Introduction:
On the 1st and 2nd of December, I was invited to conduct an evaluation of the technological accessibility of the Rice University campus. The purpose of this visit was to determine the current state of technology access for persons with disabilities and the efficacy of the adaptive hardware and software that are currently in place. Secondly, and more significantly, I was asked to formulate a series of recommendations on how the campus can move forward to a truly inclusive technologically mediated learning environment. It is intended that the recommendations provided will be used in alignment with an existing current strategic planning process to ensure that individuals with disabilities are assured the same quality educational experience as the other members of the campus community.

Through the facilitation of Alan Russell, Director of Disability Support Services (DSS), and Joshua Eyler, the Director of the Center for Teaching Excellence, I was given the opportunity to meet with a variety of staff and administrators. I also had the opportunity to take a very comprehensive tour of many of the typical technology resources that are available to the students of the university. The campus tours and the staff conversations provided a very good overview of both the built environment and the educational technology challenges for members of the Rice community with disabilities. The recommendations that are being made are based on these meetings and conversations and the review of the campus environment.

Legal Mandate:
The access to electronic and information technology by persons with disabilities is covered by a variety of state and federal laws that impose the requirement that we provide "equal and equitable access" to our programs, facilities and services. A series of legal rulings have further defined the "equal and equitable" requirement to mean that we must provide the exact same level of access to individuals with disabilities as we do to the non-disabled with some very limited exceptions. Outside of these legal requirements is the ethical imperative that we provide a diverse and supportive educational experience to all individuals, to the maximum extent possible.

To insure this level of accessibility I use a “transparency” orientation in my evaluation activities, with the intent of assisting a campus in developing learning environments that
are fully inclusive to all members of its learning community. This orientation is based on the premise that when a student with a disability encounters the institution's technological systems that their experience should be as similar as possible to that of their non-disabled peers. If this goal is actually achieved the only time a person with a disability would need to go to an alternative location would be when there is a need for a specific technology or accommodation that cannot or should not be provided in an open or public facility. The same is true of educational classrooms and labs. A student with a disability is entitled to be a full and equal participant in all classroom and lab activities. If they are excluded from the classroom or lab due to a need for adaptive technology then the institution is likely at risk for grievance and perhaps Civil redress unless the provision of this AT would rise to the level of being an “Undue Burden” for the institution under the law.

To meet not just the letter but the intent of the law, it is essential that we design and improve our technology related facilities to ensure that we are meeting the needs of all of our constituents to the greatest extent possible. The requirements of Federal disability law, and subsequent legal interpretations, have taken this requirement to the point that all institutions need to have processes and policies established to ensure that access is provided in a plan-full and proactive manner and not as an Ad Hoc or a retrofit solution. To manage this requirement, in the most cost effective and risk avoidant manner, it is incumbent that the Institution ensures that all Electronic and Information Technology acquired and implemented is fully accessible to persons with disabilities as well as the built spaces that house these resources. To be truly effective this needs to occur as a part of the acquisition and deployment process whenever possible.

**Initial Observations:**

It became very clear to me that a small but dedicated core staff exists and that they have made a strong commitment to meeting the technology access needs of the students of Rice with what appears to be varying support, depending on the unit that is being interacted with. The staff were very helpful in providing me with the information I needed to complete my campus review. In these conversations, it was clear that a basic level of accessibility awareness was present and it appeared that commitment to finding meaningful resolutions to the challenges that were encountered was clearly developing.

There also are a great number of physical accessibility issues across the campus, partially due to the nature of the existing campus buildings but also in the way that accessibility has been approached in retrofitting existing structures. It was clear that there has been a concerted attempt to make the facilities and equipment as usable as possible but a variety of issues exist across all the facilities that were reviewed.

The general lack of availability of assistive technologies outside of the library room is extremely problematic. It is my understanding that currently if specialized technologies are needed across the campus that the student must work through the DSS office to get access to this necessary equipment. This approach is legally problematic in that it
presents an additional barrier to the general campus technology environment for students with disabilities.

