHR or vendor itself, sometimes pieces come from end users, and then Informatics is the place where they can come together and bring them to life.

Another view, though, is that informatics governance is must be a subset of the overall organizational governance and that its strategy should be a subset of the overall organizational strategy, with priorities set by entire system. One subject continued to suggest the use of Lean methodology: looking at strategic projects first= strategic differentiators, but then including informatics and IT in the discussion as to feasibility and costs. One of the biggest barriers is the way finance does the budget, if it does not translate into what the institution needs done. So, budgeting should be the first step in

how you organize your operations. Then the organization could create a cross functional road map of what needs to be done.

In a perfect world- alignment between organizational strategies and informatics should propel new ideas that inform the strategy but also react to the strategy (a two way street). It is really like the push pull concept- so informatics helps create the strategy but also informatics sustains the strategy. From standpoint of clinically informed implementations there was the suggestion to embed informatics in all those governance venues so that they could give advice during all stages of planning and decision-making. Also, where IT is different from informatics, informatics must be part of the leadership team, working with the priorities and goals, along with the assignment of resources by the IT department. These concepts also arose during the discussion of strategic alignment (see below).

Another comment that recurred was what makes it work is that the governance structure doesn't depend on a lot of rules and regulations and paperwork and processes, but more on camaraderie of people with shared goals who work to streamline the processes involved.

STRATEGIC ALIGNMENT

QUESTION: *Has healthcare IT governance developed a robust accountability to the overall administrative mission and strategies of their organization, including providing feedback of the successes or failures of various aspects of the informatics programs?*

Responses to this line of questioning gave rise to several themes which were divided into first, how does this type of alignment currently work, and then how might that be improved.

1. How Alignment Currently Works:

A comment that suggested the overall problem is that Informatics necessarily sits between the system and the organization- it has to be in between- however is it a main pillar in the strategy or rather a service to all pillars? The challenge to Informatics is how do you balance all of the input streams: streams from user requests; streams from business needs; streams from system or from local or regional parts of the business; and streams from technology/innovation of what is available, etc. In one organization, the solution proposed, and instituted, was a Clinical Council, which was where the

prioritization could occur—along with alignment with the overall strategic plan for the future.

One organization developed an overarching program for integrating clinical, financial, and administrative needs within the viewpoints of their mission and strategy. They also began moving towards what was described as a "Lean methodology" where what Informatics is doing can be more closely aligned with organizational strategy. For strategic projects Senior VP's (all departments) complete a project request describing why; Everyone needs to understand, what the needs are- both for organization as well as what resources are needed. Another system appointed an Advisory Council that also interfaces with informatics. This was still a work in progress, and the membership of that group was not clearly defined, however the intent was to align the decision-making process according to the strategic goals of organization. Previously they had just looked at the projects and prioritized according to resources and what was possible to do. Now they have started to take into account overall organizational health.

In another organization, leadership groups were put together, run by executives but with input from the clinical domains. These were run by the administrators that represent all of the facilities being under the domain of informatics, and they are now the ones that are supposed to be making the prioritization decisions. The concept was that it was no longer merely informatics saying this here "we're here from the government, we're here to help." However, after those new governance committees got established, meetings were arranged, but people, usually the clinicians, did not show up, and they could not obtain quorums, and this allowed the problems to persist. Engagement was a persistent issue, especially at the caregiver level.

In another, informatics leadership's relation to the governing council was to have influence but not voting rights. The leader whose comment that was indicated that's really the way it should be– Informatics should be a resource to the institution, it should not be driving the institution.

However not all organizations developed such oversight. In what could be either a problem or a functional solution, in one system, IT oversaw all informatics projects, not just the EHR. The CEO and board constructed the mission, Senior VP's constructed the projects and tactics to fulfill the strategic plans. IT had overall control of portfolio, and made decisions as to what projects got done now or later.

Another type of solution was seen when one organization changed governance from the hospital, to a regional, and then to a system level. They had to align, at a system level, all of the inputs from the various regions, and they had to do the same from the hospital or

program level. So Clinical Decision teams were created at the system level with inputs from across the system- these could decide on system level changes or edits, or implementations, and also to potentially drive improvements in care for the entire organization.

From a nursing standpoint, at one institution, the CNIO sat at the table with other chiefs of nursing. Her comment was that optimally they should all have had a say in the development of and assignment of priorities. The problem was that this left decision-making to each of the departments separately, leaving the process too siloed. So the issue remained that while the process did not necessarily result in conflict, that due to the silo effect there was no coordinated control of decision making from one department or the other or from above. As mentioned earlier as a common theme, the follow-on comment was that way it works was still mostly that "it's good looks and charm. That's your primary tool."

2. Problems with Strategic Alignment:

a) Communication / Coordination both up and down the line:

Communication of strategy seems to be a frequent issue in nearly all organizations. Often strategy is not well communicated to frontlines and not adequately documented or deployed to align strategy with actions. This can lead to problems with employee engagement: Nurses and Doctors don't come to meetings. There were committees and they didn't accomplish much, so people saw no value in coming and they stopped. There was a general impression that the clinical functions are downstream, but informatics still had to try to make resources available to help each department achieve what they feel is important. Another comment was made that in one ambulatory organization, informatics was not even at the leadership table. This then leaves them guessing what the priorities are. Informatics at that level is always trying to catch up as to priorities. They have to figure it out in an indirect way.

Another issue raised was the timing of requests and responses- informatics, though trying to get ahead of its long list of needs, often finds out too late afterwards what was actually selected or approved. The problem is that senior leadership is working on its strategy and its impacts on planning, but Informatics is the tail, and does not find out what is going on until later. Finding a direct connection would be important and helpful, but cannot find it—again, it comes back to communication.

A side issue of communication is a lack of alignment with the workforce. One respondent mentioned that even if the organization runs a perfectly coordinated strategy and has processes in place to align all of Informatics and other activities perfectly, does the strategic plan even agree with strategic views of the workers/rank and file? Should that matter?

b) Structure:

In at least several instances, the problem with their informatics governance was that there was no real informatics structure. There was a series of teams and they would all answer to their own senior administration which would decide what they're going to do. The ORG chart had little crossover until the very top- so there was no prior coordination or strategic thinking until the very top. This limits how the organization can make things work strategically (Note that this can also apply to issues of accountability)

Lack of appropriate structure can lead to Silo effects: between local and regional; between departments; between administration and clinicians. If things are SILOED there may be no coordination between various departments and the planners.

If IT is part of equation (admin/Informatics/IT) then communication and alignment get worse. Having ultimate decision makers that are outside of the administrative/clinical axis creates even more issues- analysis paralysis is a problem, someone gets stuck holding the bag to make a decision, and no one wants to make the wrong one. When IT is managed overall by the larger system, it means that local services march to the national drummer from strategic standpoint- and local strategy or needs may be different from the national strategy. Also, many regional projects are sometimes being done that overlap, without coordination or oversight.
A corollary of the Informatics/IT dilemma is that the choice of EPIC mirrors other choices- they were sold a bill of goods, but IT makes the decisions and clinical staff need to live with those choices. Informatics is in the middle of selling IT's choices to its consumers.

c) Strategic Issues Related to Metrics:

More than one subject indicated that the organization still needs metrics up front, as well afterwards- to measure success, improvements, etc. You need to understand what you are going to do with a project- what are you going to accomplish, what is the improvement

and is there a commitment to come back in 6 months and measure if you did or did not do it. Right now, it is not systematic- things just happen, and how it gets done is just by getting there not by methodology.

One organization was looking at process metrics in the EHR and the clinical goals that are supported to define their six strategic pillars. Frequently all they got around to doing was delivering the workflow and not doing the homework afterwards. But the end outcome of the work Informatics did to help the system accomplish its goals should prove whether they have the right core priorities, and from the governance decisions made did informatics help them achieve it. A comment made was: "can one measure governance per se as effective? If you put something out there, no one's using it, it was the wrong priority or the long wrong leadership and its implementation and it didn't align with the priorities and the rank and file, then the answer should be no. The only way you will know that, however is if you have the ability to measure what you are doing, and then actually measure it."

A corollary to this was how could you use Informatics to manage operations better, and it seems that's what organizations have had a really hard time doing. If you're trying to look at quality, is the electronic health record built to manage quality? And if you're trying to manage cost, is the Informatics system built to manage cost, and is it really being used to full advantage? The answer in most situations was "no." A comment to that effect held that if you look at the broad variability of physician practice across patients that's not due to the patient's variability, it was the experience that the EHR was never used to pursue that.

d) Accountability

Another substantial issue identified was the question of accountability. Who is responsible for decisions, who is responsible for actions, and who is responsible for results? For any successful organization, these individuals need to be identified, and the point of accountability is that whoever is responsible is held to account.

Question number one would be who is in charge? Senior leadership? Informatics? IT? And who is in charge of change management, and implementation, and follow up afterwards.
One respondent mentioned "the vital few" in the budget/strategic process- but that vital few is not seen until after informatics gets called. and then it also becomes vital many. So, priority setting is one thing. The alignment of the work is another, and then the decision about what the workforce looks like is made by yet someone else. There was an impression that informatics is, in general, somewhat under underrepresented and undervalued in the equation. It's easier to see that there is a need for the build team, you

know that an analyst is needed, but if the analysts aren't interacting with users, you need some way to get that feedback, and since no one knows what is going on at the end point, there is no way to assign accountability either for what was prioritized, what was budgeted, or whether it even met the strategic goals.
The theme of needing an Informatics priority group or an Informatics governance group that has as part of their charter that the work that gets done will reflect the overall organizational policy. However, consistently it was stated that even then once you get down in the details sometimes it's hard to link any particular IT request to the bigger goal. A frequent reply was that often Informatics is just trying to make the electronic health record work better, collect data better and improve the work flow of the people that use it. So, according to one respondent, "you're counting on that group of eight, 10, 15 informatics people to reflect the overall organizational priorities." But it is those people who know that some specialties are hurt worse by the EHR than others, and when they try to address those problems no one may be able to tie it back to any more specific organizational priority. And who then is accountable for the results- the senior administration? Or the head of Informatics? Or the tail end of the line- the informatician (who has now become one of the "vital many") who is just trying to make things better for an end user or department?

e) Changes in Strategy:

Another theme that arose is where changes in strategy occur, which can lead to disruptions in basic functions. A glaring example was when in one system, Informatics was told to put EPIC into newly merged hospitals, leaving them to have to drop all work in development, training, upgrades, etc. in old hospitals that they had planned and budgeted. In other organizations, changing tides, organizational realignment/restructurings occurred, leading to disassociation with prior goals and priorities. This can improve if it stabilizes, and in at least one instance, Informatics was made a strategic pillar of organization enabling it to be more involved early on. However, the kinks were still being worked out. IT was a feeling, though, that informatics was still undervalued in that equation.

f) Funding/Budgets

One observation was that while funding falls more under the rubric of resource allocation, it does have important consequences for strategic planning processes and alignment. Where the money comes from and how it is allocated has real implications. This issue comes back to communication as well- asks may be funded or not funded because administration does not understand the financial constraints.

A similar issue noted was that often Informatics can be unsourced. Departments or hospitals may get their project approved, but then they go to Informatics and say now we need it done. They then have to have another funding process to cover the Informatics costs, and if it gets turned down it becomes Informatics' fault. Similarly, internal customers hear about something and wedge it in sideways, rather than go through usual budget process, and then come to Informatics to get it done. Informatics has difficulty in communicating that it has constraints, and cannot do it faster, cheaper, and better without resources. You cannot say you need it TODAY without consequences. Others don't understand, and this comes back to communication up the chain as well as across the organization. For some reason leadership often does not seem to understand this. In addition, Informatics leadership often doesn't have the opportunity to pitch for adding resources. There are usually too many cutbacks, not enough adding resources to meet demand. Senior admin prefers to bring temporary help, using outsourcing rather than increasing staff. But demand is always there, and usually is growing, and this gets conveniently swept under the carpet.

Another issue raised was that usually there is no coverage for analytics, AI, machine learning, and this does not even include virtual care/telemedicine. Since there is no budget for these general needs, there is no funding for talent management for their continuity and upkeep. It was stated strongly that every organization needs to have processes in place where these things are part of global strategy and funded overall, not project by project.

One comment was made suggesting that perhaps senior leaders or administrators would make different decisions if they understood beforehand what contribution to hitting a target financial number came from Informatics' abilities: to get new staff trained on the EHR in a timely manner; get them credential in a timely manner; or get other projects up and running on time and within budget. "As an Informatics leader, you have to paint it, to make it real for them, and he just didn't see those kinds of operations, those kinds of conversations happening" in any health system that that respondent had worked in. The comment continued, that, in some sense that's being critical of the organizations where he worked, but it's hard to accomplish those conversations when you're just trying to get along day to day and get your job done. This feeds back into the conversation of both communication as well as metrics.

3. What Would Represent Perfect World Strategic Alignment?

A number of similar thoughts arose in answer to the question of what would work in a perfect world.

