Developing a University Financial Trading Room: A Case History

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The paper represents the experience of creating a financial trading room at the Scott College of Business at Indiana State University. It is intended to provide commentary and advice for those contemplating building a university financial trading room. It addresses design, construction, project oversight/installation, budget, and more. The paper is a case history of our path to operating our trading room with regard to hardware/software, vendors, project management, budget issues, operating policies, and so forth. Although we are pleased with the final product represented in our Financial Trading Room, we stubbed a few toes along the way and began making a list of decisions to avoid for the next trading room. For instance, we have made interim configuration changes. Links to the photos of the trading room and vendors appear in the comprehensive references list.

This paper presents the development of the financial trading room in the Scott College of Business at Indiana State University, first opened in 2007. Our trading room is part of the Minas Center for Investment and Financial Education, and was partly funded by a grant from the Lilly Endowment. The paper explores design, construction, project oversight, installation, operations, and budget implications. The lessons we have learned are being applied to the new trading room in the new business building now under construction.

THE FINANCIAL TRADING ROOM

The financial trading room has been operational since December 2007. The project timeline indicated a completion time early in the semester prior to its first use, and although we hit that semester, it was only functional at the end of the term just in time for our grand opening. Needless to say, it is wise to reserve a wide cushion of just-in-case time.

The trading room is located on the first floor in a highly visible area of the business building, something that the dean visualized as valuable for public relations and recruiting. We converted a popular classroom, and most students and visitors walk by the trading room as they enter our high rise building. There are two independent tickers - inside and outside the trading room - and the outside ticker can be used for college messages. For instance, in June it welcomes incoming students and families during summer orientation and in May it congratulates our graduates and their families. We often use it to welcome guests visiting our college.

Our display vendor was Rise Display and we have been mostly happy with them. They rated above the other vendors in pre-sale service and continue to give excellent, personalized service. Rise's personnel offered advice on vendors and continues to make suggestions for the new trading room.
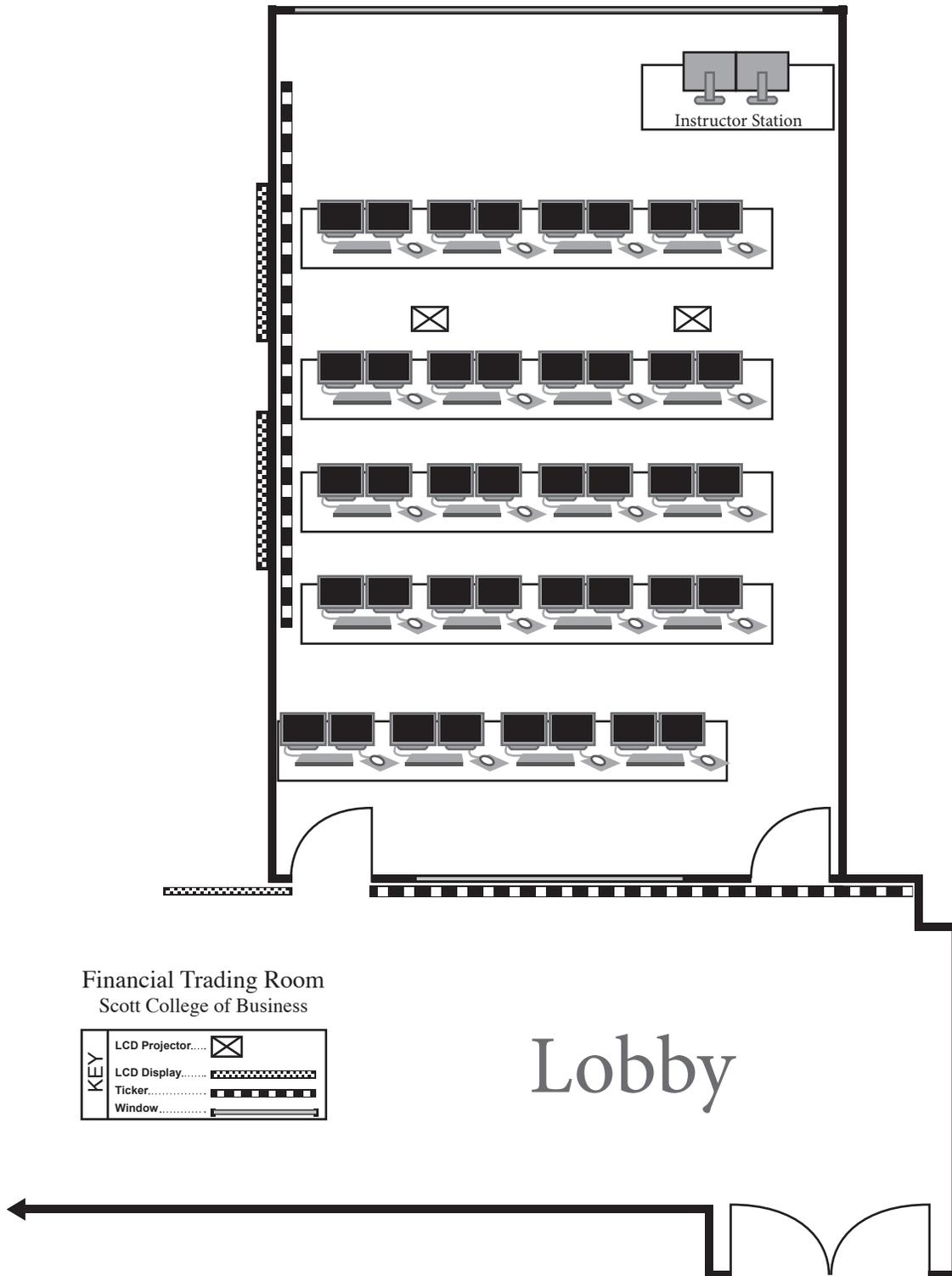
The main trading room consists of 20 student trading/analysis stations in five rows of four, and an instructor work station. Each station has two 19" LCD monitors mounted on a specialized monitor arm that holds both monitors in variable configurations. The workstation is a higher end regular Dell Windows PC. We purchased tables for two stations per table, configured in a traditional computer lab setup in rows. At the front of the room are two video projectors that display the instructor's dual monitor displays. The instructor's computer also has a television tuner card so the campus cable television signal can be projected for the class. The speakers are located in the ceiling for the cable TV and multimedia (DVD, CD, VHS) audio. Data and software are discussed later.

