

# Error Flows Inventory

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# Introduction

The purpose of this working document is to build out error flows for the purpose of identifying error-related needs to be addressed with accessibility guidelines. The companion document, [Examples of Error Flows](#), is a catalog of screenshots that illustrate the error flows described below.

Work on the document is directed by the [Errors Subgroup](#) of the Silver Taskforce of the Accessibility Guidelines Working Group.

## Working definitions

- **Error:** An action or omission of action yielding an unintended result. (From *Universal Principles of Design*)
- **Severity:**
  - **Minor:** Issue that is detected by the user but does not affect task completion. The user is able to overcome or avoid the issue to accomplish the task.
  - **Significant:** Issue that is detected by the user and affects task execution. The user must take measures to overcome the issue—try again, guess, use trial-and-error—to accomplish the task, and will likely experience more errors.
  - **Critical:** Issue that is so significant that the user gives up and does not accomplish the task. The user likely spent considerable time and effort trying to overcome the issue, and experienced many errors. (Adapted from [Barrier Walkthrough Method](#))
- **User Needs:** Features that, if not provided, mean users with impacted functional needs will likely face a critical accessibility error.

## Content template

- Error Number and Name: Unintended result of user action/system response
- User Action: Action or omission of action taken by user that triggers error
- System Response/Unintended Result: Response from system that causes an accessibility issue
- User Response: Response of user to issue and actions they take to overcome issue
- Issue Severity: Impact of issue on affected user groups
- Common User Needs: What all users need to overcome the issue, and why they need it
- Functional Needs: What users with [functional needs](#) need to overcome the issue, and why they need it (all functional needs are listed; those with requirements are bolded and highlighted and marked with **\*\*RN\*\*** (for “relevant need”), those that are not applicable are highlighted in red and marked with **\*\*NA\*\*** (for “not applicable”))
- As of Dec 16, 2020: We will only add user needs that have not yet been surfaced, and these will be marked as **\*\*NRN\*\*** (“new relevant need”)

# Error Flows

## 1. REVIEWED (ST, added additional **\*\*RN\*\***) File not found/No system message

- User Action: User enters an incorrect URL or follows a broken link (e.g., due to bad request (400), authentication required (401), forbidden (403), not found (404), method not allowed (405), internal server error (506), or service unavailable (503), system messages such as database errors, network errors, etc.)
- System Response/Unintended Result: System displays homepage or another page with no notification of system error
- User Response:
  - User does not know why they are seeing a different page
  - User does not see what they are looking for
  - User tries to figure out what happened on their own
  - User tries other methods to find the resource (search, sitemap)
- Issue Severity: Significant (potentially Critical if resource cannot be found)
- **Scope: Correct errors**
  - **Error Message**
- Common User Needs:
  - User needs a notification that the requested resource is not available, so they can use a different approach
  - User needs to know whether the resource they expected to find is likely to exist, so they can decide whether to keep looking for it
  - User needs to know if there are other ways to access the resource, so they can try to find the resource another way
- Functional Needs: Essential
  - Essential
    1. Use without physical harm or risk (to self or others within a physical environment) **\*\*NA\*\***
- Functional Needs: Sensory
  - Vision & Visual
    2. Use without vision
      - a. User needs an accessible notification, so they can access the notification with a screen reader **\*\*RN\*\***
    3. Use with limited vision
      - a. User needs a visible notification, so they can see the notification within a magnified viewport **\*\*RN\*\***
      - b. User needs a high-contrast notification, so they can distinguish the message text **\*\*RN\*\***
    4. Use without color perception
      - a. User needs a notification that is distinguishable without color, so they can recognize the notification **\*\*RN\*\***