There was general agreement on the need for alignment- Informatics governance should not be separate from organizational governance. They should be intertwined: No one-off Informatics governance defined by projects; everything should be governed by overall needs. One respondent suggested that better organizational governance would kill off Informatics governance as a separate thing. If overall strategic goals get clearly defined, then job of Informatics governance gets easier. The end result of Informatics governance should be moving organization forward, not implementation for sake of implementation. It was said that the job of informatics should be to help users!! [however, is this a contradiction if administrative governance is not paying attention to needs of the users but to the needs of the organization?] The process has to ask what will you as a leader, and what will the organization get out of it? Clinical projects vs. business projects for example- what is the priority? and how is that decided? It was at least one thought that it needs to be at operational level- what does optimal patient care require? This is in a perfect world, but most organizations are not there yet. It was mentioned that in an ideal world, operations would identify the need, administrators would collaborate across the organization and there would be a system push to get something done. Administration would say here it is, and IT and Informatics would collaborate to say here is what we need to make it happen. In that way Informatics is working to sustain and improve the organization based on patient care goals, which will then keep the organization financially stable and viable.

An important consideration was consistently found: the need to embed informatics in all governance venues so they could give advice all along. Thus, when decisions come down from above, input was already there to avoid problematic or impossible requests. Informatics governance would be responsible for rationing and doing discovery and due diligence before any bigger projects moved forward. Also, then when a project is assigned, the resources and inputs are already known so that senior administration knows what they need to provide. Informatics then becomes both advisory as well as decision-making, helping to decide on what projects, and how they would get done. The issue with this is that informatics then would have to help draw the lines for prioritization. This issue gets raised as a potential problem, as there needs to be transparency regardless of the process. Informatics must be seen as doing it for the organization, and not for themselves, so all decisions can be made in fairness since there is no agenda. Still, having Informatics in the discussion up front makes everything easier- if questions come up they can be addressed earlier.

One suggestion to solve the alignment and resource allocation problem was that if an end user or a clinical Institute couldn’t indicate where they wanted to go and how they would define success, it wouldn't even get put it in any prioritization or optimization queue until

they got their act together and did more of a pro forma with a feasibility study to say this is the outcome we're expecting, here's how we're going to measure it. Here's the resources that are going to take this is the operational sponsor, this is the clinical sponsor, and, okay, then we'll be the informatics sponsor. By making accountability and alignment front and center for every request from the top down, and from the bottom up, this alignment could be developed and maintained.

a) Problem Solving for The Perfect World

(This represents a summary of commentary from respondents)

Since finance should do the budget so it translates into what the institution needs done, administration can decide what are the priorities, and the organization would be able to respond quickly when those change. Currently they do not do that. So, budgeting and priorities have to be aligned. Having a global planning and budgetary process would have to avoid the issue of silos. Currently, silos prevent alignment- if one department or institute wants something done, they are used to just doing it. But can't work that way if the organization wishes to plan with alignment. Also, accounting for the discrepancy between IT departments and Informatics needs to be made, and those two need to be better coordinated from an alignment as well as a resource assignment standpoint.

As indicated, the assignment and measurement of appropriate metrics is critical. The organization will have to determine the point of what its technology is doing- to do billing? to solve Meaningful use? to improve quality? To do analytics? If so, has to be built in from the start. And are they examining the outcomes and the studies and the treatment that people receive and are they feeding it back to clinicians and patients and are we getting better? And generally, that was rarely done.

So once you have developed an Informatics priority or governance group that has as part of their charter that the work they do will reflect the overall organizational policy, but once you get down in the details sometimes it's hard to link a particular IT request to the bigger goal. Sometimes you're just trying to say, how do we make our electronic health record work better, collect data better and improve the work flow of the people that use it. Like the question or analytics, even just improvement of provider's lives must become a priority in itself.

The issue of how your story gets told, or sold comes up again. Is this something that will remain a problem for all time? If you want to be funded, it's incumbent upon you to be able to tell and sell your story. If you're not given access to a place to tell a story, because historically even if you're able to talk to the level of people of people who make decisions, but who may not understand the value of what you are saying, then how do you get your voices heard? How do we become part of this? How do we help the organization make better informed decisions by leveraging what we know?

This is a key problem. And it takes a lot of time and it is usually relationship based. And you know, there can be a lot of movement in the C suite that may or may not correlate with who you knew yesterday.

HOW ARE RESOURCES ALLOCATED?

QUESTION: *This was not an original research question, however the discussions regarding strategic alignment and decision-making for implementation gave rise to discussions about how resources are allocated.*

For every organization, a process has to occur in order to determine what resources will need to be included in the next year's budget. This is often a two-way process, where each unit in the organization ascribes priorities and budgetary needs, which are then aggregated and summed, and then these are fed up to the top of the hierarchy. They are then reviewed and voted on by the priorities of the senior level administrators (usually the C-suite) and fed back to the lower levels to be carried out. Similar processes were described to a certain extent by all of the respondents. However how priorities were set, and how budgetary constraints were determined by different organizations were very varied.

1. Bottom Up Resource Allocation?

ONLY MENTIONED BY 7, (13 references)

This direction in assigning resources was not often mentioned, although the process was surprisingly similar in most organizations. In this situation, Informatics governance has requests from the end users- physicians advisory council, nursing, ancillary services, pharmacy, etc. come up, and this acts like a funnel. The department then will use resources they have to address the requests, and then slowing down the funnel if there are insufficient resources to cover everything

One organization has local (clinical) governance councils that come with requests- not new software, not new vendors, but tweaks or requests for optimization— And they (users) are the ones making prioritization decisions- so it's not IT making all of the determinations. This should actually be a prime activity of informatics- "finding the things that really chap end users and try to build solutions around that." Clinicians on these committees also are users, thus at least one system feels that decisions should be made by the people that use them.

This works mostly for smaller projects-those that are 40 hours or less (a commonly mentioned cut off), the informatics team governs the priority and resources. However, for

larger projects (up to $50,000) Informatics must go to the local hospital finance team and ask for funding. If more than that, then they must be written up to include cost, FTE costs, all other costs, and benefits, and it then gets submitted it to senior administration for consideration and approval. In another organization, for major decision making: informatics has a seat at senior governance table, they can comment on what they are doing and see what others are doing. This is important, since Informatics is involved now so heavily in most things, it helps to provide input early. However, this remains a problem for the bottom up process going upstream- how to get the message about what you are doing, the value added, the service to the organization, and what is the contribution to the strategies.

2. Top Down Resource Allocation?

Mentioned by 12, 47 references

A differentiation must be recognized between organizational governance and informatics governance. Also- the strategic planning process is different from the determination and allocation of financial resources – however it is critical that these must be balanced.

One organization established an overriding committee with informatics governance, administrative and system governance, and a technology advisory council that looked at new things. So, projects often had to be vetted through multiple supporting councils- then once prioritized and approved, it would go to a Resources Management Council (IS) for evaluation regarding what would be needed for a project. Then cost and needs are analyzed and once decided on, if they are tagged as the highest priorities, and the resources are allocated. Overall, however, since resources are constrained, people often get frustrated.
In another organization, this type of resource allocation is still a work in progress- organization is trying to set strategic direction so that the project requests are aligned to strategic importance. A concept may be developed by Informatics, approved by administration, then brought to IT for cost analysis as to how much time and work will it take. The problem was noted that this entails three different administrative hierarchies. However, it then allows them to map out what will be accomplished over the next year

In another organization, a governance structure exists, which then assigns business priorities on everything. Then resource prioritization is done- scores are assigned of 350 to 1. A complex set of inputs including all things in MS Project- resources, time, etc. is used, and after scoring, the top priorities get the resources, then the next, and so on, until the resources run out (draws a line). But shiny new things often got priority, often routine things did not. The top leadership/governance would say “OK here’s your priority” and

Informatics is left to figure it out based on the resources the department had assigned in the beginning.

Another dysfunctional situation was where there were multiple informatics committees- such as an ambulatory clinical decision team. These develop things that need to get done, but then informatics has to prioritize, and often has a multi-year train of things to do. So, each year committees have to determine again what the priorities are. Due to system growth, committees also grow and change each year, and priorities and even viewpoints may change, leaving decisions that were once good falling by the wayside.

A difficulty of resource allocation is the allocation of time: informaticists work can be divided into: Training, user support, and project work. Training is easy to calculate, support is nebulous, and project work is assigned only when working on major projects where time is kept. Support is vital, but since hard to define and allocate, often falls off the plate and gets deferred. When decided previously within Informatics, from the top down, the process had been for all requests to be analyzed, and then they would fill in the puzzle- this is small, we can do that now, this is bigger, do you want to do that later, or now, which was not at all strategic. Now, however, with trying to take overall health of organization into account that process is improved. However once things get done, informatics now must move on to next project. Also, resources post implementation are always underestimated, or ignored. Support afterwards needs to be maintained, and isn't. Usually, the organization has not been looking at end users, optimization, etc. Now informatics must just do it, stuff it into the system, and roll on. Well it doesn't work, but it now has become the standard operating procedure.

There were attempts in one institution to try to fix the disconnect by establishing new governance structures at a senior level called leadership groups, run by experts from clinical domains, and including executives running all the facilities under the IT umbrellas. This process avoids the situation where Informatics is saying you need this or that because it will help clinicians, as that may be off base. If there are complaints, there has to be a place where these representatives of those people can be reached with feedback, and this can be brought upwards again

As mentioned in the section on alignment, occasionally senior administration decides something (bring on new hospitals) and that new "strategic direction" pushes informatics needs, and disrupts all other current plans and projects without additional resources. This then disrupts Informatics from doing what it needs to do to further other strategic plans that were already decided as being needed. This again reinforces the notion that the rationale for why something needs to be done needs to be broadly shared at the executive level, but also needs to be cascaded down to actual sites and people who do the work.

The question of a separate Information Technology department entering the equation also has implications for Informatics and resource allocation. This creates constraints and disconnects not only for strategic alignment and decision-making, but for resource allocation as well. If IT is the driver of most services, the interface between administration and Informatics as a separate service becomes difficult. IF IT has control of the resources, and IT makes the decisions, it is another department then telling informatics what to do. Informatics then may be limited to resources based on calculations by IT (1informaticist to 50 providers) based on no empirical evidence. (for example: “We feel that this makes the most sense. So that's what you're going to go ahead and get”) and Informatics is then left holding the proverbial bag. A similar issue exists where many things involve Informatics, but although it is not an Informatics strategy or in their plan, it still has to be done. The only way to address that inconsistency is to have the planning process be as global and transparent as possible from the beginning.

As an important side issue that was mentioned, was that each year the budget is determined for capital and for operational expenses. Requests for operational expenses can be tricky because resources in IT usually means FTE’s and these have to be long term, so are difficult to get through since they are usually permanent. However, it also has happened that multi-year projects include resources for only one year, and then the following year the resources have been neglected, or omitted, or reassigned, leaving holes in budgets and operations.

3. Balanced Resource Allocation Process?

5 respondents,24 references

There were a few respondents who described aspects of a more balanced process for resource allocation that was already in place, even if the processes were only early on, or even merely aspirational.

One example was the Clinical Council- where Informatics, clinical leaders and administration convened., and where decisions could be made. Occasional decisions can still be made lower down chain, but for bigger projects or programs this is where it happens. Quality initiatives, brought up from below, usually brought out into an open forum in this venue.

In a perfect world, the organization would embed informatics in all governance venues to give advice all along. This avoids sudden surprises, and if they cannot give good advice, Informatics leadership can at least do some discovery on the problem to help make informed decisions. This could presumably align all the requests with the cost and

resources needed, and allow the organization to better prioritize based on need and on costs.

Another organization developed a cross service line- HR Health- where decisions could be made, which would gather all of the players in one place to do horse trading, or where it could decide that one thing has higher priority and go in that direction. In this situation, Informatics did not say what to do, did not lead the discussion, but provided the tools for the organization to decide. They developed a weighted scale of six parameters- productivity/safety/revenue/ value/ etc. and everyone used the same scale. People started to use it even for non-Informatics governance as well. This group added some discipline about how to do the work instead of the loudest or most connected voices to get what they wanted. (Diminishing the issue of "good looks and charm" as how things get done.)

A similar Funding Committee was established in another organization, that took departmental inputs and allocates all funds for each year. It would be possible to go back for emergency or contingencies, and request again for new needs, but sometimes the department would just have to reprioritize something else to accommodate the new need.

The problem with an allocation process that does not provide overarching authority, is that in an organization that is used to silos, each group does things on their own. But with organization-wide programs like EPIC, or PACS you can't do that, so you need to cross what was described as "Financial budgetary boundaries." Informatics leadership had to change the administrative mindset to accommodate things across boundaries, for the institution, not just the service lines.

Another problem occurred where finance does not do the budget according to what IT and support services found necessary. So, the budget drove what can get done, rather than institutional need driving what gets done. It was felt that there would also have to be a Project Management Office or Officer- for oversight and coordination of all projects- big and small- but the respondent that made that comment also remarked that they were not there yet.

The need for a venue for a balanced process was described, and was deemed important for the allocation of new resources. Informatics grows slowly because a business case can only be made slowly and incrementally. It is not easy to expand the team. The case for additional resources had to be made at the highest level, because larger projects were not getting done since Informatics was a resource constraint. The majority of the needs come from below, so it was noted that it can be difficult to prove that point.