The trading room has a large window in the lobby enabling visitors to see what is going on in the room. The front of the room is at the opposite end, so viewers can see the instructor's projected screens and the student stations. The last row of four stations is in a separate student practice room with a push button combination lock on the door; our investment club students use this room heavily for individual analysis while class is going on and in the evenings. Figure 1 below shows a general layout for the trading room and the Rise displays. The key indicates the type of display and location.

Photographs with captions illustrate the build-out process and show various parts of the finished trading room. A link to the slide show with about thirty photographs appears in the references.

The public relations value of the financial trading room is significant – it is a stop on the campus admissions tour, and has given our financial services majors a real shot in the arm in terms of exposure. Interest in our financial services programs has increased significantly since the financial trading room opened. In 2005 the number of undergraduate finance and financial services majors averaged about 55. Since 2007 it has grown steadily to around 90 students in these two majors. Our graduates are finding no lack of positions that utilize their skills.

Figure 1: Financial Trading Room General Layout

Instructor Station

Financial Trading Room
Scott College of Business

KEY		
LCD Projector.....	⊠	
LCD Display........		
Ticker................		
Window..............		

Lobby

The Design Process

There were several champions for this project - a junior finance professor who had access to the trading room at his alma mater, the dean, and two senior finance faculty members. As building coordinator, the associate dean (author) became the project coordinator (but not the project manager - a problem described later).

We requested a list of needs as part of the initial planning process. Given the recurring cost of the data and software, it is important that this get nailed down early in the design. Is the facility a faculty research tool, or for teaching students - undergraduate or graduate? Is it only intended for financial services students, or for all business students? How many students should be served at one time? We recommend that you request a formal document expressing what is needed and why, and then ask where the software will be used in the curriculum. Assessment later should be done to confirm the actual use in classes.

Formal design can be broken down into four general categories: 1) room design, 2) room equipment design, 3) work station (electronics and furniture) design, and 4) software and data design. They are addressed one at a time.

Room Design

The room design was based on converting a classroom in a building that was originally a residence hall - not the best shape for a trading room. The size of this existing classroom limited the number of work stations, which in turn, limited which class sections could use the facility. As it turned out, we don't have enough trading stations and will resolve that in our new building with a much larger space for the trading room.

As mentioned earlier, the location of the trading was crucial for us. We're getting double duty here with the trading room serving as a wonderful publicity tool for the university. By converting a popular classroom in our main lobby, we put the facility in a prime viewing area. The outside ticker is terrific for attracting attention - both for customized messages (visitors, events) and for "announcing" the financial content via normal financial programming. The outside ticker is built into a 90 degree corner so people can see it from two directions - helpful. We often stage photographs there with visitors so that we get the outside ticker (with their names) and the visitors in the shot.

The dean and the associate dean visited the trading room at Fairfield University in Connecticut. We saw a larger trading room and got an opportunity to ask lots of questions. We also called some schools to ask questions about design and other issues.

We designed the room like a computer lab - five rows of four computers each; it might be good for teaching, but it is not a realistic depiction of actual trading rooms. From visitors, we have learned that trading stations often face each other in clusters so that the analysts can share information easily. However, our purpose is more based on training students in classes, so we might have a similar layout in a new building. Talk to your stakeholders to see what they recommend. If the budget permits, it might be appropriate to have a main teaching facility like the one we built, and then a smaller room with a more realistic financial trading workstation layout.

We also designed the trading room with a 4-station "practice" area in the back, accessible from the lobby via a door with a push button lock. Students from the investment club and certain others are given the combination and it is changed each semester. Students can use the trading room practice area after hours or during a class. We have found that the practice room has been heavily used.

