Assessing the Efficacy of Information Technology Systems at Academic Medical Institutions

JR Holt
President, JRH Associates, Inc., Alexandria, VA
jrholt@jrhassoc.com

ABSTRACT

Academic medical institutions face a challenge which is not unique in the information technology world but one which is compounded by the life and death nature of their business. Over the years most of these institutions have acquired information technology systems which may provide the information necessary for data tracking and analysis but which rarely communicate with each other; are grossly inadequate; and are extremely expensive to replace. Few of these institutions have a clear picture of the information technology installed in their numerous departments nor what their market is doing in terms of information infrastructure. During the winter of 1996, JRH Associates was engaged to assist ten medical teaching universities in assessing their information systems. In order to evaluate a maximum number of the systems in a minimum amount of meeting time (2 - 4 hours per session) with 10 to 30 of the institutions' executive level participants, JRH Associates used collaborative technology. The systems were judged in terms of their effectiveness and their "market need" using a format designed by JRH Associates in conjunction with a university consulting consortium. This paper describes the planning needed to set up the assessment meetings, the process utilized to conduct the sessions and the valuable insights gained through completion of the project.

1. Overview

During the winter and spring of 1995 to 1996, JRH Associates conducted ten “information technology assessment” meetings for academic teaching universities throughout the United States. Using collaborative technology and a structured assessment tool format, JRH designed an appropriate methodology with which to poll senior executives of the university staffs about the effectiveness of their presently installed information technology systems. A second component of the assessment was to determine the market need or competitive advantage of each system. The methodology, outcomes and lessons learned by the institutions participating in this project; by JRH Associates; and by the sponsor of the project are outlined in this paper.

2. Background

A well-known Virginia university is a member of a national consortium of academic medical institutions. Each year members of this consortium are asked to participate in an assessment of their information technology systems using an assessment tool (AT) developed by the consortium. This tool is used to judge both the effectiveness and the “market need” of applicable systems.

During the winter of 1995, JRH Associates was asked by the Chief Information Officer of the Virginia institution health sciences center to assist the center with their annual assessment of information technology systems using the consortium assessment tool. JRH Associates designed a process to incorporate the tool into a collaborative technology process using GroupSystems for DOS® software by Ventana Corporation. The assessment was conducted in February of 1995 and was so successful that JRH Associates was invited by the consortium to conduct the same assessment during the following year at not only the Virginia school but also other consortium member institutions which were interested in using electronic meeting support with which to conduct their assessment.

During the winter and spring of 1995 and 1996, JRH conducted these information technology assessment meetings at ten institutions throughout the continental United States shown in the chart below:
Table 1. Overview of participating institutions

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of School</td>
<td>Public</td>
<td>Private</td>
<td>Public</td>
<td>Public</td>
<td>Public</td>
<td>Public</td>
<td>Public</td>
<td>Public</td>
<td>Public</td>
<td>Public</td>
</tr>
<tr>
<td>Environment</td>
<td>Coed</td>
<td>Coed</td>
<td>Coed</td>
<td>Coed</td>
<td>Coed</td>
<td>Coed</td>
<td>Coed</td>
<td>Coed</td>
<td>Coed</td>
<td>Coed</td>
</tr>
<tr>
<td>Location</td>
<td>Urban</td>
<td>Urban</td>
<td>Urban</td>
<td>Urban</td>
<td>Urban</td>
<td>Suburban</td>
<td>Urban</td>
<td>Urban</td>
<td>Urban</td>
<td>Suburban</td>
</tr>
<tr>
<td>Founded</td>
<td>1876</td>
<td>1891</td>
<td>1969</td>
<td>1924</td>
<td>1946</td>
<td>1839</td>
<td>1838</td>
<td>1807</td>
<td>1870</td>
<td>1819</td>
</tr>
<tr>
<td>Total Enrollment</td>
<td>1,851</td>
<td>12,117</td>
<td>27,011</td>
<td>2,156</td>
<td>24,583</td>
<td>22,483</td>
<td>21,681</td>
<td>5,747</td>
<td>48,352</td>
<td>17,959</td>
</tr>
<tr>
<td>Graduate Enrollment</td>
<td>1,039</td>
<td>*</td>
<td>2,871</td>
<td>458</td>
<td>5,286</td>
<td>3,020</td>
<td>3,535</td>
<td>3,454</td>
<td>8,780</td>
<td>5,441</td>
</tr>
<tr>
<td>Curriculum**</td>
<td>T</td>
<td>SM</td>
<td>SM</td>
<td>SM</td>
<td>T</td>
<td>SM</td>
<td>SM</td>
<td>*</td>
<td>*</td>
<td>M</td>
</tr>
<tr>
<td>Micro-computers</td>
<td>*</td>
<td>1,000</td>
<td>500</td>
<td>*</td>
<td>1,000</td>
<td>850</td>
<td>200</td>
<td>23</td>
<td>1,000</td>
<td>1,745</td>
</tr>
<tr>
<td>On-campus LAN</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Teaching hospitals</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>*</td>
<td>*</td>
<td>4</td>
<td>*</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Hospital beds</td>
<td>400</td>
<td>*</td>
<td>*</td>
<td>1,676</td>
<td>1,400</td>
<td>1,062</td>
<td>*</td>
<td>1,400</td>
<td>*</td>
<td>900</td>
</tr>
</tbody>
</table>