4. Problems with Resource Allocation?

10 respondents/ 70 references

A common set of issues-seemingly not well addressed.

a) Resource Constraints

Numerous problems were noted to arise from resource constraints. Though everyone understands resource constraints, there was a constant battle of people who want something going up the chain to get the resources. This takes a lot of managers' time to keep doing that— instead of improving things, they are tamping things down. Another consistent problem was that the volume of requests is always greater than informatics' ability to do things. "Everyone wants shinier and newer." Informatics is frequently not doing enough of what it needs since it has inadequate resources- it needs more people, time, more one on one. The group may work to develop more champions to work for free, but until that happens there remains that resource constraint. In one organization, resources were based on the number of beds or providers, arbitrarily, with no evidence-based information to back it up. Also, regional or inter-hospital differences can result in change as well. Some hospitals may respond to change better, other less so. Some hospitals may better use the resources it has, and for some it may be a waste of time and money and will never be enough.

A general impression was that often administration considers Informatics a black hole- more resources put in, and still no knowledge of where the money goes. Although those that made that comment noted that they are trying to improve that. With better governance of resources as well as decision-making, they may be able to better take that information back up the chain asking for more or different.

Another issue that arose, is that since nothing happens in a vacuum, any one project approved usually develops issues in association with multiple other problems (unintended consequences). Another side issue from that is that once an FTE is assigned, if you move them, the original project has problems. So, Informatics cannot just swing people around. The resources are not fungible, so needs have to be well thought out in advance. One senior administrator commented as well, that they went from spending little to spending a lot- but still resource constraints are there, it just may be that there will always be a natural limitation of resources.

b) Allocation of Responsibility for Decision Making

There was also noted the problem of allocation of responsibility- if a project is not done, or selected, the Informatics person or team becomes the target. It was suggested to not make it Informatics' call, but rather to make it senior administration's call. People's biggest dissatisfier is to have an idea and then not have it be executed. Also mentioned was that you don't want Informatics making the strategic decisions that affect the well-being of the organization. A potential solution that was described was that Informatics leadership gave leaders some questions and answers to address the problems the organization faced. If someone walks in with 150 things you have no idea what to do what to prioritize. So, what to do? You take the list and think through them. Work out similarities and overlaps. Thinking about them more allows better decision making by organizing them and thoughts about them, and then presenting them to the decision-making body.

A separate problem was where Informatics has become a Pillar of the system. However, it then often gets said that Informatics will just take care of "whatever" without anyone understanding what that means, or what resources it will take. Informatics becomes undervalued and underrepresented in that equation. Thus, Informatics needs to better understand the needs and the requirements, and also has to have the ability to speak up within the organization to describe what and how those needs get satisfied.

Alternatively, informatics in a large system can have too many voices. Where there are many informatics committees that have partially overlapping footprints, so informatics leaders may end up presenting many of the ideas to anywhere from 3 to 6 different committees. One can spend months to get everything presented and approved and then there are only 5 days to build it. Building in the need for consensus has other downsides as well, if you put too many fingers in the pie, it can slow things down, and anyone can throw a screwdriver into the works. Further, if there are large groups of people where all have to agree, this can cause problems in itself. Also, differing results for different departments- One department may love a change, but another one turns itself upside down. Ultimately, somewhere, someone must be able to make a final decision that everyone will live with.

c) Allocation of Responsibility for Follow Up and Completion of Tasks

It was noted that an overarching issue is that an EHR is like a marriage not a wedding. First expenses do not relate to the ongoing costs of running it. The last part is usually neglected. People don't get adequately trained, there may be inadequate support and follow-up. Thus, unless the organization decides up front to provide resources for ongoing training, support and optimization, then those things don't happen, and you end

up with a lot of dissatisfaction. This is a significant problem, even though it was not mentioned by all the respondents. The question is how do you allocate responsibility for that follow up, and how are resources provided. How are those interventions then measured as being successful or not?

KLAS™ data is helpful and comprehensive. It can be used to put together action plans to improve nursing and provider experience with the EHR. If ongoing training is not done, or not done well, follow up optimization is critical for success. And if that is not done, then these efforts may fall to the wayside with negative consequences for the organization and its providers.

One respondent elegantly stated the problem as follows: The ability is needed to sell the image to senior leadership regarding what improvements and support means- to paint it as a real picture, in order for them to understand the value of what is needed, and the difference it makes to providers in satisfaction and in productivity, and to help them understand how this affects priorities. This is not an easy ask. Informatics has done a lot of one and done type crisis intervention in order to make things better. But the budget drives a lot of this, like at-the-elbow help which people know is expensive. And, you know, system help desk is much cheaper, it's less satisfying, and you have to wait 10 minutes and that's not efficient. But you know that the bean counters and system leadership, again, need to collaborate and talk with folks. Thus: It means targeted intervention for folks who are not making it, and that takes time and effort to first understand the data and what is telling you and second to know what you can do about it, and finally how do you fund it and implement it? And this is the question.

EVALUATION OF EFFICIENCY

QUESTION: *Given current concerns regarding decreased efficiency and burnout on the part of end users (clinicians), what metrics or evaluations can or should be implemented to improve optimization, and reduce those burdens that have been noted?*

1. Efficiency Improved??

9 respondents/24 references

There were many thoughts about how Informatics had improved the efficiency of the organization, although almost all of the answers where it had involved very specific programs- such as capacity management and scheduling. CPOE using automated dispensing shortened times. Many transactional elements have improved- labs for

batching, etc. All of these were in hospital or institutional processes that were not involved with the direct provision of care by front line providers.

It was also believed that providers would have improved efficiency from data and analytics? Once again, the result was not clinical efficiency, but machine efficiency that was improved! Another pointed out that the EHR has improved the ability to meet CMS reporting for quality measures (a win?).

Many things were stated, such as improved search capabilities, templated notes which supposedly had all improving efficiency. Getting old chart notes, information, even from other systems, and legibility, result review in one place were all put down as "wins" however these suggestions as to improved efficiency were marginal, because copy and paste, note bloat, and information overload were losses.

One respondent suggested that there was perhaps a perception that efficiency is down, however he stated that RVU's per provider, and revenue had increased by 10%, and the hard data showed no drop off. A follow-on question was whether they had measured and factored in pajama time, or other measures of efficiency in that metric and there was no reply. He added that they will now be using EPIC Signal data for optimization targeting.

One suggestion as to how they were improving efficiency was the finding that increasing MA's per doctor was worthwhile, as well as adding scribes. (Note: both of which would be unintended consequences of EHRs). Efficiency is best where everyone is working at the top of their license- MA, PA, Doctor, and so on. This was followed by a comment that everything we do increases efficiency in some way. However- "a lot of mal-efficiency in using the electronic health record was just not knowing the optimal way of doing it, of using it. You went to class and then you kind of hack through it. A lot of complaints about it and a lot of extra hours to do thing, these were based on not knowing the best way and that's what we're doing through training." A perplexing follow on answer to this was that they've actually tried to cool down the technology to make efficiency better.

Where one respondent had noted the best adoption and where they had best leveraged the investment in the EHR and optimizing efficiency was where they were able to provide local resources with deep knowledge that provided in the moment support for end users of the technology. However, he also noted that they have had drift in both of those areas. They have become very challenged in ensuring that new feature functions that the vendor intends to help improve efficiency are really adopted effectively. So, they have had minimal adoption in most of their hospitals around that. They have had great adoption at only one site because there was a local person there who became the champion. Having

local resources appears to consistently allow for the most optimal chances for improving efficiency, whether the support is paid for or not.

2. Efficiency Worsened

11 respondents / 38 references

This has been the most consistent impression: that the EHR has slowed down providers. It has increased work hours, and "pajama time is real!" One comment was that the EHR had increased the work that physicians do in a lot of unintended ways. Some of it was regulatory where there are incentives rules. There were also many examples of things that looked like they would be simple, yet the process became so painful that the only ones who did it were people who probably "have a diagnosable personality disorder." Many of the rest have developed learned helplessness as a result of the pain of doing it and they think it's better to not do something at all even with a modest risk of potentially missing useful or even important information. Another comment was that documentation and ordering have been in most cases a net loss to the organization and have created provider dissatisfaction and have slowed down the work flow. Another commented that the documentation burden is where the biggest challenges lie, with the inbox as a close second.

Another issue that arose was mentioned in a comment noting that a visiting EPIC analyst got "gob smacked" because the provider didn't know how to use any of the tools. Further, as a result of a KLAS™ survey in the prior year, administration, as well as Informatics, heard loud and clear from the clinical staff that they were still struggling with the documentation requirements in the system. Some issues were regulatory, some were under informatics' purview of control, but there came the recognition that it would be necessary to get rid of things that don't add value.

Another organization did look at their data to see how much time do nurses spend in different parts of the electronic health record. It turned out to be on average somewhere between 150 and 200 minutes in a 12-hour shift total in documentation. That represented 25% of time, or roughly three hours. What they found was that they were able to remove a large number of irrelevant data points that only added to the burden without improving the quality of care. The commentary continued that further, with any new initiative, such as a new opioid crisis or with a program for opioid diversion compliance, smoking cessation, the cry comes to just put it in the EHR and make it a mandatory hard stop so the provider can't finish without the answer. These things kept getting piled on even as the staff was still carrying the burden from the initial implementation [from 2009]. It became evident that it was necessary to clean house. One solution developed was that particular department just created a new role that an existing manager took on, to be a

“senior consultant” on EPIC. And that role was to dive into these things and make a difference- working across all of those individual systems with all applications to look at how they are optimizing what they are doing with EPIC in general.

Still, it seems that training, optimization and support are the key barriers. A number of respondents suggested that the vendor needs to get better at designing the system. But the organization also needs to get better at what they have designed in order to be more effective and efficient to put it into production, which they don't do well enough… “this will be an informaticist’s and the CIO's lifelong effort. The electronic record is cumbersome.”

Another comment was that Informatics is very challenged in ensuring that new feature functions that the vendor intends to help improve efficiency are really adopted effectively. They have had minimal adoption in most of their hospitals- unless they had a local champion. This mirrors a prior comment, where the importance of a significant local resource was the major differentiator.

So, given that implementation is always underestimated, and that the follow up and training are key pieces in the puzzle of improving efficiency and perhaps satisfaction, what are the barriers?

There appear to be a host of remaining issues. One respondent stated that the organization has spent almost no effort in improving practitioner’s efficiency. There are no resources to do it and nobody's really, terribly interested in engaging. A lot of inefficiencies are really from frustrations not from things not being there. It's more of, I don't know exactly how to do it is as efficiently as possible training and support are lacking. Even when training is offered, the managers aren't always clearing people to leave the floors to take them. This represents another side of lack of support.

Another issue is purely a lack of follow up. Did anyone ever go back through, and say “well here was our grand experiment and this is what we learned, and so what are we going to go ahead and if we're making decisions to move forward, what are the pitfalls that we need to really pay attention to, and what resources do we need to address it”? It was a feeling that the organization was doing a lot of smoke and mirrors- if you fix one thing, it creates additional or new problems with greater inefficiencies.

There are areas that are really improved with the EHR and areas that continue to be big challenges. It would seem that efficiency continues to be a pretty significant issue for providers- providers are spending a lot more time doing those tasks and interacting with an EHR and they had less time with patients than previously. It was suggested that the

entire industry of scribes is an example of why that's true. The comment was then made that the best organizations spend a lot of time with physician leadership groups, reviewing these issues, and that can create the opportunity to make life better.

3. How to Affect Efficiency

10 respondents/34 references

One respondent summarized their thoughts as follows: in order to improve efficiency, it is critical to understand what are the levers. In order to accurately delineate these, you have to ask: What are the things that can be changed to make that experience better, to improve the efficiency? One area that can be changed is the user and you can optimize the user. You can focus on workflows and improve workflows, which is harder. Another thing that can be done is to change the EPIC build, we can change the way it looks, the way it operates. We can try to make it more efficient or more usable. That's harder still. You can change Epic. You can tell Epic why their software isn't usable and get them to make changes. And we've been somewhat successful at doing that as well. That's harder still. And finally, you can push back on the reporting requirements or regulations or things like that, that drive a lot of this and that means changing the government or CMS. And that's harder still.

a) By Improving Training and Optimization:

While improved training and optimization was usually considered a main opportunity for improvement, the viewpoints regarding how and where this should be done were disparate. The general consensus of the importance of this aspect was encapsulated in this thought: how do we get people to a level of capabilities, mindset, etc. to be able to use the electronic medical record. When I was turning paper, it was a problem. I never was told how to do that, I just did it and people corrected me: you did that wrong. Well, I didn't know how to do it. We kind of do the same thing with EMR. Is that smart? Is that a good educational process? I will answer my own question, no it's a horrible educational process…if you want to make somebody who is a perfectly capable individual and turn them into a ball of jelly and make them extremely frustrated, give them a tool they have no idea how to use and then yell at them when they don't know how to use it.

Another respondent commented that they knew they could make the clinics 20% more efficient easily; a lot of inefficiencies are really from frustrations not from things not being there but from providers not knowing exactly how to do it is as efficiently as possible. So, some of it may require rearranging the EHR but most of it is getting the educational level of the practitioner to where they need to be. One institution added training: a 3-day class, two cohorts of 16. An EPIC analyst shadowed these and was

amazed at how little providers knew of functionality. The follow up was good, however this was for a total of 32 providers. There was another similar comment that most training is only one boat at one time from an ocean of inefficiency

However, even when additional training was offered, often these resources remained poorly attended. One department had a new program called the BRAIN- however no one could take the time to attend training, so remained unused. So, the conclusion that was drawn by several was what is needed is to ask frontline providers what is getting in their way? For existing solutions as well as for new solutions this question should be asked before implementing something as well.