Remember to leave extra space for the furniture - tables wide enough for two monitors per station, chairs, and room for the computers. Leaving enough space to walk behind the chairs is important, so we ended up with perhaps half the student capacity when the same room was used as a classroom with regular student desks.

Sight lines are critical for students. While tickers are not frequently used by financial analysts, the data wall certainly is used. We have two 57" LCD displays arranged side-by-side, as a single logical display, and the side viewing angle is important, especially for the stations located near the wall the displays are mounted on. It might be best to leave an aisle between the display wall and the closest student stations to increase the viewing angle. We advise that you check the side viewing angle of your LCD displays, and possibly audition it yourself at another installation.

The electronic equipment used to drive the displays should be located outside the room and not in the teaching station as we did. These devices are noisy, generate a lot of heat, have lots of wiring, and most importantly are not accessible during a class for adjustments. We have had occasional heat-related problems with the equipment in the teaching station. (See the Interim Upgrade section later in this report for our resolution of this problem.)

We were fortunate to locate the computer that drives the tickers in an equipment room in our lobby, using an existing Windows XP computer used to drive the lobby PowerPoint message system. It is easy to enter the equipment room at any time to make adjustments to the ticker programming. We discuss more about ticker programming in the Equipment and Software sections.

Room Equipment Design

The room equipment design was based on the room's layout and overall functional design. The room equipment in our facility includes the tickers, data wall displays, the teaching station, video projectors, and sound equipment. Computer equipment is discussed in a separate section.

For our trading room, we selected two three-color LED tickers. The right-most section of each ticker contains the embedded computer module that drives that ticker, and each requires an external IP address with appropriate cabling. The remaining sections of the tickers are identical and they can be hooked together like model train tracks. Because we are ultimately moving to a new building, we will be able to move the old tickers and possibly connect them all together as a single long message ticker for the student center.

We chose two separate tickers so we could vary the programming as needed. By default, the outside (lobby) ticker runs the default financial program provided by Rise. We like to display personalized messages for visitors. The ticker inside the trading room always runs the default financial program unless it is turned off. The computer that runs the tickers boots automatically into the default programming for both tickers, so after a power failure we do not have to restart anything manually (fortunately).

From a technical standpoint, the tickers are driven by a single computer running Rise ticker software. That software goes to risedisplays.com and retrieves the financial and news data, formatting it per the instructions programmed on that computer. The ticker computer then sends the character stream to the embedded computer in the right-most section of each ticker which controls the message as it cascades down the ticker. We have the ability to make changes to the programs locally.

Programming the ticker is a little tricky, and we had to write a two page instruction guide for those who might be asked to put a special message on. From the ticker computer, we cannot view the tickers while working with the ticker software that runs the tickers; now when we make a programming change, and then run around the corner to see if it was doing what we told it to dories suggested we install remote control software such as VNC on the ticker computer, and then access that computer from a laptop running VNC at a table while sitting in front of the ticker. (Note that the interim upgrade discussed later eliminated the extra PC to run the ticker messages.)

We have two video data walls provided by Rise Displays - one inside and the other outside, with different programming. We do not have the ability to do our own programming on these displays - the templates were prepared by Rise when we purchased the system. However, we do have the ability to choose from different preprogrammed displays, but haven't chosen to do that. The displays stay powered up 24/7 but the signal from Rise automatically goes down from 11 PM to 6 AM to extend the video displays' lives.

For our data walls, we chose LCD displays for maximum flexibility of text and graphics. The previous method used alphanumeric LED displays that could only be programmed for words and numbers. Our LCD displays are designed to switch between various program screens, (appearing like tabs in Windows dialog box) that cycle through a variety of information through the day. The inside data wall is composed of two 57" NEC LCD displays ganged together to appear as one logical display. The outside data wall is a 46" NEC LCD display enclosed in a wooden cabinet with large metal letters naming the trading room. Although the letters cost $20 each, it is a suitable welcome to our trading room. Each data wall includes a cable TV picture, typically CNBC.

We learned to cover the TV buttons on the bottom of the displays with black tape so wayward students sitting next to the wall aren't tempted to push any buttons. Better, put the displays on the other side of an aisle from the students to avoid inadvertent tampering and improving the side viewing angle. We took one remote control out of the teaching station and keep it in our office away from the lab, just in case a remote walks off. It is good to have duplicates of key objects. That includes the radio frequency remote control to advance PowerPoint slides while walking around the room. When they went on sale at the campus computer store, we bought some extra remote systems just in case. We have found a number of trading room objects in staff offices after they went missing.

The teaching station has many purposes in our trading room - it houses the computer that runs the instructor's screens, the A/V equipment that controls the side-by-side video projectors, a DVD/VCR combo unit, and acts as the podium and instructor's desk. It also holds the accessories in a drawer, and housing most of the electronics to drive the two data walls. As mentioned earlier, the electronic devices generate lots of heat and have fans - the noise levels are pretty bad. A faculty member came to my office to ask for directions on how to turn them off during his class, to which we emphatically said that was not a user adjustment.