**Specific Issues Identified:**

I. Equipment Related Issues

- A great variety of access issues exist across the labs and classrooms I reviewed. In the majority of instances this is due to a lack of conformance with the ADAAG (www.ada.gov/regs2010/2010ADASTandards/Guidance_2010ADASTandards.pdf) guidelines in regards to reach distances, egress and equipment configuration. It is clear that a concerted attempt has been made to avoid this situation but more work needs to be done.

- A good variety of adaptive hardware has been provided in a room in the library. However, this is not adequate in meeting the campus responsibilities in regards to ensuring an equal and equivalent experience for individuals with disabilities. In addition so much equipment has been placed in the room that it is probably not a functional space for the users who need it.

- IT administration and staff seemed receptive to creating realistic solutions to the issues of support and maintenance but need administrative guidance and direction on how best to achieve this as well as how to broaden the existing AT resources available on campus.

- OIT Support staff did not display any familiarity with the assistive technology available, nor were they able to adequately address the current level of functionality or problems in the basic configuration of equipment.

II. Access Related Issues

- In all existing and proposed facilities compliance with the ADAAG requirements for egress and access needs to be ensured and wherever possible remediated. Identified wheelchair accessible workstations each need to provide at a minimum a 60" turn radius (72" is recommended in the proposed ADAAG changes). In older facilities which cannot be modified accordingly provisions need to be provided for class relocation or temporary equipment placement.

- In rooms with projectors or "Smart" display technologies, provisions need to be provided to ensure that Closed Captions can be displayed through the projector video. In instances where "Smart" displays are in use, it is highly recommended that provisions be made to provide video at a student work area, in particular in larger classrooms and labs.

- In general there appears to be a lack of attention paid to the need for full accessibility in all general access facilities on campus. I was very surprised to
see no wheelchair accessible design in a variety of critical operational areas such as the Registrar and Cashier offices.

III. Specific Findings

- In almost all facilities reviewed access issues are present with respect to the existing instructor podiums. Issues exist in egress, equipment placement and access, as well as height and reach. The touch control panels in use in most of the rooms are not accessible. Rice should work with their current vendors to find out if this is being addressed, and if not, determine a suitable alternative.

- All public access printers are too high for mobility impaired students to use. In most instances adequate wheelchair accessibility is not provided.

- Due to the lack of readily available adaptive technology in the mainstream computer labs and technology mediated classrooms students cannot work independently and with minimal privacy in the labs and classrooms on campus. Instead they are required to use their own technology, or use the very minimal resources that currently exist.

The following set of findings are specific to the facilities I reviewed, but also need to be taken into consideration for similar rooms and facilities across campus

**Sewall 303, 305**: This is a fixed seating room with the only wheelchair access in the middle of the back row of seats. There is not adequate egress for this seating and the accessible seating should be relocated to the end of the room closest to the entry. The front of the classroom is totally inaccessible.

**Sewall 101, 133**: They keyboard trays and mounting devices prevent adequate egress. Poor cable management in the room also presents significant issues.

**Razor 119**: This lab is an absolute disaster when it comes to accessibility. It would be almost impossible for an individual with a mobility impairment to use this facility. In addition the use of in-desk monitors is both an accessibility and a general usability issue. As additional note, the reception desk does not provide for adequate wheelchair height access, which is very surprising given it appears that this is a fairly new installation.

**Hering 100**: While ramped, no access is provided to the front of the seating area. It would be very easy to correct by removing a few seats at the front of the room, and a short ramp extension from the existing ramp.

**Library**: Outside of the limited use AT room, no additional AT appeared to be present in the library. There are very significant access issues related to the equipment available in the library for patron use, predominately related to the lack of appropriate egress and equipment placement out of compliance with the ADAAG requirements. In particular are
the lack of CCTV (magnification) units and the touch screen only interfaces to equipment or for equipment control.