Thus, there are all these different places where one can affect change and to try to do what can be done in all of those areas with respect to user optimization. Although there are a number of things barriers still, informatics needs to remain very much engaged. As an example of success, one group developed a power user program to try to do more peer to peer education and trying to get people more effective at using the EHR which could represent the real opportunity.

b) Changing Documentation Requirements and Workflows:

This is feasible, but not easy, or quick. In one situation, by reviewing documentation to see if it can be streamlined, the team was able to reduce the number of questions for an intake exam by over half. Another comment, mentioned earlier, regards finding the levers. The lower on the chain, the less expensive, and easier it is to accomplish. Training would be that lowest rung. Moving up in difficulty is changing the build, going to EPIC to change that, or to alter the regulatory framework handed out by the government. There may still be some things that can be altered or improved. The Problem List is often a pain point, and while numerous suggestions have been put forward for improvements, and they remain somewhat elusive, solutions for that could be easier than changing the EHR.

c) Changing Who Does the Record

Given the current state of use of the EHR, Physicians are often working below their license. If the institution can get more people to do the lower level activities, and practice at the top of their license, like scribes or MA's, you can reduce the burden and improve the efficiency of the higher order clinicians.

4. Observations Regarding Efficiency

A significant problem is that most organizations just don't get to any of these improvements, usually because they're just stretched even putting in the EHR, keeping it around and installing new versions. Just keeping up with regulatory requirements, while also critical, it remains just hard to do all simultaneously. But the best organizations should really look at the operational management of health care and the coordination of care, physicians' satisfaction, and patient satisfaction, too. Unfortunately, the question lurking just under the surface is whether most organizations actually care enough to work to make these changes.

END USER SATISFACTION

QUESTION: *How have regional informatics leaders considered and attempted to ameliorate issues of usability, end user satisfaction, as issues to be measured or to be improved?*

1. User Satisfaction Was Not Raised as an Issue

3 respondents/3 references

Very few respondents absolutely did not believe that this is an issue. However, one comment suggested that the problem is not user satisfaction but rather training. If a provider is not trained, then satisfaction does not matter- training for competence, and certification of competence would need to be done prior to worrying about satisfaction. Another comment was that prior to becoming concerned with usability, much more concrete conversations could only happen if and when you know people are struggling, or that you're going to lose them. So that would be the time to do things differently. There was another comment that suggested that the best organizations spend a lot of time with physician leadership groups, reviewing these issues, and they thought that could provide the opportunity to make life better, but then went on the state that it was the documentation burden where the biggest challenges were, thus ignoring what they just indicated was an issue.

2. User Satisfaction Was Raised as Issue-Not Dealt with Sufficiently

9 respondents/24 references

A common refrain heard was that while physician burnout is real, it is not entirely due to the EHR. The EHR may have a lot do with it and there is also a belief that organizations

definitely need to focus on that and they need to minimize the documentation burden as much as possible. However, there does not appear to be “a secret sauce- that if you do these two things, you decrease burnout by 50%. There is a lot of noise in the signal. So it is really hard to pin down what [it means] that you are burned-out versus you are burned-out versus you are burned-out, and then how [do you determine how that] has that been impacted by the EHR.” In addition, one comment was that no one is going to go or not go to an institution because of their EHR- so little incentive to change anything.

Another contribution to this part of the discussion was the recognition that many regulatory things have been put upon Informatics without any real evidence that they would do anything from a true quality or safety standpoint. But they do drive people clicking boxes, doing things unethical on occasion, not being able to comply with them and feeling like they are not doing their job leading to dissatisfaction and ultimately burnout

What needs to be done? What can be done? Improved training is one response. How we train people for EPIC now is a poorly constructed educational process.

Another suggestion was to allow providers to dictate their notes (as they did in the past), which still is often is best in their workflow, and creates the best story about the patient. But few organizations have done that, most still try to collect a lot of details in templates for office visits which from the viewpoint of workflow usually is a negative. So, then you must have training for providers to know what to put into the record- to avoid note bloat, and increase efficiency and decrease time spent in the chart. But there is a long way to go to deal with it. One organization attempted to increase provider training. Informatics requested 4 hours per provider, but were given 2 hours. Another solution could be to have Physicians practice at top of their license, and thus it would be needed to get other lower level people to do work- MA’s scribes, etc.- at the top of their licenses.

There were those who believed that they knew how to deal with the problem of user satisfaction but have not done so. One respondent said that they went back after going live and attempted to take every single clinic through an Optimization Experience. They looked at their workflows, looked at some of their metrics; and set up some targeted training with customization labs, and then they moved on to the next clinic and attempted to work their way through all of their clinics. But they explicitly stated that that kind of experience and feedback needs to be ongoing, and it cannot be a “one and done.” While they have tried to do many of such one and done actions and crisis intervention, there usually comes a time where the budget drives a lot of how this activity gets accomplished, and it then can become difficult to go on regardless of whether it is working or not.

The question has been asked: where are we with physicians' efficiencies, physician wellbeing, where are we with measuring minutes of working after hours? Where are we with personalization, where are we in terms of after-hours use? This is a good example of where things haven't been done well. For some, it was top of mind for all of their ongoing informatics activities. One department was always looking at what were the best training paradigms to get their staff up and running most effectively and efficiently. And then continuing to get the providers to learn and self-learn how to use the tools. Determining the right amount of training to set the caregiver up for success is often difficult to ascertain. However, it was the failures that stood out. In one clinic, the informatics group looked back for two physicians that left. They saw that in retrospect they were in trouble long before they came to the attention of the administrators. "If we just looked at how often they were logging into the EHR after 10:00 PM perhaps something could have been done earlier." If informatics had that data, those people could have been targeted for improvement to prevent burnout. So, it's that kind of data, regarding what constitutes an efficient user, that everyone can see, and also agree on how to be looking at their trail through the EHR.

Another response regarded the need to identify the problem. But it seems "that everybody does a great job of knowing there is one. The trick is to understand what is causing the dissatisfaction." It was noted that too often it is just talked about, and though everyone just keeps saying that here's the problem, and it gets said in many different ways, no one invests in the teams or the time to go ahead and carefully examine, or to do some process mapping, to really do a deep dive into what the problem and solution might be. Or "to do some lean processing and try to figure out how to eliminate some of the waste. It doesn't get done."

Another organization recognized it as a problem, and noted that it's multifaceted. While the comment was made that the EHR gets a lot of blame, the comment that followed is that it is not the main cause, it's merely the face of many of those things, although the respondent then admitted that to some extent, and in some ways, it is the problem. So they identified some of the issues, and there are a number of things that are being done about it in the region, such as forming a wellness committee, and by trying to approach it in ways that might improve provider satisfaction and efficiency such as single sign-on, improving the Dragon interface, and doing some of these things that try to deliver improvements in the user experience, including an approach utilizing power users . While it is believed that there is a long way to go, they are definitely on that journey. Unfortunately, the comment was also made that no one will ever deal with it at a rate that anyone thinks will be satisfying to everyone.

As a sad aside, one additional comment illustrated that "as issues pile-up, users become disillusioned by complacent organization and stop reporting complaints."

3. User Satisfaction Raised as Issue- and Attempts Made to Deal With It

11 respondents/32 references

Identifying this as a problem is the start of solving the problem. What ways have been used to affect this?

a) Optimization as a Solution

One potential solution that has been advocated was optimization. At one organization, they developed substantial optimization classes. For this process, they tried to get everybody into quarterly classes that they run (general invitation is sent, but users need to apply). Everyone who has been there for at least three months is invited, and then if they can they are invited to an annual two-hour training update. For the last three-day program, they had 73 applicants for 30 spots. They looked at the applicant's signal scores, from EPIC. They then talked to their medical directors and their clinic managers, and that's how the final 30 were selected. They also run this training when possible by going to a hotel for two or three days- this takes people out of their environment to train so they are able to focus on it. It is expensive, and time consuming. Also, all cannot do it, which is a problem. Nurses especially, as well as many physicians, are unable to go away for three days. However, for those who have attended it reportedly has had great results.

b) Measuring What Works or Not:

To measure what works, that same group actually followed a lot of their data from the EPIC system and were looking for different trends because they are really trying to prove the worth of taking a provider out of clinic for three days. They are specifically looking at pajama time, and they are looking at how much they're using the tools. They are also looking at both note length, their coding and any other things that they can find. So, as they are playing with that data, before and after, and they have started to find that everybody is an individual despite the training, that some people get much, much better and whereas other people don't.

Several organizations have begun to use KLAS™ survey data for nurses and for doctors. One found only a small correlation between burnout and EHR satisfaction but still used the data to find individuals who needed help.

One organization has developed a process to specifically try to improve burnout. They started with using the Maslach Burnout Inventory for all clinical users in that domain. They then brought a type of rapid process improvement team for two to three interventions. During the survey process they brought a multi-level approach to determining what the providers and clinical users feel are their frustrations in their clinical work day. And then they bring a team to help them facilitate addressing those issues.

Another organization started by trying to define burnout risk and tried to quantify burnout. They have done a couple of different things- certainly a lot of provider surveying, perhaps even hitting the point of ***over*** surveying a little bit on provider burnout with both industry standard scales and the Maslach Burnout Inventory. However, they have not done a survey across the board for 100% of the physicians or other providers.

Provider engagement surveys have also been used. Since these are often very generic, they may only have a few, very poor questions on it specifically about burnout, or about satisfaction with the EHR. But questions about the EMR that have been used suggest that the EHR is not highly esteemed. This was found to be interesting because the respondent came from a prior institution where the EHR was ranked number one by the medical staff as a satisfier, not a dissatisfier.

One of the systems, using Signal data, logging information, time stamps, etc., found what they felt were the providers who were less effective. Then they developed what they call the pathway to proficiency, which was an entire curriculum around improving the ability of those providers to manage the day to day things they do very often that may not take much by themselves, but when you add up how often their done it expands their day. So, handling in-basket messages, handling refill requests, creating those documentation tools so that the notes that are used for the kind of visits you have the most are ready to go, easy to use, has all the parts needed and doesn't require typing the whole thing every time. They work with them in real time. Specific departments were asking for it initially, and then they spread it to the full region. And it's now required for new hires to go through prior to starting work.

c) Clinician Engagement Work

One organization developed a clinical engagement steering committee that is solely focused on provider burnout, providing well-provider management. So that engagement committee has been running a Lean project now for about three years with some very

defined tactics and the organization of metrics around that. They believe that they are starting to see a little bit of light at the end of the tunnel. They started a revamp of their physician informatics group, and part of that was specifically designed to really look and support the work with the clinical engagement committee. Specifics on their metrics or processes were not defined.

4. Fixing the Process

If it is possible to address the EHR itself, either through usability improvements, or merely by changing the build, then this would be desirable, however it was usually deemed more difficult, and thus less likely to have a good outcome. One group cleaned up data entry for nurses, it seemed to have worked- they were able to shave 175 questions down to 75- as it did make a difference, they asked why leave them, but the only way to know if it improved things was to actually measure it, which they have not yet done.

Along a similar thought, another respondent stated that their guiding principles should be that they are only putting something in the record if it provides clinical value, not for somebody to report or to merely collect data on something. If it's not going to provide value for the care of that patient in that moment or in that stay or for something useful, then they are not going to approve adding it. More optimally, if it is something that is needed, but not currently featured, they would try to find a way to get at it from some other process or data that is already in place. This is part of what they like to consider their own design philosophy.

Another respondent suggested that since EPIC is a tool, if there is an issue, you can try to separate it into: either the tool is wrong; or you are asking people to do things they don't know how to do. But their answer was actually that it's both problems. Thus, it is worth trying to address both issues.

The observation was again made in this aspect that this is a process with very slow change. If one was to compare the way the EHR is now to the way it was 5 years ago it's very different. It's better, but it's an **incremental process** where there are major problems that need to be chipped away at because the nature of them with our current software is complex and not everything can be fixed to the standards that we would really like in an ideal world. Between the organization begging the vendor to prioritize changes (it was felt despite the marginal results that they are generally committed to doing that), or making changes at home, both with training and improvements, it still never happens as fast as anyone wants.

METRICS AND PROCESSES

QUESTIONS: *Has the Informatics leadership determined best practices for evaluating the effectiveness of EHRs and other programs that they have implemented?*

> *In an ideal world, what metrics or practices should or would be utilized?*
>
> *In what ways have regional informatics leaders considered defining metrics to evaluate and measure their efforts, both towards the ends of improved demonstration of the value of healthcare IT as well as improving the actual outcomes of their efforts?*

A minimum of 15 themes for potential methods or metrics were developed during the evaluation of the respondents (albeit with some overlap). They are described in some detail here. It should be noted that in the preliminary study (11) only six channels were suggested by the evaluative process. There was clearly a sense of more robust thinking about this issue of how to measure things, and further, that the idea that these things were not only measurable, but that there was value in that measurement, and value in being able to use these to improve what Informatics does. The respondent's comments were summarized and collated, and when aspects of their replies were discussed during the interview process, those findings are also included in the section for each metric.