We bought an expensive-looking teaching station and would do that again. Its wood grain surface looks nice and the station itself is large enough to hold lots of books, notes, and so forth on the surface. It is equipped with the campus standard Extron MediaLink push-button video switching system for the A/V equipment - but this is more complicated than most found in other classrooms.

The teaching station needs to be located in a spot where the instructor is able to see the data wall and the screen, yet not block any of the projected images. The teaching station should be able to be opened from both sides for configuration and maintenance of the electronics. Make sure it is deep enough to contain the devices and the cables, and to be able to close the doors.

We have two video projectors in the trading room, mounted on the ceiling. The two are similar Panasonic 3200 lumen XGA models used in newer classrooms, carefully mounted and aimed to provide parallel side-by-side images on the front board. Each projector was designed to display one of the two monitors in the instructor's teaching station. We suggest being on good terms with the campus A/V technicians at this point because it seems we called them a lot to tweak things.

For security purposes, each projector is alarmed with the campus standard 125 dB audio alarm - our building has been faced with a number of thefts of the ceiling mounted projectors. The trading room experienced spontaneous alarms on the ceiling mounted projectors, but the staff was unable to quiet the alarms with the key lock intended for the purpose. Ultimately the alarms were replaced but the alarm sounds continued. After lots of investigation, we found a raccoon in the ceiling had chewed on the alarm wires!

We looked for a front wall covering that could do double duty - serve as the projection surface most of the time and also act as a dry erase white board. We chose WallTalkers brand but it didn't work well: we had trouble erasing the writing. The company instructed us to buy their brand dry erase markers and erasers, and even that didn't solve the problem. After investigation, it appeared that the wrong product type had been ordered. Ultimately the company agreed to replace it at cost and the original wall covering was removed; a different type was installed that was designed 50/50 for projection and writing, and although it works a little better, it's still not as effective as we wish.

Our college installed Extron panels in most of the smart classrooms to control the projectors. These simple devices have eliminated the use of the remote control for the video projector and also many of the service calls. The instructor pushes the Proj ON button to activate the projector, and selects which video source (Desktop computer in the station, DVD, VCR, or Laptop) should be displayed. This capability is recommended - it greatly reduces the number of trouble calls, and provides some protection to the equipment. The Extron panel has replaced the need for separate remote controls for the projectors and DVD player.

At the request of the faculty using the trading room, we modified the Extron panel to temporarily turn off one projector in order to write on half of the white board while continuing to project on the other half of the front board. Because this classroom suffers from low ceilings, the projection surfaces (left and right) share time with the underlying white board. If possible, a trading room should be designed so that the video projection surface does not have to share time as a writing surface.

Each data wall display is driven by a engine, a rack-mounted Windows XP computer running dedicated display software. There is a transmitter at the Rise engine and a receiver at the display, and you can locate the display several hundred feet from the engine. The output from the Rise engine is converted to a video signal that is pumped along a low voltage wire (actually a Cat 6 Ethernet cable) to the location of the display where it is converted back into a regular computer video signal. A Rise engine has no peripherals of its own - to work on them you need to attach a keyboard, mouse, and use the large displays as a monitor. As mentioned earlier, locate display electronics outside of the teaching station!

Ceiling-mount speakers were installed to play the audio from CDs, DVDs, VHS tapes, and television programming. They also play the sound from the TV tuner card installed in the teacher's station. The audio volume is controlled both from the instructor's computer and from the Extron panel.

The Rise LCD displays inside the lab (the inside displays) were configured with their own sound panels for the embedded TV display, and occasionally we turn up the sound on the television program. The outside display (lobby) did not have speakers. Rise provided no other sound for their data wall programming, but that may have evolved since we purchased our displays. For our trading room in the new building, we will not order the sound option for those NEC displays - it was very expensive and rarely used.

Our advice is carefully audition anything – furniture, monitors, wall coverings, projectors, data wall displays - before you commit to it. Check out the functionality and the ergonomics.

Instructor and Student Work Station Design

This section is divided into computer workstation, display technology, and furniture discussions. Based on our preliminary visit to Fairfield University, we learned that a good high end Windows desktop computer would serve well as the trading work station for the trading room. Much of the analysis that students are doing seems to be in Excel using data extracted from the various financial data sources streaming into the trading room.

The workstation model initially selected in 2007 was a Dell Optiplex 755 small-footprint system unit that would sit on the desk, beneath the monitors. The current equivalent would be the Optiplex 760 Ultra-Small Form Factor model. Dimensions are 10.3" x 3.5" x 9.95". The spec included a 3.4 GHz Pentium D processor with 2 GB of RAM and Windows XP, the campus standard O/S. We chose 16X DVD optical drives and 160 GB SATA hard drives.

We received assistance from the campus IT department and relied on them to get a good volume quote. They decided to wait until it was time to order and then re-quote the computers. When we did, somehow the standard tower case was ordered. There was little space for them in the trading room, and certainly not on the desk top, blocking view. I did not take enough care to monitor the actual purchase order, even though I carefully reviewed the original quote.

