ATHEN Report on the Accessibility of GMail and Google Calendar

February 29, 2012
Executive Summary

The Access Technology Higher Education Network (ATHEN) is continuing its functional evaluation of the components of the Google Application Suite to determine the accessibility of each component for users with various types of disabilities and assistive technology. This evaluation covers GMail and Google Calendar (Calendar). There are several positive findings for users with certain types of disabilities, including users of:

- screen magnification software
- keyboard-only interactions
- some high-contrast visual layouts

However, there were still significant shortcomings especially for screen reader users. Some of the major problems include:

- the inability to easily navigate messages in a conversation
- the inability to attach files to an email message
- the inability to schedule meeting times between multiple participants
- excessive tabbing or illogical page layouts resulting in significant user inefficiencies

Both GMail and Calendar offer “more accessible” interface options for screen reader users, but even those prove lacking in some fundamental areas. Other than performing some base level operations in each application, neither GMail nor Calendar can be considered equitably accessible to all user groups, especially for the visually impaired.

Introduction

This report is the second in a series of reports on the accessibility of Google Apps. Its predecessor, the “ATHEN Report on the Accessibility of Google Documents”, is available at http://athenpro.org/google-docs-accessibility. This report uses the same methodology as the previous report but is applied to GMail and Calendar. The same set of assistive technologies is tested with the addition of the VoiceOver screen reader. For details on the background of ATHEN or on the nature of this project please refer to the original report.

One observation made during our tests is that the level of accessibility support in Google Apps is constantly changing. Google constantly updates the applications, the Chrome browser, and ChromeVox. Many, if not most of the changes that occur during these upgrades are not published by Google. Our tests were completed in late January and early February 2012, and even during that time and throughout the end February while compiling the report there were noticeable changes in the level of accessibility support. Because of the ever changing accessibility landscape in the applications and the lack of information about changes made by Google, some of our findings could be moot by the time this report is published. While we welcome all of these improvements, communication about what changes are happening would greatly benefit the community. Without that level of communication, we cannot make an assessment of the current status of accessibility support without doing a complete re-evaluation of the application suite.

Two Accessibility Models
In GMail and Calendar, Google seems to be providing accessibility support through two models, neither of which is fully functional or implemented. First, they are providing shortcut keys for almost every function. Second, they provide limited semantic markup in the form of ARIA landmarks, headings, and other functional blocks to aid in page navigation and usability. The shortcut key model provides a lot of helpful navigational and functional aids to many assistive technology users by allowing these users to avoid excessive “tabbing” to navigate and use the application. With screen readers though, these two models bring into focus some of the fundamental issues at hand through three main problems.

First, many screen reader users will want the ability to interact with the application in standard ways utilizing the semantic structure of the page, and that level of support is not present in either GMail or Calendar. Second, the keyboard shortcut model is not reliably communicating results of actions back to the screen reader. The only screen reader that voices any confirmation of a keyboard action is ChromeVox. It is unknown at this time how the applications are communicating that information back to the screen reader, whether it is through proprietary or non-standard methods only available to Chrome and ChromeVox or through ARIA attributes that other screen readers do not support yet. The combination of JAWS and Firefox provides a lot of support for ARIA attributes so this case seems unlikely. Third, many of the shortcut keys interfere with the operation of the screen reader because there are already screen reader specific keyboard shortcuts assigned to those key combinations, thus requiring the user to perform screen reader acrobatics in order to effectively use them.\(^1\)

While there will be continued debate over which accessibility model is most appropriate for delivering accessible Web applications, it cannot be denied that both models lack sufficient support to allow screen reader users to effectively use the applications. As Google adds more accessibility support, we encourage them to fully implement support for both accessibility models so that all functions can be accomplished through either model, exclusive of the other model.