1. Communication Success

4 respondents/ 7 references

Metric should be used because:

There are two general sets of issues that come up when communication success was brought up. The first is communication in the sense of actual communications- emails sent, phone calls received and answered. The other involves the use of the EHR in its truest form, as an agent of communication between a patient, his provider, and then with other providers. The information that goes in must come out in a useful, and findable form. Even in a hybrid situation, such as handoff sheets where clinical communication is commingled with actual communication, these two concepts are in play. The question was raised, but the solution is not likely to be simple. Another respondent commented that there are three things you do- you look up information, you enter information, and then you order something which is the output- all of these entail communicating what you are doing for that patient.

Since communication in all its forms is a critical function of an EHR and informatics, some metric or metrics should be developed and used. Providers need to be able to use

the EHR to facilitate coordination of care- how well does it do that, and is it used properly to do that, and if not, how do you fix that?

Metric being used?
Possible answers could include: the number of emails or calls answered, patient satisfaction with how those calls were handled, the speed in which labs, x-ray reports, pathology reports, etc. arrive in an in-box. All are possible. More difficult would be how long it takes a provider to go through a note and find some actionable information. Did note bloat ruin the experience of reading a chart note. Can that be improved by getting rid of copy and paste, or templates with three months of information? Difficult to measure, but important to understand.

Problems with metric?
One problem mentioned was that for entering data- there is often no standardization and no training on what is a good note. It is taught somewhat in med school, however in the real world, you fall to easy defaults: too much or too little information. Would it be possible for notes be standardized into useful notes: how well are notes entered; how well are they read; and how well do they convey what they need to convey. Or how well does it work to accomplish its task (communication). Just because you put it in the EHR doesn't mean it will work, sometimes just picking up a phone is better. But then, how do you measure that?
Even if a product is well built, and may even do what it is supposed to, how do you measure if it is doing what it is supposed to be doing, or if it is even being used, or if it is addressing the wrong problem, or if it is not being used well since not enough training. Clearly, while this is a significant issue to measure and address, the solution is not going to be easily arrived at.

2. Customization

6 respondents/9 references

Metric should be used because:
Customization is a valuable product. In one organization, when a new hire comes in, they receive one on one training. Someone works with them to ensure what they needed to do in the EHR is customized: what are the pain points, what are the struggles, tell them that they can use this, or this tool does that. However, there are not enough resources to do that for everyone. "One starfish thrown back in when thousands are on the shore." While this type of optimization can be costly and time consuming, it certainly would seem to reap benefits. A trainer needs to find how the provider learns, how do they receive info the best, and then they can tailor an approach. Maybe you learn well one on one, maybe

not, maybe a self-learner can be sent a one pager or just an explanation. But you can't just send a newsletter saying this works for everybody, because it won't.

Metric being used?
How do you track this learning process? Can this even be measured? Do you track the number of users customized? The resources it took to do that training? Can indirect measures be used as a proxy- end user satisfaction after training, or reduction in rates of burnout, or less pajama time?

Informaticist time and effort can be divided into user support, training, and project work. Training is scheduled and is a given, user support is more nebulous, hard to define but maybe can be tracked, and projects are what are usually measured, although only by time and completion- not by success and not by outcomes metrics. But support, and customization, need to be measured at least by number of instances, if not by successful outcomes, otherwise it gets deferred and falls off the plate.

Problems with metric?
Other than merely tracking the time spent, or the numbers of people customized, this is difficult to do, and difficult to isolate from other things being measured.

3. Efficiency

12 respondents/69 refs

Metric should be used because:
The reasons for this were discussed at length in an earlier section. From a business standpoint, from an individual provider's wellbeing standpoint, and from the organization's provider relations standpoint, this makes sense. However even here there are numerous issues that were felt to be of value to be addressed.
First, there were many comments regarding the need to evaluate how providers used the system both prior to their training as well as after implementation. This is basic business acumen. Second, the question of how the system was designed was discussed by multiple respondents, and the only way to find out if it is doing what you want or expect is to test after it is in place to find out how it has affected the people using it. Also, even if it was designed well, if the end users cannot use it, or do not know how to use it properly, then that is information which must be understood so that it can be improved. Also, knowing how much improvement is possible can be used to justify the added expense of training, support, and rebuilding that must be done.
As a correlate of that last point, regarding any metrics that could be used is the consideration that although the perception is that people spend more time in the electronic chart, it may be more critical of a problem with epic being slow: people are

waiting to log in, waiting for epic to open, waiting, etc. This is not captured in signal either, and this would need to be measured and validated separately as well.

Metric being used?

From EPIC, the PEP- provider efficiency profile, and for nursing the NEAT- Nursing efficiency assessment tool are now available. However, it was remarked that these are new- so there are no exact profiles yet on what is optimal. But it is possible to start to use them for comparison- clinic to clinic, clinic to individual, etc. One respondent suggested that EPIC has a personalization assessment (not clear if that was different from the PEP or Signal data), so they were trying to use that, but at present felt that there was no specific tool for measuring efficiency.

Another comment was that you need to ask people at the front lines what is getting in your way? What can make your life better, or what do you need to see in a record. That takes time to do. Another has been looking at KLAS™ survey data, but that is only an indirect measure of efficiency. And finally, another started their own kind of efficiency metrics, however, when asked what it was, or how the scoring was done, it appeared to be merely free form subjective scoring by Informatics.

One important note was that for this, as well as in general, that better metrics upfront are needed. Burnout is lagging indicator; we need more leading indicators. This is also critical for follow up: the need for sequential information over time.

Problems with metric?

One respondent remarked that studies done by the vendor cannot necessarily be relied upon. Another issue raised (mentioned previously) was that even if you use the data, it takes a lot of resources, operational staff, to sit with the outlier individual and correct the problem. Another issue raised was that documenting with dictation or with scribes changes things a lot- the user is not spending as much time in the note, but if and when they have to document on their own, they likely become even more inefficient.

It was also noted that while there may be correlations between time spent and satisfaction, we don't look at it so we don't know.

4. Proficiency

3 respondents/11 references

Metric should be used because:

This measure has a large overlap with efficiency, and optimization. However, several respondents felt that it was important in its own right. If you customize the tool people still may not be able to use it well. If you become more efficient people may still be dissatisfied, with the build, with the process, or with other things. But how capable the users are at using the tools should be measured as a separate variable.

Metric being used?
One question was whether time spent in the EHR represented proficiency or efficiency? Could you count pajama time as a metric? Or is that a reflection on how they relate to patients in clinic, or how they use or don't use the EHR well?
One suggested metric was to find out how was EHR used- calculate the percentage of orders placed from user defined order set vs. individual selection. A similar metric could be constructed from the use of chart notes as well.

Problems with metric?
Difficult to identify a realistic metric.

5. Optimization

12 respondents/47 references

Metric should be used because:
Again, this is not only a hot topic, but was one of the more talked about metrics among the respondents. All 12 addressed this as a metric, and as a process to improve the metric. While it also incorporates to some extent the issues of training for proficiency, customization, and efficiency, what this represents is probably a distinct concept, that being making the EHR the best and most personalized process for each and every individual. Measuring it, though, is another story.

Metric being used?
KLAS™ surveys were one measure mentioned as a possible source of information on the need for, or the success of optimization. Employment surveys, either for all employees, or specifically targeting providers, cam served as a proxy for the need for optimization, however it does not speak exactly to whether there is merely lack of optimization, or just dissatisfaction in general. Efficiency metrics, from Signal, or elsewhere also were mentioned.
The only specific measure might be merely a counting of those providers who had undergone specific training with someone who was able to optimize the system for them. Looking at percentages of people in a clinic, clinics in a system, etc. might be the only valid indicator. This is not something that is often tracked as a specific data point.

Problems with metric?
Measuring indices of efficiency may only be helpful if measured before and after optimization. It is possible that this can be found to indicate that optimization has worked for an individual. However, it is still not a direct measure.

6. End User Satisfaction

12 respondents/ 85 references

Metric should be used because:

This is likely a contributing factor for burnout, and burden. However, the EHR and informatics may not be the only contributor to that distress. This factor can be both easier and more difficult to assess, but it is one factor that nearly every business now attempts to measure, since it serves as a report card for how you are doing.

There are probably several aspects that could be tested here. First would be satisfaction with overall employment, of which use of the EHR would play a part. It could also be a measurement of satisfaction with the EHR itself, how it was installed, how it is being used, if it makes a provider's life better or worse, or patient care improved. Another aspect of satisfaction would be how well does a provider or employee feel served by the organization, and specifically by informatics and its people. Is training done well? Are there good response times to questions or problems? All of these are important, even if overlapping questions.

Metric being used?

Most organizations indicated that their primary mode of assessing satisfaction was the use of surveys. Several used the KLAS™ survey, (13,14) however that was good but time consuming, and costly. Further, doing it more than once a year can become a burden to providers, even if it provides better information. One respondent remarked that surveys were needed quarterly in order to really understand what was happening, however doing that many surveys would in itself create additional significant burden for the providers it was intending to help.

The Maslach scale adapted for provider burnout was another metric described, although this, too, is an indirect measure of satisfaction as it related to informatics and the EHR. Another indirect means of assessing satisfaction was "rounding" where a representative from informatics would go around on a regular basis to nursing units or clinics, and ask providers in those venues how things were going, and was there any help that could be provided. Effective, but time and resource consuming**.**

Problems with metric?

Hard to get adequate data that is actionable on a regular and necessary basis. Also, some of the most dissatisfied providers may already burned out, and will fail to respond to even the most helpful survey.

7. Provider Engagement

7 respondents/27 references

Metric should be used because:
Provider engagement is a metric now often being used by healthcare organizations at large. Although this is not a metric specific for informatics, it can provide a general overview of employee and provider satisfaction, and the desire of those employees to engage with and advance the activities and strategies of the larger organization. This has important implications for the success, not only of the entire enterprise, but can impact the success of any informatics activities as well. For purposes of training and for satisfaction, and engaged workforce will generally work harder to incorporate new technology provided, and can also add to the feedback loop to make it better. A provider body that is not engaged will likely learn less, use the technology at a lower functional level, and will fail to even show up for training or for learning sessions where important feedback and suggestions might be of use for further development and action.

Metric being used?
General surveys such as generic employee satisfaction surveys, or informatics targeted tools such as the KLAS™ survey (14) have been utilized by most of these organizations. If people are unhappy then it is necessary to dig down further. Additional surveys and focused interviews would be the best way to uncover that unhappiness and then find out how much of that is attributable to the implementation or configuration of the EHR. Also, it would be beneficial to create a a place for feedback within the organization for whether the EHR is working or not working well. If there is that feedback then necessary resources should be designated to address that.

Another suggestion was to just go to a clinic and receive verbal eggs and tomatoes thrown at us. Difficult to sit through, but those can generate a lot of projects for things to improve based on that feedback.

Problems with metric?
The limitation with any metrics for engagement, is that the primary finding of lack of engagement usually suggests that people who are most unengaged will not be answering. Call centers, or problem offices will only be used by people who have not given up. If that is the case, then it is needed to get people from informatics into the clinics and wards so as to generate that type of feedback, and bring it back so that things can be worked on.

8. Usability

9 respondents/23 references

Metric should be used because:
On many levels usability is a prime issue. Poor usability can lead to problems with satisfaction, efficiency, burnout, and disengagement. Poor usability can also contribute to

poor data entry, lack of adequate documentation, and safety and security issues. For all these reasons, while not all of the respondents felt that this was a key metric for investigation, 9 of 12 mentioned it as something to be looked into. However, several of those who did not feel this was a useful metric suggested that since it is too hard to evaluate usability, it would just be better to evaluate optimization and personalization, as that improves the flow for an individual even if EHR is problematic.

Metric being used?
In general, feedback for usability is hard to do, no practical tools exist.
One suggestion was to use direct observation by informatics people in a clinic or with users, or get feedback from provider informaticists, nursing informaticists, ask them "you've seen how people use this, what are your thoughts, does it work, does it flow well," and use that for functional feedback.
A suggestion was made to do the evaluation for usability prior to implementation- not just to use PowerPoint, or a mock up, but also a real time test for real time users prior to it being installed. While this might not work for a large vendor EHR, it could certainly be done by an institution that is about to deploy a particular build, or incorporate a new software module such as for CDS, or CPOE.

Problems with metric?
Usability is difficult because usability is partly vendor related, partly configuration related and partly physician training related. And there will always be a mix of that which then takes sophisticated informatics is to sort through all of that. Often it is even difficult to define and evaluate usability in an academic setting.

Further, what's unusable for one person may be due to just poor screen designs from the vendor and what is unusable to another person maybe because no one showed him the short cut or how to do this more effectively. So usability is harder to track clear that anybody is doing that well It has been suggested both now and in the past that EHR vendors should send their new versions through people that are trained in human computer interface design, but that respondent was not even sure if they were doing that or not. The comment concluded that the vendors play those cards close to their chest for commercial and proprietary reasons, and that worse, some of the big vendors don't even allow any screenshots to be displayed in literature for fear of loss of proprietary information. This is a problem.

Other issues?
The perception people have is that they spend a lot more time in the record than the data out of the tool says they're in. While enough is not known yet to draw any conclusions about what else is considered part of that, such as is that a problem with slow log into

Epic, or is the waiting time once they've logged in while they're waiting for EPIC to open. While that may not show up in some of the user data, that extra 25 seconds of waiting every single log-in is still part of the user's time, and though not captured in EPIC, it becomes a major usability issue and a big dissatisfier.