The vendor refused to take them back, so we investigated an under-table mounting system (a CPU sling mount), but those were not satisfactory and were returned. We had to move on and installed the system towers on the floor. We were afraid of damage to the plastic bezels from the chair legs, but we haven't had much of that. However, we have had a problem with cut cables near the floor, and finally tied that to the vacuum cleaner used by the custodian in the lab. He didn't report it, and we originally diagnosed vandalism and filed a police report! Lesson: be careful with locating cables in the room.

The dual monitors we chose were high end Dell 19" LCD displays. We had to make sure the workstations had appropriate graphics cards for dual monitors; we chose ATI Radeon X1300 Pro Dual monitor adapters with VGA and DVI ports and 256 MB of video RAM. We had been solicited by a high end monitor arm vendor (a referral from the Telemet salesperson) but ended up with a significantly less costly solution from Moview. It might be discontinued now, but the cost per station was $170. Be sure to match the monitor arm with the furniture to make sure it fits - we have trouble opening the table cable cover with the monitor arm attached to the table top. In retrospect, we might have been able to do away with the dual monitor arm and go with the monitor's own stand flat on the table top, but we didn't evaluate that option even though the ultra small cases did not get ordered after all. We have a storage room with 42 discarded Dell LCD monitor stands!

One unexpected problem was the amount of space that dual 19" monitors take up, blocking the view to the front of the room for shorter students. In retrospect we should have auditioned the complete workstation from tables and chairs to the electronics and mounting hardware. We suspect we could have done well with dual 17" monitors that would have permitted some space between work stations. See the photographs.

In the new building I anticipate we will drop the monitor arms altogether and go with low-profile monitors on their own stands on the student desks. That way they can be moved as needed. I would want to be sure the stand is compact.

The instructor's computer in the teaching station is the same Dell Windows desktop computer used at each student work station, and has an internal TV tuner card installed. The TV tuner is attached to the campus cable TV system via coax cable and can be used to display CNN or CNBC on the video projectors. Its sound output is amplified and sent to the ceiling mounted speakers throughout the trading room. The tuner card comes with its own remote control, and it is access like other Windows applications. Using two monitors, the instructor can resize the TV window and drag it to either monitor's portion of the Windows desktop. While it is difficult to say how often it is used in a class, we turn it on prior to every trading room visit and demonstration.

We ran into a problem during a recruiting commercial shoot in the trading room. Evidently someone had changed the workstation password in a previous session, and we were unable to log into the teaching station. Everyone sat for more than an hour until one of our OIT student workers hacked into the computer and reset the password. There is a tradeoff between locking it down (to prevent such events) and making it easy enough for a wide variety of individuals to use. We suggest having a backup account name on that computer that can be used in the event of a lock-out situation such as we had.

The student tables we used were designed for two computer work stations per table, two tables per row. The vendor was KI, a campus standard, using moderately expensive Datalink training tables that come with a front panel to cover wiring from the wall between tables. There is a hole with grommet in the table top to route cables down to the system unit beneath the table.

The adjustable chairs were also from KI, with casters. For 10 tables and 20 upholstered chairs, the KI cost with delivery was about $16,000. We have not had any problems with the KI furniture, but some of the furniture has some stains on the seats. We forbid drinks and food in the rooms but it is sometimes difficult to enforce this policy.

The instructor's teaching station was the Media Director model from Spectrum Industries. There are several photographs of this station. The teaching station looks good and is functional.

Software and Data Design

We asked the finance faculty to provide a list of data and software needed for the trading room, and got lots of suggestions. As mentioned earlier, after we opened the trading room, it became obvious that some of the data requests might not be as useful as others. Nonetheless, it was a learning experience at every stage. It was very helpful to talk to other universities about how they employ their trading rooms. Most are open and willing to share their experiences.

As mentioned earlier, the financial data for the data walls and tickers comes from the Rise Display vendor. We used the standard 20-minute delay data from Rise for quotes. We learned from Rise that although we could negotiate a real-time arrangement with each of the exchanges, we would have to sign a contract saying that nobody would use the real time data to make actual trades. This is a potential nightmare, and we quickly determined that this practice was unenforceable, especially with the ticker and data wall display located in our public lobby outside the trading room. We have noticed that many individuals sit at tables in the lobby and watch the financial data come across, including our custodians!

We initially believed that Rise provided all of the data for the trading room (including the workstations) but quickly learned we had to arrange for the workstation data. Our Rise consultant provided referrals to vendors for the workstation databases and software. We tried repeatedly to work with a well-known vendor for current market security prices, and had trouble getting them to return our phone calls. Finally, Rise suggested we talk to Telemet North America who offered similar packages; we have worked with them for our trading room.