### The Report Card

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\(^1\) It should be noted that there are ways to remap shortcut keys to different key combinations that will not conflict with the screen reader, but since there are so many keyboard shortcuts this is an impractical solution for users.
- A = a user can fully use all functions of the application
- B = a user can perform most functions using the prescribed methods of interacting with the application
- C = a user can perform many functions, but there are significant gaps in functionality
- D = a user can perform some basic functions, but most functions are unavailable or there are other significant problems
- F = a user cannot use even basic functions of the application

GMail

Standard View or Basic HTML View?
Google provides two user interfaces for interacting with GMail: the Standard view which contains all of the rich interactive features of Gmail, and the Basic HTML view which provides a more static version of the interface. The Basic HTML view is described as a version that is more compatible with older browsers, has less functionality than the Standard view, but has more accessibility features than the Standard view. However, the Standard view is also stated to be “quite accessible with JAWS 9, 10 and 11 due to JAWS support of ARIA”\(^2\) It should be noted that JAWS is currently on version 13, and version 12 was released a year and a half ago in October 2010 but there is no mention of either of these versions in Google’s documentation.\(^3\)

There was a lot of debate among project participants about which version of GMail to test in the evaluation. Arguments for the Basic HTML version were
- It is more likely to be the version that current screen reader users will be actively using, and
- It includes some additional accessibility features like additional headings and ARIA landmarks.
Arguments for the Standard view were:
- It contains all of the features that Google considers part of the “standard” GMail environment, rather than an environment with limited functionality.
- It is updated with new features well in advance of the Basic HTML version, if the features ever make it to the Basic HTML version.\(^4\)

It needs to be noted that in the Basic HTML view, which is promoted as being the more accessible version for screen readers, there are still some basic accessibility errors such as the “To”, “Cc”, “Bcc”, and “Subject” fields being unlabeled form elements. This means that all screen reader users\(^5\) will not be able to properly address an email message unless they guess at what

\(^2\) [http://support.google.com/mail/bin/answer.py?hl=en&answer=146375](http://support.google.com/mail/bin/answer.py?hl=en&answer=146375)

\(^3\) As a further note in the lack of documentation support, there are fundamental misspellings of terms like “live regions” as “livergents” on pages such as [http://support.google.com/mail/bin/answer.py?hl=en&answer=90559](http://support.google.com/mail/bin/answer.py?hl=en&answer=90559)

\(^4\) As an example, the ability to create a task out of an email message is absent from the Basic HTML version.

\(^5\) JAWS and NVDA do not attempt to label any of these input elements. ChromeVox announces the “To” field but none of the others. VoiceOver announces the “Cc”, “Bcc”, and “Subject” fields, but not the “To” field.
information is being asked for in each form field. Given this lack of fundamental accessibility support we cannot recommend using the Basic HTML view as an “accessible” GMail alternative. Users with disabilities should have access to the same features and functionality as non-disabled users. Further, Google documents that GMail Standard View is “quite accessible”. Therefore, Standard View was used in the current evaluation.

Also, it should be noted that GMail utilizes fairly standard HTML and JavaScript coding practices (in contrast to Google Docs, which contains very advanced on-screen/off-screen relationships dictating how the majority of the application operates). Therefore GMail could be made accessible using standard and well-established coding techniques.

**High Contrast Mode**

High Contrast Mode changes the color scheme of the page to provide more contrast between the foreground and background elements. It is used by some people with visual disabilities. Google does provide some high contrast themes and options for viewing their applications. Google’s implementation was not tested in this set of evaluations.

Grade: A- on OS X; C on Windows

On OS X all of the functions could be performed in high contrast mode. However, in a few instances buttons and text had insufficient contrast. In Windows many of the buttons appear as black on black, in which case users have insufficient information about the purpose of these buttons to make them usable. Skilled users may know they can hover over buttons to see the buttons’ tooltips if they’re able to use a mouse, but many users are likely to be unaware of this workaround.

**JAWS with Firefox**

JAWS is the most popular Windows-based screen reader.

Grade: D

GMail is quite difficult to use with JAWS for a number of reasons. It is difficult or impossible to

- easily navigate through messages in a conversation thread
- attach files
- determine if a message is starred or marked as important
- work with the task list
- set GMail settings
- compose messages with the rich text editor
- access the “People” functionality when reading messages
- find the shortcut keys and screen reader help screens

GMail uses ARIA landmarks to aid in navigation of the interface. However, some additional landmarks would greatly aid in navigation. In general, the interface needs more semantic structure to aid in navigation. One key area where this would be beneficial is within conversations, so users can more easily move from one message to another.
There are many tasks that have shortcut keys defined for them, which in theory would make the task accessible. However, the aforementioned conflicts between JAWS and GMail shortcut keys render these features unusable.