**Recommendations:**

I. Immediate Actions

- Triage existing accessible facilities to ensure, at a minimum, that adequate wheelchair accessibility is provided to the stations in the classroom or lab. Remove unnecessary furnishings that block or restrict access and egress.

- Develop a campus standard for "Accessible" Computers, and ensure standardized software and hardware configurations in all locations, when possible.

- Ensure that at least one fully accessible workstation is available in all computer labs, classrooms and facilities where students interact regularly with technology (i.e. the library). Ideally at least two should be present, one near the front of the room and one in the back to allow for student independence.

  - Include scanners with ADF units in strategically selected locations.

  - Where possible install electromechanically adjustable tables on selected adaptive workstations in high use areas such as main computer labs and the library.

  - Ensure that all stations allow for full wheelchair accessibility. We recommend a surface depth of 36" and a width of 60" (minimum 48") to allow for all user necessary equipment to be on the desktop as well as placement of a scanner or CCTV unit when necessary.

  - For general campus deployment we recommend looking at some of the less expensive and open source AT for general campus builds and the placement of high cost AT such as JAWS or K3000 in strategically selected locations. Ideally, the ability to use license management software would allow for the wider distribution of these high value packages. NVDA (www.nvda-project.org) is getting high marks as an alternative to JAWS or Window-Eyes, and ClaroRead is a lower end alternative to reading/writing systems such as K3000. Dolphin EasyReader could serve for a digital text reader solution on Windows, and Ghost Reader for the Mac OS.

  - Install larger monitors on all adaptive workstations, with a minimum size of 22".

  - Insure that all major "access" categories are included in the selection and deployment of adaptive software.
Develop an AT-IT liaison system based on existing technology support systems to insure that all campus adaptive technology receives regular and thorough maintenance and support.

- All IT support personnel should have a general knowledge of the various AT systems and their functionality. This level of knowledge should be comparable to that which is expected for mainstream software packages.

- Ensure that all adaptive systems are of a similar type as the other equipment available, and that a regular replacement and upgraded plan is developed comparable to the plan that is used from mainstream technologies.

- Standardize the assistive hardware and software that the campus acquires to ensure uniformity, both for issues of student access as well as support, maintenance and upgrades.

Designation and training of a campus assistive technology specialist.

- Primary job responsibility should be dedicated to the technology access needs of the campus at least at a .25 FTE level. In the short term a higher FTE may be required to move the campus forward in a systemic way but long term .25 is what we typically recommend for an institution the size of Rice.

- Staffing at this level would also allow for:
  - Evaluation and remediation for the significant amount of inaccessible academic and student support software available on campus.
  - Development of a comprehensive knowledge base of the hardware and software platforms commonly deployed on campus and their accessibility challenges and remediation.
  - Development of an IT Accessibility Plan for Rice in cooperation with the campus community.
  - Develop a triage system where AT functionality issues are established as a priority response item.

Adequate training and professional development resources need to be allocated to ensure currency on a wide variety of adaptive technologies by IT support staff.

Establishment of a single point of contact for AT oversight, maintenance and support issues with the Rice IT group and not as a function of DSS.

Leverage of the current campus IT buying practices to ensure a consistent and pervasive AT environment.
II. Long Term Recommendations

- A proactive institution-wide policy must be developed and implemented to ensure that a campus compliance plan is developed, executed and maintained.

- Policies and procedures should be developed and implemented to ensure that academic websites and web based content has a functional level of accessibility and works with the commonly available assistive technology in use on the campus.

- Provisions must be made to ensure that multimedia content is properly captioned; a parallel system needs to be developed to ensure that existing multimedia content is equally accessible.

- Adequate resource streams must be developed and maintained to ensure that the long term technology access needs of the institution are met in coordination with an overall campus strategic plan for educational technology use and implementation.