We had originally intended to have one or two high end Bloomberg financial data terminals in the trading room - one on the instructor's station and perhaps one other. Although the company had offered a 50% academic discount, that price increased significantly just before our trading room was scheduled to open. Despite pleas from a number of universities, the price increase was final (at the time). Although we did not purchase Bloomberg initially, a single terminal was recently ordered for fall 2010. The financial data initially implemented in our trading room falls into these categories:

- Historical security prices (CRSP, University of Chicago) www.crsp.com/
- Current business data (Compustat, McGraw-Hill) www.compustat.com/
- Current market prices (Telemet Orion) www.taquote.com/

Each faculty member in finance has an international background, and their research is worldwide. We purchased North America and Global versions of each of the financial data sources. We were able to negotiate with the software providers for multi-year pricing concessions if we licensed both North America and Global packages. We quickly learned that the annual data fee is the most expensive component of the financial trading room budget, and it is an annuity - each year, every year.

Before choosing the number of licenses for each of the packages, we had to estimate the number of simultaneous users. While equipping every station was ideal, the cost was too high, especially for Telemet. The others were licensed for the campus. We ended up with 8 or 9 Telemet licenses, including one for the instructor station. We found that talking to other universities with trading rooms was helpful in determining how many stations need to have certain software.

We also found that each vendor packages these data streams in an assortment of products, and that they often duplicate each others' data. My role as project coordinator but with limited finance background meant that we needed help from the experts. We asked for a very proposal specifying the data and software be used by each finance and insurance course and asked the faculty to be explicit. It is also important to do assessment to see how the data and software are being used.

Based on experience from visits to other universities, we also purchased the FTS Financial Trading System software spun off from Carnegie-Mellon University. This real-time software simulates trades using actual market data and informs students about their virtual portfolios. The FTS system includes many analytics to help student evaluate performance. The annual FTS license fee is less than most of the financial data. There is a helpful FAQ at the FTS web site, listed in the references at the end of the paper.

Installation and Project Management Issues

The first phase of installation was conversion of the classroom, room 109 in the Scott College of Business. This was a 45 seat classroom with risers in the rear. We decided to remove the risers and reverse front and back; the large window in the lobby offers an excellent view of the room and screens for visitors to the trading room. The campus

architect had drawn the layout and although we did some checking, we had little experience with actual trading rooms at the time we fixed the design. The classroom shape dictated the layout, more or less.

The university bid the renovation project and a local contractor received the work. I knew the contractor's managers personally, and enjoyed visiting them on the job site. The contractor did an excellent job, and the price was very competitive.

The campus architect served as project manager, representing all of the campus Facilities Management departments, and was the direct university contact with the Rise project manager. As our building coordinator, I served as the liaison with the business school and was the self-described project coordinator for the faculty. While my trading room knowledge was minimal at first, my experience grew throughout the project.

The architect was occasionally slow in following through on items. The project sat on the sideline for many weeks after we thought construction would commence. In fact, we took the classroom out of service nearly a full year before the project actually tied up the classroom. My advice is to lay out the time line and add plenty of safety time in order that the trading room is finished before it is needed.

The Rise equipment was not ready to install at the completion of the renovation work. In fact, there was some minor slippage in the delivery date. I presume that is pretty typical, and we had plenty of time before our grand opening.

However, the local installation technicians (third party service) were not up to the task, and Rise more or less acknowledged that. The techs installed digital movie theater projectors, and repeatedly had difficulty with our job, calling the project manager many times for clarification. They confessed they had never installed a ticker or a Rise data wall. Some Rise pieces were missing, and we learned that we did not have all of the infrastructure pieces in order. I have technical IT skills, and blame myself for not being in direct contact with Rise. We instead relied on our campus architect who is not a technical IT person. The infrastructure problems occurred in two technical areas:

1. Although we had external IP addresses for each ticker, the cabling was terminated in the teaching station and not at the tickers themselves. We fixed this in 48 hours using campus personnel to rewire, but we should have had that right before the installation started. And because the lobby has a spline ceiling, the cabling extension to reach the ticker was unsightly.
2. Power to the digital signs needed to have an isolated ground, and our old building wiring had shared ground throughout. Even the new wiring used the same shared ground, or so we were told. This was a larger technical problem.

We resolved the first problem quickly, but only after the first installation team left campus. The second took longer and the university outsourced installation of six isolated ground circuits at a project cost of $500 per circuit. After that work was finished, Rise confessed that we needed only one isolated ground circuit for all of our signs, not six. They made a price reduction to offset some of the cost, and agreed they shared part of the blame for fuzzy communication. We recommend that you have a very clear understanding of the infrastructure needed, and make sure an IT/networking person signs off on the understanding from the university end. Had we taken the time to chat with Rise about these requirements, I believe we would have caught the oversight and certainly had better working diagrams for things like terminations of Ethernet cables. This is why I believe I should have served as project manager, not just the business school's coordinator.

Once these infrastructure changes were complete, Rise dispatched a more experienced installation team from Texas to complete the installation. When it was discovered that the third Rise engine that drive the tickers was not included in the shipment, we substituted our own low end PC in an equipment closet elsewhere in the lobby. As it turns out, that was fortuitous because we have access to that computer at all times, even during class, to adjust the ticker programming for the outside ticker - the announcements and events messaging system as needed. Rise credited our account with the cost of the missing Rise engine - about $1000.