9. Patient Experience/Patient Satisfaction

4 respondents/ 7 references

Metric should be used because:

While this was not a common suggestion, it was felt to be of significance, since there can be interactions between provider satisfaction and patient satisfaction and safety. Also, connections between provider screen time during an office visit has been suggested as a potential problem for the provider-patient relationship as well. In addition, patient facing aspects of technology or the EHR can work or not, and this too can have implications for informatics, and as such it should be measured.

It should also be mentioned that patient care issues spill over into patient experience metrics, especially where informatics functions such as communication or coordination of care can have an impact.

Metric being used?

One suggestion was patient related surveys: if the information belongs to the patient, and information they get from and EHR is theirs, how easy was it for them to find it and use it; can they read the information provided to them; can they read the provider's notes, etc.?

On a more functional level, it should be possible to measure the effectiveness and efficiency of the care of the patient- scheduling, information, other patient satisfaction issues should be either measurable, or found with questionnaires. Along the same line, did patient care processes make it better for patients? Did they get them home faster, get them transferred to X-ray faster or easier, or better?

Another avenue was in regards to patient outcomes- but real ones are hard to get at using the EHR. Questions such as how are they doing, are they back to work, are they home quickly, are they doing well? This is a function that needs to be there, but is not there yet.

The question of coordination of care and how it relates to patient satisfaction would also be important to know, but though it needs to be measured, and the EHR should facilitate those processes, the technology is not really ready either.

Problems with metric?

The technology exists for some of these, however some other aspects as described are difficult to evaluate.

10. Data Quality

8 respondents/24 refs

Metric should be used because:

This metric also encompasses several different domains regarding what data you are trying to measure. On the lowest level, the question would be can you obtain the data you need to do basic quality metrics and reporting, and how clean can that data be maintained and extracted.

On a higher level, the question of data quality would be how good would the data be for doing analytics. Can the data be extracted and then put into a usable format for knowledge discovery or doing actionable clinical research? If data has issues, then Informatics governance needs to be able to identify the problems and address them. So you have to measure that.

On an even more elevated level, the question remains as to how good is the data that is available, and how good is the EHR and the system at providing validity, reliability of data and service to the providers? And then further, what gets documented, how does it get documented, and when it is recalled, how useful is it- are these narrative entries? Or structured entries? How can they be used usefully?

This has implications for design and builds for the EHR as well- if you are going to put something in place, then you have to understand what are you gathering the data for, and what will you use it for. These are all important questions for a clinically based system.

Metric being used?

The easiest answer for addressing this metric is to evaluate the ability of the EHR to provide basic administrative and clinical data for addressing quality metrics, either governmental, or insurance based. Is the data clean, and available? Is the system, or the provider capable of addressing whatever incentives or requirements that are necessary for their practice.

Other data, such as utilization data, individual doctor/nurse use data, success data, cost of care data, all should be measurable, but usually not well tracked. These should be tracked better, and it should be able to evaluate them for completeness.

One informant suggested that the next big jump in data that will be needed patient recorded outcome measures, on top of other clinical care metrics. It is here that we have a chance to develop apps that people use at home to find and track data and its quality, and if a provider can use it to check out how their patients are doing.

Problems with metric?
People are as efficient or inefficient as the input device and their capability of systematically pulling things out of their brain and putting them on paper. That's really not an EHR problem, that's really a different people think differently problem. But there is no systematic way of how you could put this together. Is the problem how you document? Or what you document? And then how do you measure what is going in, so you can find what you are going to get out. These issues are all wrapped up in the highest order aspect of data quality here. And right now that data is not routinely found in the EHR.

11. Safety Outcomes- Quality Outcomes

3 respondents/ 7 references

Metric should be used because:
This was another metric that was felt by several respondents to be important, however it was not top of mind for most. Also, there is some overlap with regulatory issues. For satisfaction of Meaningful use, quality and safety had to be measured to some extent. However, safety issues also arose in a number of circumstances as a result of unintended consequences directly related to technology and its implementation. But the intent of the reason this is raised here was primarily to look at the use of the EHR to address specific safety and quality initiatives, and to see how well it was capable of responding to that need.

Metric being used?
Specific safety metrics such as infection rates, readmissions, falls, etc. can usually already be tracked. New safety metrics should be evaluated and added when they can demonstrate that they contribute to better care.
In one system, it was decided to look at rates of sepsis and survival. So a tool was able to be developed to do that. However, having a tool and knowing that it works are different things. So, metrics were developed to not only validate the tools, but to evaluate how effective it they were at minimizing sepsis, and for improving the care provided for those that got sick.
Monitoring of alerts is also a substantive issue, and over or under occurrence of alerts can create their own safety issues.

Problems with metric?
As mentioned in other sections, Patient related outcomes data will also become more and more important and this will be an ongoing challenge to define those, and to develop the means to monitor them.

12. Regulatory Burden

4 respondents/9 references

Metric should be used because:

This was an infrequent, however important aspect to be mentioned. There are several issues to be addressed for this metric. Several comments were made to the effect that EHR's were originally designed as "billing machines" and until government rules and regulations minimize that need, it will be difficult to achieve substantial design improvements.

There is also a need to address what is required in an EHR- in the note, in the orders, in the other documentation. If regulations are driving that, it is hard to streamline the EHR to make it work better. An example was cited that in Ireland 20 years ago, notes were 2 lines. And they worked, but now with templates and copy and paste, there is note bloat, which only adds to the dissatisfaction noted with EHRs.

Metric being used?

Right now, things like note size are being monitored, however there does not appear to be any specific relief on the horizon. Other issues such as monitoring alerts for appropriateness can also be done, which also factors back into safety issues.

13. Financial Metrics

9 Respondents/ 20 references

Metric should be used because:

Discussions of financial issues with informatics was not only robust, but could have been anticipated due to the issues of resource allocation and implementations described elsewhere in this report. As often happens, it all comes back to money. Being able to demonstrate that what you do has a financial impact, other than being an ongoing source of leakage of funds should bring dividends.

There is a need for more coordination and communication between executive leadership, Informatics leadership and clinical leaders, who all need to talk to develop better ways of taking care of patients: monitoring use of orders, use of testing, use of procedures, etc. One thought was that the organization should put analytics people along with implementation people to do analytics and set it up prior to any project, so analytics does what it needs to at the same time the project is done. That way analytics can reply to all partners "Did we hit it, or did we not?" You have to measure before you can know what levers to you should be pulling.

Metric being used?

Since the EHR was not built specifically to measure quality nor was it built to measure costs, the EHR is not being used to evaluate or manage either at this time. But it should be and could be. In general, the biggest measurement will be revenue- how much is being billed, and how much captured. A potential metric would be to use the EHR for tracking the cost of care. It should be able to help with that, comparing both the claims and what's ordered to see if the physicians are doing well in that way.
In consideration of how information is reported to the state for compliance, this should be measured. Are people using the system, and is it generating additional income? You need to know that- so two pieces should be measured: usage and financial ROI.
Informatics must be able to determine that if you hire additional staff to assist MD's, it will cost more, how to justify that based on increased throughput, fewer losses to burnout, retirement, quitting. The cost to replace a provider is high, so retention may be another metric to measure.
A simpler metric, which is much simpler to determine, are projects completed. But in addition, the cost of projects should be tracked, and compared with efficiencies gained, or some other financial metrics that can be delineated.

Problems with metric?
One comment suggested that Informatics delivers the tool, and it should be up to the administration to measure the success of the implementation. However, if informatics is not working to solve the problem, it will remain their problem.
Another important observation is that even if you measure costs, it is hard to measure problems avoided, and the costs associated with that? For how you calculate that into the ROI would need a good deal of extra thought, but it is something that bears looking into.
Along the same line comes the question of how to look at the amount of time it might save your caregivers versus the cost of the capital to expand a program. The paraphrased quote is that "There are some sort of classic hard numbers you could take a look at and say this should inform how we should deploy the machines. And this is where we should go with them because of labor, unrest, etcetera. We need to make people happy. But getting the total cost of ownership and return on investment is really hard in healthcare and in Informatics. Because a lot of times the cost is dollars it costs to avoid it as opposed to actual costs saved."

14. Leadership Satisfaction

5 respondents/7 references

Metric should be used because:
Although this should be the most self-evident metric, only five respondents actually mentioned this directly, with only a few comments. If you are doing a good job, the

satisfaction of your senior executives, as well as the individuals in other reporting departments should be happy with what you have done with them and for them. Despite this, it may not be as self-evident as one would suspect, or hope. A story in one of the comments by a respondent was that when meeting a new senior leader, one on one, it was remarked to the new exec that there was no decision-making structures and processes in place to manage population health priorities. When the Informatics lead stated that they should start thinking about governance, and the structure of the organization, and how you use that as you build the new Division. The reply was a quizzical shrug. However, in retrospect, six to 12 months later what was the new exec doing? She was building a committee structure, with governance and prioritization processes. Lack of organizational understanding of governance can impede your own governance. This represents an important takeaway.

Metric being used?
In one organization, there is a survey of leaders. While not specifically about Informatics, there are questions included about it in general.

Another organization employs a survey of the executives- done every three years by outside audit firm. They do a deep dive into executive leadership and are they satisfied, and how are they and others doing their jobs, etc. This is probably the best metric, but is not inexpensive, and is also likely quite time consuming.

In another system, the senior IT exec puts a flag on all projects, plans, etc. that involve Informatics. This communicates to other senior leaders what entails Informatics, and also allows Informatics to be included in discussions regarding costs, time, and other factors for new or ongoing projects.

Although as mentioned that governance metrics are "squishy," however it is needed in order to monitor both satisfaction of other execs. Like with physician satisfaction, it needs to be seen how happy are they with how you did, and how others did to help their own departments. Technically, this needs to be done more often than every 2 years, but it is hard to do.

15. Organizational Satisfaction/Success

10 respondents/ 27 refs

Metric should be used because:
It should always be important for your department to know how the rest of the organization views your activities and their success or not. This is reflected in the high attention to this metric, although the number of comments was not quite as robust.

Metrics being used?

In one system, at quarterly meetings, the leadership requires the executives or leadership who asked for a project to come back and present what their department or clinic obtained from the project, and if they suggested an ROI, then what did ROI did they get from it. This at least holds people accountable on a regular basis, and makes it top of mind to be thinking about success or not. For example, what was patient flow like compared to before a patient flow project was put together. The leader had to show the return, and show the benefit to the organization from a quality, financial, or other perspective.

As a potential problem, but also a possible metric, it was commented that measuring governance satisfaction is going to be "squishy" but then suggested that possibly a regular survey of executives. But otherwise this might be hard to define.

KLAS™ survey data is also one potential metric to determine the organization's success. (13) If the employees and providers are satisfied, it is an indirect proxy for how well things are going. However, once the data is received, there is often no clear mandate on how to use the data, no deliberate steps given about how to address the findings. Informatics is often just left to do it on its own.

One specific metric of organizational success mentioned was clinical effectiveness and efficiency of processes or care. This takes some doing to determine, but it is doable.

One comment, partially but not completely tongue in cheek was how often does Informatics get to say "NO." Since Informatics usually doesn't say that, they often get a lot of random projects that may not be designed to fit together which makes it hard to get alignment and satisfaction that can be clearly demonstrated.

An alternative avenue for determining overall organizational satisfaction would be a consideration of other outcomes and successfully solving them with technology. For example. using safety outcomes as an organizational priority: if you are doing a better job with safety, then patient care is better, patients are happier, organization is more successful so satisfaction is derived from those other metrics.

Another respondent mentioned that employee engagement with the informatics staff and service metrics from their customers are being worked on.

Problems with metric?

A barrier for Informatics is that since most executives don't know what you are actually doing or working on. So how would you measure or demonstrate if you are successful

when they don't even know what Informatics does specifically, let alone how to determine if it is successful or not?
In order to avoid this, it is necessary to instill a clear understanding of what Informatics is working on. The organization needs to define priorities and then assign work based on that. The leadership and the organization need to know its needs and desires (and thus outcomes) so that senior leadership can define the necessary work and the appropriate outcomes, financial or otherwise. And then if this is not done up front, and if the organization is unhappy, everyone points fingers, but really this is a governance default rather than good governance.

Other issues?
A particularly apropos comment in this regard was that what we often measure is the success of a program not directly the governance success, or Informatics success. However, if you don't measure it, you cannot see if you made a difference. The end outcome of the work done for something that the system makes a priority is an example of whether the right governance decisions were made about their core priorities. If Informatics has helped them achieve it, while you cannot measure governance per se as effective, you can still ascertain that the process was effective. On the other hand, if you put something out there, no one's using it, or it was the wrong priority or the wrong leadership or implementation, or it didn't align with the priorities of the rank and file, then even if it was brilliant, it is still a failure for the organization.

DISCUSSION

Most of the points for discussion have already been touched upon in the results section, in which the various respondents actually answered many of each other's questions during their interviews, whether intentionally or inadvertently. The robust discussions with the informants have provided a rich background and a good deal of deep thinking regarding the topics in this study. This discussion section will merely touch again upon some of those thoughts, and perhaps add some additional concepts where appropriate.