- Adequate polices must be developed and implemented to ensure that all new technologies and technological systems are fully accessible upon purchase or deployment. In instances where this is not possible, due to "lack of availability", accessibility issues should be identified and a plan developed for the provision of alternative learning activities or remediation as appropriate.

- Development and implementation of a campus wide “Access” oversight committee to ensure that the long term needs of the campus are being met and that technology access is appropriately addressed in all technology related initiatives of the institution.

III. Additional Comments – “Smart” Classrooms

- Facility for the display of Closed Caption (CC) video is not present in the classrooms. It is recommended that CC decoder units be installed into the base equipment carts or installation of projection units that have built in CC chips.

- Training of instructional staff on the use and activation of both the ALD and CC systems in these classrooms is strongly recommended.
Introduction
The purpose of this report is to provide the results and recommendations obtained from a comprehensive review of selected Rice University websites. These sites were evaluated for their accessibility and functional usability with commonly available assistive technology such as screen readers, screen magnifiers, speech recognition, and keyboard-only input. This review evaluated a selection of high-use Rice sites from the home page.

The sites were also evaluated for their conformance with the Section 508 standards and the W3C's Web Content Accessibility Guidelines (WCAG) 2.0 guidelines. Overall the sites displayed moderate conformance with these specifications with some notable exceptions. It is important to note that a tension exists between conformance with 508 and WCAG and the concept of functional usability. It is not uncommon to have sites that conform to these requirements and still have sites that are functionally unusable for users requiring access technologies. That is truly the case with the Rice sites reviewed.

Overall Findings
In all sites a variety of conformance and functional usability issues were identified. In most instances these problems can be resolved with some fairly simple remediation.

Issue 1
Some functions and widgets are inaccessible to any I/O device except a mouse, which excludes keyboard-only and speech recognition users.

Recommended Remediation
Technology, styling, and scripting exist to make navigation fully accessible without changing the look of your site. It would be best to review such technologies and select a programming choice that better meets the needs of all your users. The skipnav on the homepage, for example, is a very good technique; expanding its use to elsewhere in the system would be helpful.

Issue 2
No documentation or guidance is provided for users of access technologies or those who might need support. Despite the huge number of links in the main navigation, Disability Services was not included.

Recommended Remediation
Adding basic information on how the system interacts with access technologies and a contact option for technical support would be a best practice.
**Issue 3**
Sites did not support OS-based High Contrast mode or user-customized font faces or other display characteristics.

**Recommended Remediation**
Choose CSS styling that allows both browser-based display changes and user-customized overrides. This can be accomplished without changing the look and feel of the site, but will allow users with various vision disabilities or who are using a variety of display technologies to interact more fully with the sites.

**Issue 4**
A lack of proper or appropriate document structure was present in most of the sites reviewed. This included missing H1 elements, empty heading elements, and non-sequential ordering of heading elements H1 through H6. The proper use of "Headings" and logical and sequential navigation structure is absolutely essential to the effective and efficient use of the digital environment. Properly identified headings and labeled links provide the assistive technology user an efficient and effective way to navigate what can often be dense websites. H elements should not be used purely for visual styling.

**Recommended Remediation**
Use appropriate and sequential HTML styling to layout websites. The labeling of links, appropriately, provides the user with a brief description of the purpose for the link; the same link text should not be used to point to different destinations. Ensure that proper navigation is top to bottom left to right, to reflect the typical visual layout of most websites.

**Issue 5**
Keyboard focus is not visually apparent on some page elements (i.e., as you tab through the page, you can't see where you are).

**Recommended Remediation**
The default nature of web browsers is to visually highlight clickable page elements when they receive keyboard or mouse focus. The CSS for the website needs to be adjusted so that the default nature is re-established, or, if background color is interfering with the default focus display, CSS needs to augment that display. Multitudes of styling events can occur when a clickable element receive focus, but is very difficult if no styling event occurs on focus.