As you might expect, there were glitches in the initial operations of the trading room, but Rise was good for the task, providing expert assistance from Kansas City for hardware and from Toronto for software support. The initial data wall programming was just to get us started, and the project manager worked with us to finalize the design, per our agreement with Rise - we had credit for so many hours of design and programming time in the original contract.

Some of the glitches we experienced were due to not making sure all the connections were made properly - for example, our campus cable system that provided the CNBC programming for both data walls, getting appropriate IP addresses, and so forth. One glitch appeared the day of the grand opening when the TV picture was frozen behind the curtain we intended to remove to unveil the room. Needless to say, we were sweating a little to have Rise get the changes done in time, but in fact it did work shortly before the unveiling. The guests might have wondered why the associate dean kept peeking behind the blue curtain. Rise assisted in solving the problem remotely from Canada.

Initial Operations and Shakedown Period

We had the campus IT staff install the computer workstations and monitors in the tables and connect them to the LAN. At first we decided to leave the student stations open (unprotected) to facilitate making future changes as needed to each workstation. However, we found that bootleg software, inappropriate material, and lots of spam quickly appeared on the machines in the lab. We ultimately decided to lock down the hard drives to prevent permanent changes by the users. We purchased a special card for each computer similar to that used in our other Windows computer labs. The cards allow changes to be made to the computer's configuration during a session, but when that computer is rebooted the hard drive reverts to the original files. Since the initial installation, we have moved to a software lock-down solution for campus computer labs.

As with other campus computer labs, we prepared a hard drive image to use with transmit to all stations in the lab at the same time. Thus with one command, we were able to put the same programs on all of the stations in this room. However, we did lots of tweaking as new software is installed, thus requiring the hard drive image to be modified. It might take a semester or two to get up and running in a steady state. We gave ourselves a few months to shake out the bugs, and we pilot tested the lab in the spring semester before assigning regular classes to meet there.

The instructors need to become familiar with the resources in this room. Training is always critical, and it took longer than we predicted to get a schedule without time conflicts. We found that Friday mornings are the preferred time when few classes are scheduled. Some training came from campus sources, while other sessions were conducted by our financial data providers. The simplest technology is to have a speaker phone to amplify the voice of a remote trainer. For remote trainers, newer methods are now available that use the instructor's workstation ceiling speakers; consider Webex and Netmeeting software applications.

Maintenance Issues

We have experienced some ongoing maintenance issues with the equipment. In each case it resulted in a new piece of equipment being shipped overnight to the college, with installation soon after. Then we sent the old unit back to Rise in the same box. We ended up replacing the following items:

- 46" NEC LCD display (not failed at the same time as the 57" display)
- One 57" NEC LCD displays (see explanation below)
- Both of the two Rise engines (one simply stopped working when the other hard drive failed; the other overheated in our teaching station)

After the fact, we learned that the NEC 57" display was not defective; the Rise engine failure prevented that display from working With some incidents the problem persisted after the new unit was installed and were solved in other ways. However, Rise was very quick to respond and worked well with my staff to coordinate the arrival of parts and a technician to do the installation. Rise provides a web-based monitor report to let us know when various pieces of their equipment do not seem to be working - very helpful but we have had some false indications.

For most of the work we had Rise do the repair or equipment swap. I volunteered to reinstall the replacement Rise engine in the teaching station in order to get it back online sooner to meet a deadline. Other than cutting myself inside the teaching station, it was successful. Our own A/V staff was very busy at the time, and in fact with budget cuts has become even busier. The replacement LCD displays are heavy, and we chose not to use our university staff to install the replacement LCD displays; we didn't want to chance dropping a display.

We had many visits from the campus audio/visual staff to do the initial installation and configuration of the teaching station and its Extron control panel, and overall troubleshooting. The Extron panel was more complex than other smart classrooms on campus, and until it functioned we controlled the projectors with a remote control. Our A/V staff is highly overworked and that is typical of most campuses as the classroom technology increases in complexity. Most business schools will not have this expertise internally.

One humorous note – one of the two 57" LCD displays stopped working while the other continued to work. Each has its own transmitter/receiver pair, connected by the Ethernet Cat 6 cable. After quite a bit of troubleshooting, our A/V staff narrowed the cause down to a chewed wire to the power supply in the ceiling that fed power to the receiver; the receiver converts the low voltage signal to a regular video output to feed into the monitor. Evidently the same raccoon that chewed the projector alarm wires worked on the display's power supply wire. Rise was able to provide a replacement power supply at minimal cost to the College of Business. While waiting for the new power supply, we were able to temporarily resolve the problem using a Nikon camera battery charger power cable – same design – to reconnect the receiver to its old charger. Almost two years later we found the hole in the foundation that had allowed

several raccoons to enter and solved that problem.