**ChromeVox on Windows**

ChromeVox is the built-in screen reader for the Chrome browser.

Grade: C

Overall, the accessibility of ChromeVox in GMail is quite good and most functions can be accessed except for a few notable exceptions. Some of these exceptions involve core functionality and thus kept ChromeVox from receiving a B in our assessment.

ChromeVox accessibility is heavily dependent upon the use of shortcut keys. Even with the lengthy list of shortcut keys, there are still many aspects of the system that cannot be accessed. Some of the major problems with ChromeVox are:

- files cannot be attached to messages
- the GMail settings page cannot be read by ChromeVox
- when composing messages with the rich text editor, ChromeVox frequently says “deleted” after reading a line
- the Tasks feature cannot be used
- the “CC” and “BCC” fields are difficult to find because they are nowhere close to the “To” field

**VoiceOver**

VoiceOver is the built-in screen reader for OS X.

Grade: D

VoiceOver has many of the same issues that JAWS does, with some additions. Most significantly, VoiceOver cannot:

- easily navigate through messages in a conversation thread
- add a label
- create filters
- easily reply to or forward messages
- mark a message as important
- work with the task list
- set GMail settings
- compose messages with the rich text editor
- find the shortcut keys and screen reader help screens

Some of the additional problems encountered can be attributed to the contextual toolbar not being responsive to keyboard commands via VoiceOver, like the “More” and label menus. Additionally, if the user switches to the plain text editor for composing messages it is easier to compose messages.
Keyboard Only

Keyboard-only access is trying to use an application using only your keyboard without ever relying on a mouse. Keyboard-only access is a critical test because many assistive technologies interface with computers by mimicking the behavior of a keyboard. Also, many users simply cannot use a mouse and need to interact with an application solely through a keyboard.

Grade: B

Most functions are accessible using keyboard alone. Google’s documented shortcut keys provide a lot of assistance in quickly navigating the interface and performing actions. The only notable exceptions are

- selecting or deselecting all messages
- using the rich text editing features
- inefficiencies in creating and managing the visibility of labels
- accessing the GMail settings

There are also times when an excessive amount of tabbing is required to access portions of the interface.

Sticky Keys

In addition to testing with keyboard alone, an assessment was conducted using Sticky Keys. Sticky Keys is not a product, but rather is a function built into operating systems. Sticky Keys allows users to submit key press combinations in serial as opposed to the normal parallel fashion. For instance, instead of simultaneously pressing Control and V, the user can press the Control key, let go of Control, and then the V key. Sticky Keys is used by some people with mobility impairments.

This assessment was included because in the earlier evaluation of Google Docs, problems were observed that only occurred if Sticky Keys was enabled. However, this was not the case with GMail (or with Calendar). The same problems reported in the preceding section related to keyboard accessibility were observed, but there were no additional problems that solely affected Sticky Keys users.

Read and Write Gold

Read&Write Gold is a software application that assists users in reading and composing text through a series of tools such as text-to-speech reading, word-by-word highlighting, and spell-checking functions designed for particular learning disabilities. It is not considered an alternative means of interacting with an application, like a screen reader. Rather, it adds a layer of functionality on top of an application to aid the user.

Grade: A

All of the major functionality of Read and Write Gold works fine in GMail.

ZoomText
ZoomText is a screen magnification application that allows users to selectively enlarge portions of their screen, such as the area beneath their mouse. It also will read the text from the page to the user.

Grade: B

The screen magnification functions of ZoomText work fine with GMail. When using the screen reader functionality some of the same problems as in other screen reader tests were uncovered, namely that the tab order for user interface elements were not always logical. This made looking for specific functions problematic at times as the control being looked for was not already in the zoomed in section.