* Not available  ** Curriculum: Traditional (T), Semi-Modern (SM), Modern (M) [10]

3. Research Methodology

JRH Associates was asked to use the consortium assessment tool as a basis for the review. The tool is organized into ten sections and each section contains a list of from three to 20 information technology (IT) systems found at academic medical institutions. Each system is defined by the tool and the universities used these definitions in order to standardize their evaluations.

3.1 The Assessment Tool

There are ten different sections of the assessment tool covering patient management, patient care, patient tracking; managed care for physician hospital organizations and contract managed hospitals; clinician support; community and regional support; executive, decision, management, financial and administrative support.

3.2 The Assessment Scoring Values

Each of the institution IT systems was evaluated using rating scale or scoring values as defined by the assessment tool.

The market need or competitive advantage was evaluated on a scale from one to five based on the requirement for the institution to have the capability or technology to be successful in the marketplace. The ratings were defined as:

1 = No competitive requirement
2 = Basic automation requirement (no competitive advantage)
3 = Automation requirement (no competitive advantage)
4 = Competitive advantage
5 = Significant competitive advantage

If a technology was installed and operational, the effectiveness of the technology to the users within the institution was rated on a five point scale in terms of its ability to “meet overall needs” as defined below:
In order to be able to compare data from all institutions completing the assessment and to compare data across multiple years, the rating schemes were the same for all institutions.

3.3 The Process Methodology

The methodology consisted of the following steps:

3.3.1 Participants

Each university invited its senior executive staff to participate in the assessment meeting. In some cases the participants were augmented by members of the Information Technology or Information Systems (IS) departments. The augmentees were there to provide further detail about the institution’s IT systems but not to vote.

The participants included:

- Members of the Board of Directors
- Chief Medical Officers
- Chief Physicians/Surgeons
- Department heads

The Chief Information Officer (CIO) always attended as a non-voting member of the group and was the official sponsor of the meeting. All arrangements were made through their offices.

3.3.2 The Order of the Assessments

CIOs were asked to order the assessments so that the most important items were covered at the beginning of the meeting when attendees were fresh. Some institutions chose to change the order of assessing the systems in order to enable the participation of members who had schedule conflicts and who would have missed some of the more important reviews had the original assessment tool order been followed.

3.3.3 The Attendees

CIOs were instructed to invite 125% to 133% of the total number of participants. At the worst, there were more attendees than computers and some of the participants shared a workstation. However, in some cases participants with limited computer skills were helped by having a partner who was more skilled than they.

It was stressed that the most appropriate attendees be invited to participate. This was especially important with regard to the market need or competitive advantage section of the assessment. Participants with a broader view of the market would be better able to provide an accurate picture of the outside world.

3.3.4 The “Cross-walk”

Each institution was requested to have an IT staff person create a “cross-walk.” This was a document which referenced the system definitions listed in the assessment tool to the systems which the institution actually had. The section order of the “cross-walk” was to match the order in which the meeting was to be conducted.

The example given in the instructions is illustrated below.

| Assessment Tool System Title: Scheduling |
| Assessment Tool System Description: An enterprise-wide system .... (definition from the assessment tool) |
| University System Title and Description: ENTWIDE. |
| This system was installed enterprise-wide in 1993 and serves not only the Medical Center but our four remote clinics. It will be upgraded with a “clinic feedback functionality” during July of 1996. |

The “cross-walk” was closely proof-read prior to the meeting to confirm its accuracy and a copy was provided to each participant as well as to the facilitator. A staff member familiar with both the assessment tool system definitions and the university installed systems attended to provide information as needed.

3.3.5 Refreshments

It was highly recommended that refreshments be provided
during the meeting and that the participants be informed about the refreshments. We each have our own motivations and making folks comfortable was certainly an incentive to their participation.

3.3.6 The Timeframes

In terms of the market need or competitive advantage assessment, each CIO had to decide whether they wanted their participants to determine the market need for a particular system based on what they knew the market was doing “today” or “three years from today” or “five years from today”? Most assessments of the market need were made based on knowledge of what the market would look like three years in the future.

Additionally, in terms of the effectiveness of the internal systems each system was evaluated as it existed on the day of the meeting. For systems which had not yet been installed, the decision was to judge the effectiveness of the system based on the promotional information provided by the IT department about the system as it was to be configured when it was operational.