Steady State: Operating the Trading Room

Expect to have some issues with operating this complex facility, so reserve time to monitor and respond to problems. Some are inexperience of some faculty who don't know how to operate the systems. We've seen settings changed that need to be reset in order to get sound from DVDs and so forth. Having technology and A/V personnel on call is very helpful; a telephone in the room is necessary.

Interim Changes

After operating the trading room for about two years, we made some changes to room security, the display controller hardware, and data/software. Occasionally we found the trading room door closed but unlocked. Despite pleas to all users to make sure the door was closed and locked, the problem persisted. We decided to replace the lock so that the trading room would remain locked. That is, when the door was opened with a key, it would remain locked from the outside. We contemplated adding video surveillance but did not have the budget at the time. In our new building we intend to add the financial trading room to the building video surveillance system.

In analyzing the maintenance issues with our Rise engines in the teaching station, it became evident that we should relocate the Rise engines (and the broadcasters and cable tuner box) from the teaching station inside the trading room to an adjacent equipment room in which we have a full-sized computer rack. Not only did this relocation reduce the heat build-up in the teaching station and lower the noise level (cooling fans in the Rise engines) but the simplicity in programming the tickers was very helpful. We would recommend that anyone considering a similar trading room locate the display hardware elsewhere. Now we are able to work on the hardware at any time, even during a class using the trading room.

After speaking with the Rise consultant, we chose to take advantage of his offer to upgrade our tickers to web controllers and eliminate our PC that we used to control the tickers. Once installed, we would program the ticker play lists via a web site rather than on our local computer. Rise sent us the new controllers and dispatched a technician to install them. The new programming method can be done anywhere there is an Internet connection, and it is considerably simpler.

The most obvious missing data stream was the Bloomberg terminal. Initially too expensive, in 2010 we decided to adjust the budget and add a Bloomberg terminal in a student accessible area of the trading room. Although Bloomberg offered an attractive multi-unit discount, at this time we were only able to afford a single unit. This added about $20,000 to our annual software and data license budget.

Overall Budget Picture

We learned that the least expensive part of our trading room project was the room construction. For us, renovating a classroom with a few special features (such as the viewing window and a push button lock for the student practice room) cost about $40,000. The basic computer equipment and furniture cost about $150,000. The display equipment from Rise was a little over $100,000 including a maintenance contract for the hardware and license for the data feeds to the signs. We added another $3000 to upgrade our ticker controllers in 2010.

Annual data license fees comprise the largest cost component of our trading room in the first three years. Some licenses are per-station, and others are campus-wide licenses. While it depends on the number of stations licensed for specific software, we're now spending about $86,000 per year on software and data, and would probably spend more if we had the funds. However, we would need to sit down with the financial services faculty and discuss priorities as well as duplicate services.

Summary

We are pleased with our trading room equipment, and feel that Rise Display was a very good partner. They assisted us initially in considering various design aspects, and other than some glitches in the installation process, Rise has been a joy to work with. The Rise consultant visited after the installation and has been very willing to answer technical questions as they arise. For instance, we had a maintenance glitch in which we were told the unit was not under coverage when it failed. In fact, the consultant quickly intervened and said it was a Rise data entry error - we were indeed covered with a three year service contract.

The Rise consultant has referred many potential customers to us and I am more than willing to provide tours,

answer questions, and demonstrate the financial trading room. We have had TV and newspaper coverage, and two campus recruiting commercials were shot in our financial trading room. We believe we have a wonderful tool that our students can use to competitive advantage in the workplace.

We plan to apply the lessons learned to the development of the new trading room in our new building. We always knew that the current trading room was a pilot, and it provided a living laboratory for developing the concept.

Equipment and Related References

- Dell Optiplex Workstation Computer (initial selection) www.dell.com/content/products/productdetails.aspx/desktop-optiplex-760?c=us&l=en&s=bsd&cs=04
- Extron Video Switching Panel www.extron.com/product/prodtype14.aspx
- Instructor Media Director Teaching Station www.spectrumfurniture.com/
- KI Datalink Tables and Chairs www.ki.com/products/24/1598/Powered_Tables/DataLink_ Training_Table_System/.aspx?ncat=4&sitecat=51
- Panasonic PT-LB60U XGA Video Projector www.fullcompass.com/product/355253.html model replaced by PT-LB80U
- Rise Display www.risedisplay.com
- Walltalkers Display/White Board Coverings www.walltalkers.com

Software and Data Feed References

- Bloomberg Business and Financial Information www.bloomberg.com/?b=0&Intro=intro3
- Compustat Data Services www.compustat.com
- CRSP – Center for Research in Security Prices www.crsp.com
- FTS – Financial Trading System www.ftsweb.com
- Telemet Orion www.taquote.com

Additional Information about the Financial Trading Room in the Scott College of Business

- Financial trading room description: www.indstate.edu/business/finance/tradingroom.htm
- Minas Center for Investments and Financial Education www.indstate.edu/business/centers/minas.htm
- Trading Room photo slide show with captions: www.indstate.edu/business/tradingroom.pdf. click to change slides

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