**Dragon Naturally Speaking with IE**

Grade: D (possibly a B when Dragon is used in combination with Firefox)

Dragon Naturally Speaking does technically work in GMail, but not in a way to take advantage of any of its features to aid people with disabilities. One of Dragon’s strengths is being able to recognize link text on a page so the user simply needs to say “click send” in order to click on the send button. In GMail, virtually none of the links or clickable items are recognizable by Dragon as being clickable links. The means the Dragon user, in order to use GMail, must resort to issuing keyboard commands, like saying “tab” repeatedly to navigate through the page, or must issue GMail shortcut key commands. The other alternative is to utilize the Mouse Grid, a series of increasingly finer detailed grids superimposed over the screen, to click on sections of a page. Both the keyboard commands and the Mouse Grid processes are very labor intensive and inefficient when they are the only means by which a user can navigate the page.

A surprising discovery late in our testing process revealed that Dragon and Firefox work quite well together. This was surprising because the conventional wisdom has been to always use IE with Dragon because there is better support for this combination for all Web pages. We are uncertain at this point why Firefox works so much better with Dragon than IE and we are currently doing some more tests as to the accessibility of this combination.

**Google Calendar**

**General Trends**

While the Agenda view has been optimized for screen readers, that level of accessibility support does not extend to the screens where events are created and edited. This makes the Agenda view good for read-only calendars, but for practical purposes assistive technology users, notably screen reader users in this case, will not be able to fully access all of the functions of Calendar.

The importance of being able to schedule meetings between multiple participants based on free time availability, especially in large organizations where joint meetings are frequently scheduled, cannot be underestimated. To date there is no way for many assistive technologies to perform this basic task.

**High Contrast Mode**
Grade: A on OS X, D+ on Windows

There are no major issues with high contrast mode on OS X. However, on Windows, several user interface elements become invisible and several lack any type of tooltip. This requires the user to explore the screen with their mouse to discover what hidden functionality is there.

JAWS

Grade: D-

JAWS has numerous accessibility problems, rendering the Calendar almost unusable for practical purposes. The problems include the inability to:
- use semantic markup to navigate through the user interface
- add guests to meetings
- find available meeting times for multiple participants
- set repeating meetings
- manage calendars and calendar subscriptions

ChromeVox

Grade: C

ChromeVox has numerous accessibility problems, rendering the Calendar almost unusable for practical purposes. Some of the overarching themes are:
- the lack of audio feedback after performing actions
- the lack of internal navigation
- unlabeled, or poorly labeled form elements

The lack of semantic structure and properly labeled form elements in the page makes numerous tasks extremely difficult, if not impossible, to accomplish.

Additionally, ChromeVox was not able to
- find available meeting times for multiple participants
- easily determine if a meeting is repeating

VoiceOver

Grade: D

VoiceOver has numerous accessibility issues in Calendar, notably:
- difficulty finding the controls to create and save meetings
- times being misread while creating meetings
- finding common meeting times for multiple participants
- removing already invited participants
- adding and removing additional calendars

Keyboard only

Grade: B
Most of the functions are accessible while only using the keyboard. The most notable exception is the inability to find available meeting times for multiple participants. There are also times when an excessive amount of tabbing is required to get to portions of the interface.

Much of the keyboard-only assessment came from the Sticky Keys assessment, which in essence is also a keyboard-only test too.

**Sticky Keys**

In addition to testing with keyboard alone, an assessment was conducted using Sticky Keys. Sticky Keys is not a product, but rather is a function built into operating systems. Sticky Keys allows users to submit key press combinations in serial as opposed to the normal parallel fashion. For instance, instead of simultaneously pressing Control and V, the user can press the Control key, let go of Control, and then the V key. Sticky Keys is used by some people with mobility impairments.

This assessment was included because in the earlier evaluation of Google Docs, problems were observed that only occurred if Sticky Keys was enabled. However, this was not the case with GMail (or with Calendar). The same problems reported in the preceding section related to keyboard accessibility were observed, but there were no additional problems that solely affected Sticky Keys users.

**Read and Write Gold**

Grade: A

All of the major functionality of Read and Write Gold works fine in Calendar.

**ZoomText**

Grade: B

The screen magnification functions of ZoomText work quite well with Calendar. When using the screen reader functionality some of the same problems other screen reader tests are uncovered, namely that the tab order for user interface elements are not always logical. This makes looking for specific functions problematic at times as the control being looked for is not already in the zoomed-in section.

**Dragon Naturally Speaking with IE**

Grade: D- (possibly a B when Dragon is used in combination with Firefox)

All of the same issues raised in GMail usability also apply to Calendar usability in regards to Dragon Naturally Speaking.