3.3.7 Additional Strategic Questions

Two institutions added a strategic evaluation of a list of IT systems they were considering acquiring. Using a scale of one to five, the participants were asked to evaluate the list of IT systems in terms of their importance to the institution. A rating of one meant that the system would have no value to the institution and a rating of five meant that the system was critical to the acquire within one year.

3.3.8 Items Provided to the Facilitator

One week prior to the meeting, the CIO was asked to provide the following items to the facilitator:

a. A list of invitees and their titles.
b. The item order in which they wanted to conduct the assessment.
c. The “cross-walk” list.
d. The timeframes.
e. Whether they wanted to use the term “Market Need” or “Competitive Advantage” or some other terminology which would be readily understood by the participants.
f. Other questions they wanted to ask.
g. Logistical information.

3.3.9 Items Provided by JRH Associates

The following items were provided by the facilitator:

a. The process design
b. Process facilitation and technographer support
c. A handout with the Market Need and Effectiveness scoring values.
d. The collaborative technology computer platform, overhead projector, LCD panel, LAN hardware/software and printer.

3.3.10 Logistics

Each meeting was held in a room with the following set-up:

a. Tables in a U-shape or a conference table
b. One or two projection screens
c. An overhead projector
d. A flipchart or whiteboard to use as a “Parking Lot”

3.3.11 The Meeting

Attendees arrived and a short presentation was made by the institution’s Chief Information Officer as the sponsor of the meeting. Attendees were given copies of the assessment scoring values on a sheet of paper. The scoring was explained and discussed to assure that participants understood the meaning of each of the values.

The “cross-walk” was also handed out and explained in detail. There were non-voting IT staff persons available to answer questions about all of the systems installed at the particular university.

A short system familiarization exercise followed to acclimate the participants to the electronic meeting support using the GroupSystems® Group Matrix tool of GroupSystems for DOS® software by Ventana Corporation.

Then the group completed their scoring of the first section of the assessment tool using the Group Matrix tool. When everyone had completed the ratings, the results were projected onto a screen in the front of the room. Group Matrix allows participants to assess the market need and effectiveness of each of the IT systems on a scale from one to five. The tool displays the ratings in matrix format as shown in the example below:
Table 3. Illustration of assessment matrix

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>MARKET NEED</th>
<th>EFFECTIVENESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Location</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Patient Schedules</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Patient Medications</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Participants would enter their individual scores into the matrix using their keyboards. The mean of all the ratings were displayed on the leader workstation and projected from there onto the screen in the front of the room.

The Group Matrix tool includes the ability to set a consensus threshold such that if there is a high degree of agreement on a rating, the matrix cell will be colored green. Conversely, if there is a high degree of disagreement the matrix cell will be colored red. The cell color is determined by a statistic developed by Ventana Corporation called the “Coefficient of Concordance” and based on a normalized Standard Deviation. The facilitator and CIO set the consensus threshold throughout the meeting.

Any cells which were colored red, indicating a lack of consensus, were thoroughly discussed. Participants were allowed to change their scores if they wanted to during or after the discussion. The goal of the discussion was not to reach total agreement on the score for the competitive advantage or effectiveness of a particular system. The goal of the discussion was to determine why participants disagreed on the scoring.

4. Key Findings

If the assessment of a particular system indicated that the institution’s installed IT component was highly ineffective and the market need or competitive advantage for that system was high, then the CIO might want to explore replacing or fixing the present system.

However, if a system were judged to have little competitive advantage and yet the institution was expending considerable resources to install or perpetuate it, the CIO might want to reconsider the efforts in that regard.

4.1 Patient Support Systems

Patient support include IT systems such as scheduling, admissions, registration, indices, records and voice/text.

4.2 Doctor Support Systems

Doctor support includes systems such as access, credentials and research.

4.3 Other Patient Systems

Other patient systems include IT such as orders, results, plans, case management, discharge, profiles and outcomes, charts, diets, laboratories, emergency services, operating room, pharmacies, radiology, telemedicine, therapy, education, data storage, digitized monitoring, and picture archival.
4.4 Extended Patient Systems

Extended patient systems include such things as support, occupational health, health maintenance/wellness, home health care, and dialysis.

4.5 Additional Patient Systems

Additional patient systems include IT systems such as registries, infections, quality assurance and risk management.

4.6 Managed Care Systems

Managed care includes systems such as enrollment, referral, risk management, claims, premiums and affiliations.

4.7 Contract Managed Care Systems

Contract managed care includes systems such as billing, modeling and monitoring.

4.8 Management Support Systems

Management support systems include IT such as budget, cases, cost accounting, productivity, executive support, external data, knowledge bases, market analysis, product lines, personnel, and office automation.
4.9 Regional Support Systems

Regional support includes systems such as community health networks and information.