Limitations

This study involved only twelve informants from five different organizations. All of the organizations reside in the Pacific northwest, which may limit some of the perspectives from a geographic perspective as well. Some were at different levels of the same system, and some were at the same level of different systems. The differing perspectives are somewhat telling, although it would be unfair to assume that this sample represents the entire universe of informatics leadership. Having said that, however, the organizations

represented a broad swath of types of healthcare businesses. There was an academic medical center which was at the head of a broad-based health system; a large regional health system; a larger multi state system with a national footprint; and a local representative of a different national health system with a very mature background in informatics. The fact that there was often a great divergence of not only impressions as well as opinions speaks to the fact that governance in informatics is currently not a well-defined function, however the difficulties experienced by all of these leaders in either proving their value, or demonstrating their effectiveness, or even just communicating these to other parts of their organization suggests that a better solution must be found in order for informatics to succeed. There is a recognition that Informatics is important, however how that factors into organizational and informatics success is still hazy.

Roles, Duration, Level

As described, the leaders interviewed were all at senior levels. It was noted that there was a high degree of turnover, although most had a rather long history of involvement in informatics, and a good deal of experience as well. Also, despite this rather long involvement, it was noted that the roles themselves were found to have changed frequently, and many of the official positions had either been recently created, or were in the process of being molded by the individuals involved. This malleability could be interpreted as either a positive or a negative. On the one hand, it suggests that there is still some leeway for creating a situation that will work better for you as a leader within the organization. On the other hand, such plasticity could provide additional barriers to making a job do what is needed. For a skilled operative this might be easier to accomplish. For someone with perhaps good informatics skills but not so excellent administrative acumen, the need to create your own job on the fly might be too much to allow success.

The other side of that equation is that if the leadership role is flexible, the functions of the department in which it exists may also be poorly defined. As this is one of the main barriers to success that was noted in subsequent sections, the ability to know how and where you fit into the corporate hierarchy may be one of the more critical factors in getting your job done. Thus, unless it is possible for you as a leader to create not only your position, but also fashion a department around you that you are sure will function as needed, it could be a direct pathway to failure. It cannot be stated strongly enough, however, that although the structure of an organization may vary from one to another, the way that it is structured may create or remove barriers to many of the functions to be described in these subsequent sections. Since those barriers and the solutions to address them are better articulated there, they will be better served being discussed as they arise.

While success as an executive or an administrator usually requires good emotional intelligence and an aptitude for political maneuvering (15), it might be hoped that the capacity for success should be more than a requirement that you have "good looks and charm" as your primary tool.

Implementation

Several themes were noted during discussions with the respondents. For implementation of projects it appeared that there were certain similarities in how those were done in various organizations. For minor implementations, things were often left to the lower level departments to sort out. However, for higher level projects a variety of mechanisms were in place to deal with how items were prioritized and approved. Some of these processes were more organized, and some were less so. There were several patterns noted, which included processes which were determined at a system level and handed down, versus those that were driven from clinical or operational needs and passed up for approval. While a balanced approach appeared to have more satisfaction, few respondents seemed convinced that their own processes were the most optimal means of deciding what gets done. Several suggestions were made in regards to what types of processes might work best.

First, involvement of the people who would be using the software should be involved at all levels of the decision-making process, from the initial evaluation, through final decisions as to what and how any program would be approved and implemented. This should include users who were computer savvy as well as individuals who were computer naïve, as those would likely be the ones to have the most problems. Also, those who use the programs would likely be the ones who would have the best vantage to gauge what problems need to be solved, and how would any new program solve them.

Another point made was that while requests or needs noted at the clinical or operational levels should be passed up to senior administrative levels for approval, the upper level process for making decisions must be transparent, and fair, and should allow for alignment with the organization's strategic goals as well. One respondent's repeated mention of a Lean process (which can mean different things to different people) does have some appeal when it encompasses a requirement for approval that includes specific needs, and to delineate exactly what organizational goal or strategy it will satisfy. If every included such a determination, then it would be more straightforward for a leadership group to assign values and priorities to particular projects, rather than the criteria of "good looks and charm." Thus, a "two-way street" concept of applied decision-making would be more ideal.

The process should also be developed in a manner that avoids silos, where all divisions of the organization can not only see what and how something is decided, but also that all are on board. When needs are assessed and resources assigned, and a consensus that a particular project is needed, or will be implemented, there will be little room for complaints or conflict to arise at a later point. And this latter point should include the issue of a potential conflict between the overall administrative members of the organization, and informatics when a separate department of Information Services (or Technology) is involved, and is needed to allocate those resources that were approved by the complete process. In fact, since Informatics and Information Technology are both needed to serve the organization, they should be there to inform and advise, and should be able to suggest, but should probably not be the final arbiters of decisions regarding implementation other than to say they can do it, and what they would need to accomplish that. In a perfect world, all of the players would be working together to push forward the organization to a successful outcome.

Strategic Alignment

Informatics' alignment with overall mission and strategy encompasses two issues that were developed from the analysis. First, alignment with organizational strategy will only work if there is a strategy, and second there must be a process by which it is decided upon and implemented. How informatics works within that strategic process becomes a tertiary issue, and can only be seen after addressing the first two points.

For the purpose of discussion, it will be assumed that every organization has decided upon its strategic goals. This is likely a gross over-assumption (16,17), but it is beyond the scope of this paper to decide if this is the case, or not. That being settled, the question that remains would be: is there an optimal structure or process, and how should informatics work within that?

The topic of optimal organization can be difficult. As can be seen in the responses from the subjects here, there are multiple varieties of structure, and multiple views of how things are organized. There may be other variants, however from the discussions here, it would appear that there are two viable options, a centralized approach versus a distributed approach. The centralized approach would consist of some type of senior decision-making body or committee, where various inputs could be reviewed, and decisions could be made that would not only comply with overall strategy, but would allow for coordination and communication between various parts of the organization. A less centralized approach might be reflected in a distributed decision-making process. In this type of situation, decisions could be authorized to various subdivisions of the

organization. In this type of system, the divisions, whether geographical, or functional, would need to have authority and responsibility for not only making decisions, but for budgetary decisions, and also for accountability. Since few organizations in health care have such independent divisions, which are capable of autonomy and self-direction without integration with an overall organizational strategy, this type of process or structure appears to be less than optimal. Further, the likelihood that decisions made in one division would probably still have impacts on other divisions, and also that activities pursued in one or another section would be duplicative, or even counterproductive, it would suggest that this is not the better choice.

So, if a centralized approach would be the better option, how should or could it be structured to avoid the problems that have been noted by the respondents. From many of the responses, and especially those from the executives that were able to "create" their own situations, one option would be the development of a centralized committee or decision-making body that would be comprised of leadership from all departments within the organization. Having such a diffuse representation would be necessary, if not mandatory, so that any decisions made could include input from all positions, as well as to obtain buy in from all of them as well. With such a centralized body, not only could decisions be made that conform to the overall strategies, but ultimate accountability would be held by that body as well. This could include ongoing oversight if necessary, as well as a reporting structure for completed projects. Having such a broad-based structure would also minimize the possibility of "silo-ing" where one department would be pursuing projects that others might benefit from but not be aware of, or departments working at loggerheads. Also avoided would be the sudden intervention done in one department that, after the fact, might necessitate resources that a different department had either been assigned, or had already allocated. One drawback could be over-assignment of too many or too small a level of projects to this body, with a work overload occurring, however delegation could also be accomplished which would minimize that likelihood.

Assuming that such a structure could be created, the next issue is where should informatics sit in relation to that structure? A comment made during the interviews was that "Informatics necessarily sits between the system and the organization- it has to be in between- however is it a main pillar in the strategy or rather a service to all pillars?" Does Informatics warrant a separate seat at the decision-making table, or should it be present to inform and support? Should Informatics have veto power over decisions, or if a project is suggested and supported, should it merely say how it can accomplish that, and for how much? This is not a simple question, however from the responses, it seems that a preponderance of answers leaned in favor of the support role. In a truly collaborative organization, if Informatics believed that the costs to the organization would be too high, then one might hope that the leadership of the organization would listen. Having such a

centralized approach should also mitigate the difficulties that were mentioned by the interjection of a separate Information Technology department. (As well as the possibility that there are multiple or competing informatics departments.) Having these two functions working together, rather than independently would better serve the support functions that both should aspire to. If there are specific needs of Information Technology that supersede Informatics, then having both working together would still provide a better relationship and likely provide improved outcomes rather than having them work separately. Even if they are separate but equal, having a specific coordinating function of some sort should be mandatory. Further, the communicative and integrational aspects of Informatics would provide an important counterweight to a purely technical department of IT, as will be discussed next.

It was mentioned also in the results sections that "the challenge to *Informatics* is how do you balance all of the input streams: streams from user requests; streams from business needs; streams from system or from local or regional parts of the business; and streams from technology/innovation of what is available, etc." There are at least two parts of this issue. The first is communication, and the second comes back to making the decision and balancing all of those inputs. If a decision-making body has been created to do that balancing of the clinical needs, the organizational needs, etc., and the venue is there to do that, then what remains is largely the issue of communication. This is an often overlooked, but critical needed aspect of informatics. For a clinical informatics program, there is no other body within an organization that has the capability to engage with front line providers, nurses, and other employees. The needs of those workers have to be reflected in any communications that move up the chain of command. Also, new technologies, new ideas for processes that require informatics involvement, and identification of problems or shortcomings of current implemented programs all must be identified, and be brought forth. If that is done on a regular basis, and if it is done not only responsibly and with the necessary documentation and substantiation as to need, costs, and benefits to the organization, then where better to have that function than informatics. This is currently an important piece of the upstream communication necessary for the lifeblood of any organization. When all of these input streams are brought up to a central committee, and all of the competing divisions, each with their own problems and challenges can bring forth all of their respective needs, then all of them can be collated and prioritized. When the full scope and range of projects are present, optimal decisions might be possible. And in order to balance competing visions, if all the proposals are fully documented, it will become much easier to determine which ones are needed more. In the full light of day, with everyone present. With Informatics working as a support system, and in an advisory role, no department can consider Informatics working for its own specific benefit, and all should feel that their own needs were adequately considered. Further, if a project fails, or goes over budget, or creates

problems, while Informatics assisted in the decisions, and while it would still be accountable, it would not have primary responsibility for any failures of strategy.

One other consideration for this type of structure, however, is that Informatics would still need to be engaged and integrated into all levels of the organizational structure. Local or regional divisions within the organization would still need both support and advice from informatics, both to bring issues from the workforce up to the middle levels, as well as to inform decisions being made on a more local level that involve informatics programs. If a particular hospital, or regions, or department was having issues with an EHR, for example, local representation from informatics would be essential in order to determine the problems and address them. This would also necessarily entail coordination and communication between the various levels of the informatics department. The head of informatics would need to know what was occurring down below as much as the local informatics lead would need to understand what would be the effects of decisions made at a senior level.

Another benefit of such a coordinating and communicating role for Informatics would be the opportunity for Informatics to provide ongoing communication back down the line. Employee and provider engagement often being difficult, especially where they feel they have no voice, might be improved by having a sounding board, a belief that they have a voice at the table, and also to receive feedback from the senior administration as to why and how these decisions are being made.

Such a structure, and having this type of support/advisory role for informatics obviates a number of other issues that were raised by the respondents. The issue of changes in strategy necessitating sudden changes in projects in midstream might be less likely to happen if all decisions were coordinated up front. Also, additional resources might be made possible for general needs such as analytics, telemedicine, etc., where advances in technology might benefit the organization as a whole. The costs for developing such programs would thus not need to be taken out of other budgetary lines if they could be "sold" to senior leadership as a strategic imperative.

Essentially a structure and process as described above would address the comment of one of the respondents "that better organizational governance would kill off Informatics governance as a separate thing. If overall strategic goals get clearly defined, then the job of Informatics governance gets easier." Another advantage of having a seat at the highest levels of governance, in an advisory role, would put informatics leadership in a position to avoid being solely in a reactionary mode- responding to tickets, putting out fires, and trying to solve problems caused by prior projects. Being able to set goals, assist in guiding the organization's directions should provide better opportunities for success for

Informatics leaders. Coordination relies on relationships with leadership. Good relations equal better governance, non-communicating relationships equals problems. Such a structure should obviate the necessity for "good looks and charm."

Resource Allocation

While this is a critical aspect of organizational management, resource allocation within any entity would need to be consistent with the structures described above. Most of this should likely be addressed through the processes involved in strategic decision making, however several comments are probably applicable here. If an overall strategy dictates the process, and if budgeting is designated by senior leadership in consultation with informatics (as it applies to informatics projects), then few surprises should occur. However, a number of comments from respondents suggest that additional needs could become problematic without prior attention. Although the goal of any project manager is to complete a project on time, within scope, and under budget, it is also common for informatics that resources post implementation are frequently underestimated or ignored. Thus it would be incumbent on any informatics leader to ensure that adequate resources for training, education, follow up, and especially for monitoring metrics (to be discussed next) must be created. While this suggests a more active role for advocating for budgetary concerns, it should be mandatory in any proposal from any other division, and accommodated in any request for a project or program. This cannot be understated. And it should not be forgotten. To do so would invite major problems, such as have already been noted. Along the same lines, support functions in informatics must be supported, and these must also be accommodated as separate budgetary issues, and approved as needed by any senior leadership process or structure.