- Dragon does not recognize any of the user interface as being clickable textual items
- Shortcut keys or tab navigation must be used
- The Mouse Grid must be used

Additionally, Dragon is not able to dictate text into any of the text boxes within Calendar. This makes it impossible to even schedule a meeting.
Again, late in our testing we discovered that the combination of Dragon with Firefox yielded unexpectedly good results. We are doing more testing to see what level of accessibility support exists with this combination.

**Conclusion**

In general, the grades for specific technologies interacting with GMail and Calendar were higher than they were for Google Documents, although there were still significant problems. The improvements are most likely due in part to the relative complexity of the applications. Google Docs is a highly complex application that uses unconventional methods for accepting and processing input, whereas GMail and Calendar are built using standard user interface elements. Assistive technologies tend to perform much better with standard user interfaces elements. Because GMail and Calendar can largely rely on these standard elements, Google could easily do much more to make the entire interface more accessible. Significant work still needs to be done for visually impaired users, especially screen reader users. Many of the problems encountered in this report could have been solved if standard user interface elements had been used in ways specified by the W3C through the Web Accessibility Initiative (WAI).

Additionally, Google should not be satisfied with simply offering accessibly enhanced versions of the applications through different views. While these views might be more accessible than other views, for large numbers of users they still remain woefully inadequate. What is needed is a way for all people to have equitable access.

Finally, communication from Google about improvements they are making in accessibility is key for our campuses. We are not able to easily assess the accessibility of the application suite without doing a complete re-evaluation of it each time we want to know the status. Once we know a baseline of what is and what is not accessible, knowing what changes are being made or have been made will greatly aid us in giving accurate and timely information to our decision makers and stakeholders.

In order for some users to effectively use the core functions of GMail and Calendar, they may need to rely on third party tools that can interact directly with Google’s mail and calendar services. These third-party solutions are not an equivalent method for interacting with Google’s services, because much of the functionality is not available to these third-party tools. This suggestion is a way for some users to cope until Google’s services are equitably accessible.
Appendix A - Participants

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Appendix B - Functional Task List for GMail

Reading Conversations
1. Go to the list of conversations in the inbox.
2. Go to the list of conversations in Sent Mail
3. Move up and down through the list of conversations and read information about each (at a minimum, read the names of the people involved in the conversation, the number of messages in the conversation, the subject line, and the date and time of the most recent message in the conversation)
4. Identify whether the current conversation is starred.
5. Identify whether the current conversation is marked as important
6. Identify why the current conversation is marked as important
7. Identify whether the current conversation includes an attachment
8. Move to the next screen of “older messages”
9. Move to the previous screen of “newer messages”
10. Open a conversation (for testing purposes, open a conversation that has multiple messages)

Taking Actions on Conversations
1. Archive a conversation
2. Mark a conversation as spam
3. Delete a conversation
4. Mark a conversation as important
5. Mark a conversation as not important
6. Add a label to a conversation
7. Add multiple labels to a conversation
8. Select “Filter messages like these” from the More menu
9. Create a filter using the form that appears after the previous step
10. Select all conversations
11. Select all unread conversations

Working with Messages
Google Mail messages are organized into conversations, consisting of one or more messages that share a subject line. The inbox, search results, and other views present the user with lists of conversations.
1. Move forward and backward through the messages that make up a conversation, and identify whether a message is expanded or collapsed
2. Open (expand) a message
3. Close (collapse) a message
4. Mark message as important
5. Mark message as not important
6. Star message
7. Reply to message (sender only)
8. Reply to all
9. Write a reply and send it
10. Forward message
11. Print message
12. Archive message
13. Mark message as spam
14. Delete a message
15. Add to tasks (from the More menu)
16. Create an event (from the More menu)