**Issue 6**
Many pages had text and background that offered insufficient contrast.

**Recommended Remediation**
Check contrast and ensure that it conforms to published standards.
**Issue 7**
The use of alt tagging on some images was inappropriate. Ensure that all images that need alt tags have appropriate descriptions, while those that are “eye candy” have empty alt tags.

**Recommended Remediation**
Alt tags allow non-visual users to understand the meaning of an image; ensure that all images have appropriate alt tagging.

**Issue 8**
Link text was occasionally vague (“click here”) or redundant.

**Recommended Remediation**
Link text should always be unique and descriptive of the item being linked to.

**Issue 9**
Some embedded videos do not offer a "closed caption" option for users who are deaf or hard of hearing, and do not include description of visual elements for users who are blind. Some videos contained “autocaptions” which were of very poor quality. Keyboard control of videos was difficult and in some cases impossible.

**Recommended Remediation**
Develop a policy to address the need for closed captioned and described videos and a timeline for implementation of policy. Ensure that the video player is usable with keyboard only, with or without a screen reader in operation, across as many major browsers as possible. Ensure that captions, descriptions, and transcripts are complete and accurate.

**Issue 10**
Although technically not an accessibility violation, the home page navigation is very link-heavy and complex. Also, navigation is not consistent through the rice.edu domain; each subsite or page seemed to have a somewhat different navigational scheme, as well as slightly different look and feel.

**Recommended Remediation**
Consider reorganization and simplification of the navigation options, as well as a standard template across the domain, to offer better usability to all.

**Issue 11**
Although technically not an accessibility violation, some pages displayed “validation” icons that were inappropriate or inaccurate, such as a “508 Bobby Approved” icon on the DSS homepage.

**Recommended Remediation**
Regularly review pages to ensure that they fully meet the validation requirements of icons or badges, or remove the icons/badges completely. In this case, the “Bobby” tool
has not been available for many years and the icon directs users to a non-existent webpage.