4.10 Administrative Support Systems

Administrative support includes IT systems such as accounts payable, materials management, claims, assets, general ledger, patient accounting, payroll, time and attendance, development support, preventive maintenance, education and residents.

5. Evaluations

At the conclusion of each meeting, the participants were all asked the same five questions designed by the facilitator to evaluate the success of the meeting. The questions were:

1. Was this session worth your time?
2. Did we achieve our purpose?
3. Were the directions clear?
4. How was participation?
5. Would you be willing to do this again next year?

The evaluation scoring was:

1 = Well below average
2 = Below average
3 = Average
4 = Above average
5 = Well above average

The combined average responses are represented in the following figure:
6.2 The Scoring Values

Participants had a difficult time deciding on the correct rating for the Market Need/Competitive Advantage of a system because of the similarity of terms on the rating scale. Participants found that there was little appreciable difference between rating a system as having “No Competitive Requirement” and a “Basic Automation Requirement: No direct competitive advantage.”

Additionally, for administrative information technology systems, there was no competitive advantage to be gained by having or not having a system. It was felt that a different scale which would assess the value of a system to the individual institution was more appropriate than a evaluation based on competition.

6.3 The Attendees

It was difficult to get the appropriate mix of participants to evaluate so many different IT systems all in one meeting.

6.3.1 Diversity

Although there was a diversity of attendees at each meeting, the predominance was institution staff rather than clinicians.

6.3.2 Expertise

The expertise was either at the user level -- which was too low for a market need assessment -- or at the executive level -- which was too high for an assessment of the system’s effectiveness.

6.4 Knowledge of the Systems

Few, if any, of the participants were familiar with all of the IT systems. No one but the CIO -- and sometimes not even he/she -- knew the exact nature of all the IT at the institution.

6.5 Clinician Focused Systems Versus Administrative Systems

Whereas the importance of clinician focused IT is appropriate to judge in terms of its competitive advantage for an institution, information technology supporting administrative functions has relatively little competitive impact. Most institutions felt that administrative systems were simply necessary as a matter of sound business practices.

7. Recommendations

If this process is replicated, the following recommendations are made in order to enhance the success of the process.

7.1 Revise the Scoring Values

Use an even numbered scale (one to six or one to four rather than one to five) so that participants cannot simply choose the middle value when they are unsure of about the score for a particular system.

Revise the market need scoring values to more appropriately reflect an assessment.

7.2 Invite the Appropriate Attendees

To ensure that attendees have the appropriate knowledge about the systems, conduct two or three different meetings as follow:

a. Invite the “users” of systems to evaluate the effectiveness of the systems.

b. Invite clinicians, senior staff, department heads and board members to evaluate the market need for a system.

c. Finally, conduct a meeting with an IT steering committee or some appropriate group of decision makers to compare and contrast the scoring from the previous two meetings and make decisions about actions to be taken.

Variations of this methodology were used by several of the institutions with more satisfaction than institutions which combined the assessment in one meeting.

7.3 Separate Clinician Focused Systems from Administrative Systems

Reorganize the assessment tool so that only clinician focused systems are being evaluated for their market need or competitive advantage -- with the rare exception being administrative systems which are on the leading edge of technology or which are seen by customers (physicians, insurance companies, patients, etc.) as being competitively important.

8. In Closing
The CIOs were most helpful -- as were their staff -- and vitally concerned with the success of the meetings. In a world of accelerating rates of change where the average tenure of a CIO is under three years, these folks experience tremendous pressure. They are -- without exception -- extraordinary individuals. The consortium was most supportive in providing resources whenever requested. We are very grateful to them for this opportunity and trust that the project provided them with the information they needed to be able to serve their member institutions better.

REFERENCES


Biography

JR Holt is President and owner of JRH Associates, Inc., a leading collaborative technology company in the Washington, DC, metropolitan and Tidewater, Virginia, areas.

JR Holt has over six years of experience in merging Electronic Meeting Support with traditional facilitation methods to heighten group communication in sessions such as strategic planning, business process reengineering, quality improvement, and process analysis. Her background includes leading the non-profit Hampton Roads Quality Management Council in providing educational programs, forums, and conferences on Total Quality Management and Total Quality Improvement. She also conducted computer-based staffing analyses, financial studies, and efficiency review studies as a Management Analyst for the US Army and Navy in both the continental United States and Europe for 13 years. JR worked with a US Senator on Capitol Hill as well as for a multinational corporation in its Washington, DC, Congressional Relations office. She has also designed, developed, and delivered training specifically tailored for a variety of organizations in the fields of quality management, facilitation and technographer.

JR has a Bachelor of Science degree in Mathematics with Minors in Physics and Education from Radford University in Radford, Virginia.