Composing Mail
1. Select the “Compose Mail” button
2. Add a receipt to the “To” line. Choose the recipient from your Contacts
3. Add a recipient to the CC line. Again, choose this recipient from your Contacts
4. Attach two files to the message
5. Review the two attachments, and uncheck one of them so as not to send it
6. Compose a message, and use the rich text editor to:
   a. Make text bold
   b. Make text italicized
   c. Make text underlined
   d. Change the font
   e. Change the text size
   f. Change the text color
   g. Insert an emoticon
   h. Add a numbered list
   i. Add a bulleted list
   j. Increase indentation
   k. Decrease indentation
   l. Add quote
   m. Align left
   n. Align center
   o. Align right
7. Ascertain the following characteristics of the text that currently has focus:
   a. Is text bold?
   b. Is text italicized?
   c. Is text underlined?
   d. What is the current font?
   e. What is the current text size?
   f. What is the current text color?
   g. What is the current emoticon?
   h. Is this a list? If so, is it numbered or bulleted?
   i. What is the current level of indentation?
   j. Is the current text a quote?
   k. How is the text currently aligned? (left, right, or centered)
8. Change message to plain text
9. Check spelling
10. Find a word that spell check identified as misspelled
11. Use Google’s recommended correct spellings to correct it
12. Send the message

Finding Mail
1. Place focus in the search field
2. Search for a message
3. Go the search results
Working with Tasks

1. Open Tasks
2. Read the list of tasks
3. Mark a task as complete
4. Add a task
5. Delete a task
6. Email task list
7. Close Tasks

Getting Help

1. Select Mail Help
2. Find and open the list of Gmail keyboard shortcuts
3. Find and open Gmail accessibility help for screen reader users

Working with Settings

1. Go to the Mail Settings
2. Navigate the settings, change various options (this is an application in itself - not sure how specific we want to get)

Working with Labels

NOTE: There are multiple ways to accomplish most of these tasks. Since this is a functional task list, I haven’t specified the steps for any of these actions.

1. Create a new label
2. Assign a color to a label
3. Toggle the new label so that is shown in the Label List, then hidden from the Label List, then shown again.
4. Select multiple conversations in the inbox, and assign the new label to them
5. Navigate to the new label in the Label List, and select it, then browse the list of conversations associated with this label

People Features

1. When reading a message, navigate to the list of people who are participants in the conversation (aka the “group”)
2. Start a group chat
3. Send an email to this group
4. Schedule a meeting with this group
Appendix C - Functional Task List for Google Calendar

Creating an Event
1. Create an Event (not through Quick Add). Include the start date and time, end date and time, location, and description
2. Choose a time zone
3. Choose the calendar to put it on
4. Add two or more guests to the event
5. Remove one of the guests
6. Find a meeting time based on the "Find a time" link
7. Find a meeting time based on the "Suggested times" link
8. Make one of the guests "optional"
9. Repeat the event so that it occurs on that same day every month (e.g., second Wednesday) for the next six months
10. Add a reminder by Pop-up 15 minutes prior to the event
11. Add an attachment to the event
12. Add a color code to the event
13. Send an invitation to the event to other participants.
14. Duplicate the event
15. Change the owner of the meeting
16. Create an Event through Quick Add.

Browsing Events
1. Switch to the Day view and read the events
   a. Go to the next day
   b. Go to the previous day
2. Switch to the Week view and read the events
   a. Go to the next week
   b. Go to the previous week
3. Switch to the Month view and read the events
   a. Go to the next month
   b. Go to the previous month
4. Switch to the Agenda view and read the events
   a. Go to the next day
   b. Go to the previous day
5. View the details for a particular event
6. Determine if an event is a recurring event
7. Determine what hours you are available during the day.

Editing Events
1. Edit an event
2. Add an additional guest
   a. Remove one of the guests
3. Delete an event
4. Undo the deleting of an event

Searching Events
1. Search for events by keyword
2. Navigate to the search results then read them

Calendar Functions
1. Create a new calendar
   a. Share it with a specific person
   b. Make the calendar public
   c. Set the color of the calendar
   d. Setup email notification options for the calendar
2. View only a single calendar when multiple calendars are visible
3. Add a friend's calendar
4. Toggle the visibility of the friend's calendar
5. Subscribe to a calendar (Add by URL)
6. Unsubscribe from a calendar (Hide this calendar from the list)
7. Change the time zone of a calendar
8. Indicate that you are attending a meeting that someone else put on your calendar.
9. Change your attendance status for a meeting someone else put on your calendar.
10. Add a note to a meeting someone else has scheduled.
11. Print a calendar