**Sites Reviewed:**
http://www.rice.edu/
http://futureowls.rice.edu/home.aspx
http://futureowls.rice.edu/futureowls/Apply.asp
http://Rice.edu/university/apply-now.aspx
http://financialaid.rice.edu/
http://financialaid.rice.edu/Content.aspx?id=48
https://dss.rice.edu/
http://it.rice.edu/
http://people.rice.edu/
<table>
<thead>
<tr>
<th>Software Guideline</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the software provide keyboard equivalent commands for all the functions of the application?</td>
<td>X</td>
<td></td>
<td></td>
<td>Web browser based application, but not all clickable elements have visual focus or a way to activate via keyboard.</td>
</tr>
<tr>
<td>Does the documentation of the software contain clear and precise description of the use of keyboard equivalents?</td>
<td>X</td>
<td></td>
<td></td>
<td>No separate documentation provided.</td>
</tr>
<tr>
<td>Does the software provide logical tabbing order?</td>
<td>X</td>
<td></td>
<td></td>
<td>Generally yes, with exceptions.</td>
</tr>
<tr>
<td>Is the use of keystrokes logically progressive (i.e.: down arrow followed by enter key).</td>
<td>X</td>
<td></td>
<td></td>
<td>See above</td>
</tr>
<tr>
<td>Does the software interfere with existing accessibility features built into the operating system?</td>
<td>X</td>
<td></td>
<td></td>
<td>Does not support OS High Contrast; some CSS &amp; Javascript interferes with accessibility features of the browser.</td>
</tr>
<tr>
<td>Do any forms or functions of the application require timed response?</td>
<td>X</td>
<td></td>
<td></td>
<td>Not that I encountered, although they may exist inside secured areas beyond my ability to test.</td>
</tr>
<tr>
<td>Can a user adjust or modify the timing parameters.</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are there visual and auditory prompts for control keys?</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do all the icons have text labels associated with them?</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the software allow the user to select text only buttons?</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the use of icons consistent throughout the application?</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Software Guideline</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>Comments</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------</td>
<td>-----</td>
<td>----</td>
<td>-----</td>
<td>----------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Is keyboard access to pull-down menus provided?</td>
<td>X</td>
<td></td>
<td></td>
<td>Yes but there are exceptions, and some do not navigate smoothly via keyboard.</td>
</tr>
<tr>
<td>Are all text displayed by the application accessible?</td>
<td>X</td>
<td></td>
<td></td>
<td>Generally yes, with a few exceptions.</td>
</tr>
<tr>
<td>Do all audio alerts have equivalent visual alerts?</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the application support existing operating system sound features?</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can a user adjust the volume from the application?</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the adjustment of volume reflected system wide?</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the application provide alternative accessible formats for audio used by it?</td>
<td>X</td>
<td></td>
<td></td>
<td>In some cases yes, in others, no, and in some cases captions are of poor quality.</td>
</tr>
<tr>
<td>Does the application use color coding as the sole means for conveying information?</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the application support user defined color settings system wide?</td>
<td>X</td>
<td></td>
<td></td>
<td>Some colors in the website are hard-coded and not user-adjustable.</td>
</tr>
<tr>
<td>Does it allow for inverted text color as an alternative to highlighting?</td>
<td>X</td>
<td></td>
<td></td>
<td>Does not support OS High Contrast</td>
</tr>
<tr>
<td>Does text or important graphics displayed by the application have patterned backgrounds?</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the user able to override default fonts for printing and text display?</td>
<td>X</td>
<td></td>
<td></td>
<td>In some cases yes, in others, no.</td>
</tr>
<tr>
<td>Can the user disable or adjust the properties of flashing, rotating, and moving text?</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the association of labels for data fields consistent with the data field it describes?</td>
<td>X</td>
<td></td>
<td></td>
<td>Mostly yes, but notably the search box in the main nav field doesn't have an associated label.</td>
</tr>
</tbody>
</table>
Does the application provide all manual and documents in electronic format as an ASCII text file which include text descriptions for all charts, graphs, pictures and graphics | X |
Can the user output any report or print job in electronic format and an ASCII text file? | X |
Software Guideline | Yes | No | N/A | Comments |

Additional Notes:

**Heading issues**
- In several cases visual styling is used that indicates a desire for headings (enlarged bold font set off by white space), but they are not coded as such. In other cases h tags are used, but don’t make logical sense and appear to have been used for visual styling only.

**Keyboard issues**
- **No visual indication of keyboard focus**: A few items on the home page (Pinterest, Facebook, Twitter, and other social media icons) are tabbed through using the keyboard but do not appear visually, while most other items receive visual focus appropriately.
- **Mixed keyboard access to widgets such as video players**: Video players on the home page show mixed accessibility, such as the inability to exit the video player via keyboard if using Firefox.
- **Skipnav**: There is a great skipnav solution on the homepage, but nothing equivalent on other major pages. Some other pages have hidden skipnav solutions that only work for screen-reader users but not for sighted keyboard users.

**Miscellaneous**
- **Link-heavy page designs**: a very large number of pages link directly off the home page. Menu/site reorganization to reduce the number of direct links would improve usability as well as accessibility; analytics may help guide this decision. Other major pages are similarly link-heavy.
- **Link Text**: although in general link text is unique and accurate, there are occasional cases of inappropriate link text such as “click here” or “more” that need to be corrected.
- **Adobe Flash Player requirement**: Bill Payment Suite requires Adobe Flash Player, which may cause issues for access technology users. Without a student account I cannot fully test this potential problem.
Evaluation Platforms:

- Windows 7 Home Premium with all updates. Mozilla Firefox 31, with and without accessibility plugins.
  Internet Explorer 11, JAWS 14
- iPad 2 iOS 7.1
  Safari 7.0
  VoiceOver