Evaluation of Efficiency / End User Satisfaction

The evaluation of changes in efficiency, as well as end user satisfaction, were considered substantive issues. General thoughts about these two problems largely traveled in the direction of improved education, training, and optimization of the EHR. As mentioned, it is important to understand "what are the levers" that can affect these, and then it is necessary to ask "What are the things that can be changed to make that experience better, to improve the efficiency?" Optimization is one thing. Workflows can be improved, but that is harder. The build can be changed to affect the way it looks or operates. Usability might be improved, but each step in this process becomes more difficult, more expensive, and more time consuming, and many of them have no specific end in sight. So, where or how do you push on those levers? This may remain a difficult question at best, and

possibly unanswerable question for the near future. However, optimization and training may be the best answer at this time, even though it may be a less than optimal solution.

The problem with this, though is (from the results section) that "most organizations just don't get to any of these improvements, usually because they're just stretched even putting in the EHR, keeping it around and installing new versions. Just keeping up with regulatory requirements, which is also important, it remains just hard to do all of that. But the best organizations should really look at the operational management of health care and the coordination of care, physicians' satisfaction, and patient satisfaction too. Unfortunately, the question lurking just under the surface is whether most organizations actually do actually care enough to work to make these changes."

A solution to this and other problems is Measurement and Accountability. One of the more important comments was that "it remains up to every party to start to say these are our priorities, and this is how we define success. And using this definition is how you measure it. What were we doing before and where do we want to get to? You must hold yourself accountable for studying the data and saying that you did so. And then you can document that this was a success, but we didn't do so well on that one and, and why is that? But it takes a lot of discipline and a lot of folks are just so happy to get things turned on and sort-of being used they stopped being systematic or never start being systematic about measuring that value proposition." And therein lies a problem.

Regarding end user satisfaction, there is still a paucity of concordance on how to best deal with that. Although very few believed it was not a problem, and there have been many calls for why it is an issue, probably related to the rapid implementations of EHR's across the country, solutions are not readily at hand. The general belief by the respondents was that the best current solution for this is improved customization and optimization. Other thoughts included improved attempts at workplace wellness programs, although that is outside the purview of informatics per se.

Thinking About Metrics

A minimum of 15 themes for potential methods or metrics were developed during the evaluation of the respondents (albeit with some overlap). They are briefly described. It should be noted that in a prior study (2) only six channels were suggested by the evaluative process. There was clearly a sense of more robust thinking about this issue of how to measure things, and further, that the idea that these things were not only measurable, but that there was value in that measurement, and value in being able to use these to improve what Informatics does.

Rather than go through a separate discussion regarding Metrics, it appears that in general the respondents recognized the importance of measuring what you do in order to be able to improve what you do. The responses regarding the issues involved in each of the metrics described are already discussed in the results section, and are mostly self-explanatory. However, in an attempt to develop a more general discussion and a means of thinking globally about metrics, the author (BN) developed a general scheme of how metrics can and should be approached. This is encapsulated in Table 1. This approach creates groupings of the various metrics based on two axes. The first axis regards that of how narrow or broadly you wish to measure. Some things should be measured on an individual level, others on a slightly larger level, such as a clinic, ward, or perhaps a department. Others will perhaps need to be evaluated on a more global or organization-wide level. Some metrics can apply on several levels as well (efficiency, for example).

The other axis for evaluation is the type of metric being used. Some of the metrics apply more to organizational health. Metrics such as Financial or Organizational satisfaction would fall into that rubric. On a different note, a number of metrics would be more related to quality and safety. Finally, some metrics are more individual based, even if such a measure might be applicable in aggregate over an entire system, such as measures of efficiency, or user satisfaction. This can be measured one on one, or across the system. An additional category was added for metrics that would apply primarily to Informatics activities, even though many of those may fit elsewhere in the scheme. The matrix allows for an leader or an organization to pick and choose what aspects it believes would benefit them the most at any particular time. Further, there are corners of the matrix where no good metric currently exists. This can be because there is not one, or because it might be possible to measure something only in the most controlled situation, or in an academic lab (usability comes to mind). There are most certainly more metrics that will be found, but this can provide a start. As additional concepts and means of testing are demonstrated, they can be added, or changed. But at least there is now a framework to begin the discussion.

Other Thoughts About Metrics

What follows are a number of thoughts brought up by respondents during the study that are particularly apropos for thinking about metrics, and how they can or should be used. A particularly meaningful comment was that it might be better to measure fewer metrics but make them really meaningful. However, this would be more satisfactory as an answer if those metrics were being measured regularly and with intentionality. It would be important to measure the value and impact of any changes that are made by informatics. Is what you are doing making a difference? Is there a benefit to be realized? And then

how can you measure that? The answers to questions like these underlie the importance of measuring things, since if you cannot demonstrate the value of a proposal, and your level of success in achieving that, then there will be difficulty in obtaining approval up front, and also being able to justify your next program or proposal. While some metrics may not be available, or even possible, whatever metrics that can be monitored or measured should be. The ability to communicate success or failure should be a mission critical function of any informatics effort. Yes, it takes time, and effort, and resources to do that. Even if the only output that can be obtained is "stories," the ability to demonstrate a narrative cannot be underestimated. Also, if nothing is being measured, then it becomes difficult to address the problems that have inevitably arisen after implementations.

Finally, the ability to measure what you do needs to be built in to any approval process. If a request is going to be made for a particular program or project, the ability to understand its effect on the organization and its potential outcomes should be mandatory. Thus, in order to gain approval for anything, it should be incumbent on the requestor to consider and demonstrate what the effect will be.

A FEW OTHER POIGNANT THOUGHTS: (additional comments from respondents)
GOVERNANCE
"I think governance is really tricky business. On the one hand good governance may not be very efficient but maybe it is in long run. I mean, getting stakeholder input is expensive and time consuming whereas dictators who can make decisions themselves can move the process forward so much faster but in the long run which one is better? I think trying to find that happy medium and I think it's a fluid business because obviously governance for implementation is different than optimization."
COMMUNICATION
"I would like to see more communication between people and departments-- now that so many physicians are employed by big organizations, you now have the chance for the overall executive leadership of the organization and the IT leadership of the organization and the clinical leadership of the organization, come together and say, 'Are we talking to each other enough?'"
DEFINING SUCCESS
"It's up to every party to start to say, these are our priorities. This is how we define success. And using this definition, this is how you measure it. So, what are we doing before and where do we want to get to? And then, you know, holding ourselves accountable to studying with the data and saying 'Yeah, we did so. Okay on that one, but we didn't do on that one and, and why is that?' But It takes a lot of discipline and I think a lot of folks are just so happy to get things turned on and sort of being used they stopped being systematic or never start being systematic about measuring that value proposition."

CONCLUSION

A qualitative study was performed to evaluate governance in informatics. This entailed in-depth interviews with targeted senior leaders in healthcare organizations through the Pacific Northwest. These leaders stood in various positions either at the level of the C-suite, or as the heads of their departments. Their roles were evaluated, both from a functional as well as a structural viewpoint. A diversity of roles and functions were noted, even for different people at the same level in different organizations.

There were, however, many similarities in the barriers these leaders had to face both to justify their activities within their organization, as well as to the rank-and-file provider base that was entrusted to their departments. Issues of communication to senior leadership, as well as to providers, were frequent, and were comparable across organizations as well as within organizations. Barriers to obtain the resources necessary to fulfill their mission were often present, and there were difficulties in integrating and engaging with other departments that needed informatics but did not truly understand its requirements.

Aligning informatics activities with the greater organization should have been critical, however, attaining such alignment was often problematic, both as a result of lack of communication upstream, as well as a lack of metrics that could demonstrate the value of those activities. This gave rise to difficulties crafting a message to leadership communicating the need for early involvement of informatics in decision-making processes, particularly before budgets and priorities were decided upon.

Development of robust governance structures that are deeply embedded in the organization is critical. Although, according to the various respondents, most governance structures had developed organically, and often almost haphazardly, a number of threads suggested the possibility that a particular means of integrated structure might be optimal. This would require integration of informatics leaders at all levels of the organization, and instituting specific mechanisms for engagement with other leaders and departments.

Creation of an appropriate means of measuring what Informatics has accomplished, and the ability to demonstrate how it creates value for the health and strategies of the institution are critical. This is fundamentally important, as additional barriers are created if parts of the organization do not understand the value that Informatics provides. A matrix of potential metrics was developed in order to facilitate thinking about those metrics, as well as to create a framework for moving this effort forward for the future. The matrix consists of two axes. On one axis resides the concepts of how broadly the

metric can be utilized: for testing on an individual level, a departmental level or an organization-wide level. The second axis regards general typology of the metric, loosely categorized as metrics that measure benefits to the organization, those that can measure the quality or safety of the care provided, or measures that evaluate individual activities or perceptions.

As the practice of Informatics matures, it has become imperative that it become integrated into the life stream of the organization it works within, at all levels. Structures will need to be developed to allow that to happen in a meaningful way. There is a growing recognition that the ability to have metrics which can demonstrate the results of what is accomplished and prove its importance, not only to the organization, but to the patients that it serves. This recognition must lead to a more concerted effort on the part of informatics professionals to pursue this.

TABLES

Table 1

EHR EVALUATION MATRIX

	SYSTEM BASED	QUALITY BASED	INDIVIDUAL BASED	INFORMATICS METRICS??
MACRO Level	Overall Financial ROI	Total Quality Measure Performance	Satisfaction by Organization	? How to Measure Success
	Patient Experience	Data Quality for Research	Satisfaction/Efficiency by Entire System	% Optimized
	Regulatory Burden			Provider Engagement
	Leadership/ Organizational Satisfaction			Communication Success (right information to the right person at the right time)
LOCAL Level	Specific Targets- Improved Transfers, Faster Discharges, Etc.	Departmental Safety or Quality Measures	Satisfaction by Unit- for Providers and for Leadership	Departmental or Program Satisfaction
	Departmental Metrics		Problems; and Did You Fix them– by Clinic/Department/Unit	Informatics Satisfaction?
				Communication Success
MICRO Level	Improved Effectiveness	Data Quality	Individual Efficiency Measures	End User Satisfaction?
	Decreased Burnout?		Improved Proficiency	Successful Customization
	Lower Provider Turnover?		Individual Satisfaction?	Communication Success
	Improved Provider Engagement- Nursing and Physician		Response to Support?	
			Usability	

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APPENDIX 1

Interview Guide

Newman Capstone Project Interview Guide

Interviewee's name: _____ Interviewer's name:_____
Date: _____ Time:_____ Setting:_____
Recorder's name:_____ Folder name/#:_____ Record #:_____

Set phone etc. to silent!
Go over consent form. Contents will be repeated here. **Mention here that all information discussed is confidential and only the research team will see it. All interviews will be recorded and transcribed, but prior to analysis or evaluation, all identifiable information will be removed and coded, both for the informant as well as their institution of origin.** Confirm name and consent to recording before starting. Announce that you will ask for consent again while recording.
Turn on recorder
It's [date] and this is [X] interviewing [Y] at [site name] on [date] at [time]. We would like to record this interview, and we need your verbal consent- do you agree to participate in this study, as well as to recording the interview?
[Wait for response.]
I am a graduate student enrolled at OHSU completing a Master's degree program in Informatics. I am performing a follow up study that originated from a collaborative project to examine how other organizational models effectively support informatics for both the system and the user.
Original Project Goals were:

1. To Understand how HCOs, define effectiveness in terms of informatics
2. To Identify what characteristics may either positively or negatively impact effectiveness

The current project has been developed to review opinions and find more detailed answers to a number of issues that were developed by the prior studies.

Questions:

1. What is your role? [and how long have you been in this role?]

2. In a perfect world, how would you describe the process of implementation of healthcare IT in your institution, and how should IT governance work to facilitate that?

3. Among potential issues that were identified as related to governance in Healthcare IT, was the question of the how IT strategies align with overall organizational strategies.

    a. Could you describe your view of the strategic alignment of healthcare IT with overall healthcare management in your institution?

    b. How is it done well?

    c. What could be made better?

4. How are resources for healthcare IT allocated by your organization, and by the governance structure of your healthcare IT department?

    a. What benefits accrue from the current setup

b. What problems or barriers have you noted as a result?

5. How would you describe any changes in efficiency of healthcare provision due to healthcare IT?

    a. How has this been an issue for you in your institution, and how are they being, or have they been addressed?

6. Reduced end user satisfaction and burnout has been described in relation to healthcare IT implementations related to decreased efficiency, poor usability, and issues relating to burdens of increased needs for compliance (billing, administrative, regulatory, etc.).

    If this has this been raised as a potential issue within your organization or department then how has it been dealt with?

    If not dealt with, what are your views as to the need to deal with it or not?

7. What processes and metrics are in place to evaluate:
    a. Effectiveness?
    b. Efficiency?
    c. End user satisfaction?
    d. Usability?
    e. Financial Metrics?

8. How else have you, or could you, measure the success of your governance efforts?

9. If processes are not in place, what processes and/or metrics would you like to put in place?
    a. From a practical standpoint?
    b. From an ideal standpoint?

10. Do you have any other thoughts or ideas that may be helpful?

11. Any thoughts about individual Optimization?