5. Use with limited color perception
  - a. User needs a high-contrast notification, so they can distinguish the message text **\*\*RN\*\***
6. Use with limited depth perception **\*\*NA\*\***
7. Use with limited orientation or spatial tracking **\*\*NA\*\***
8. Use with photosensitivity (too much or too little) **\*\*NA\*\***
- Hearing & Auditory
  9. Use without hearing **\*\*NA\*\***
  10. Use with limited hearing **\*\*NA\*\***
  11. Use with limited auditory processing (speech) **\*\*NA\*\***
  12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time) **\*\*NA\*\***
- Sensory Intersections
  13. Use without vision and hearing
    - a. User needs a message that persists after the screen reader presents it, since Braille displays will often show only a portion of a status message. **\*\*RN\*\***
  14. Use with vestibular issues
  15. Use without spatial auditory awareness or perception (needs diegetic sound)
- Functional Needs: Physical
  - For all of these, the user needs to be able to read the message, and then be back at a likely location to continue the search for information, especially if they might likely have taken a long time to reach the location from which they launched the broken link. For example, if the user has already navigated through a long page listing research papers to reach the section they are interested in, they would likely prefer to be back at that list and simply chose their second choice, rather than having to start over at the beginning. **\*\*RN\*\***
  - Mobility
    16. Use without mobility
    17. Use with limited mobility
    18. Use with limited reach or range
  - Motor
    19. Use without hands
    20. Use without multiple touchpoint gesture
    21. Use with limited strength
    22. Use without fine point control
    23. Use without physical tracking speed
    24. Use with tremors
  - Physical & Sensory Intersections
    25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
    26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity

- 27. Use with chronic pain impacting input or interaction modality
- Speech
  - 28. Use without vocalization
  - 29. Use with limited vocalization or volume
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention
    - 31. Use with limited ability to direct attention**
      - a. **User needs clear next steps to find the resource, so they can follow steps to find the resource \*\*RN\*\***
    - 32. Use with limited ability to shift attention**
      - a. **User needs clear next steps to find the resource, so they can follow steps to find the resource \*\*RN\*\***
  - Language & Communication
    - 33. Use with limited ability to comprehend spoken language
      - a. **User needs the link to not have been broken to begin with.**
        - i. **User's assistants need to have gotten a warning that the page was going to move.**
        - ii. **The site needs to be reviewed with a link checker regularly for broken links to be sure that these users can have a reliable learned plan to access the resources they need. Remove any links that will no longer be valid, or have those lead to the next closest resource. \*\*RN\*\***
    - 34. Use without ability to read**
      - a. **User needs symbols in the notification, so they can recognize there was an error \*\*RN\*\***
      - b. **User needs as many access supports in the notification as are in the resource \*\*RN\*\***
    - 35. Use with limited ability to recognize written language**
      - a. **User needs symbols in the notification, so they can recognize there was an error \*\*RN\*\***
    - 36. Use with limited ability to comprehend written language**
      - a. **User needs clear language in the notification, so they can understand the nature of the error \*\*RN\*\***
      - b. **User needs same reading level in the notification as are in the resource \*\*RN\*\***
    - 37. Use without ability to write
    - 38. Use with limited ability to correctly write (or type) words and use punctuation
    - 39. Use without understanding symbols
    - 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location

- a. **User needs clear language in the notification, so they can understand the nature of the error \*\*RN\*\***
- Learning
  - 41. Use with limited ability of math and numeric concepts
  - 42. Use with limited compositional skill (simultaneous thinking and input)
  - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)
- Memory
  - 44. Use with limited short-term or working memory
    - a. **User may need the link to not have been broken to begin with. (see more detail under 33) \*\*RN\*\***
  - 45. Use with limited medium or long-term memory
  - 46. Use with limited sensory memory
- Executive
  - 47. Use with limited planning, organization, sequencing, and execution ability**
    - a. **User needs clear next steps to find the resource, so they can follow steps to find the resource \*\*RN\*\***
  - 48. Use with limited emotional control and self monitoring
    - a. **User may need the link to not have been broken to begin with. (see more detail under 33) \*\*RN\*\***
  - 49. Use with limited judgement
    - a. **User may need suggested next actions to take \*\*RN\*\***
- Mental Health
  - 50. Use with debilitating fear or anxiety
    - a. **User may need the page that is displayed to have the same design as the site that they were on, (rather than a simple server error message) so they are not worried this is a virus, or major error. \*\*RN\*\***
    - b. **User may need text on the page to be un-alarming and friendly such as, "Oops, we're sorry this page is broken right now. Try these instead: ..." \*\*RN\*\***
    - c. **User may need icons that are not overly alarming and that do not imitate icons used for physical dangers and emergencies. \*\*RN\*\***
- Cognitive & Sensory Intersections
  - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
  - 52. Use with limited phonological or phonemic awareness
- Functional Needs: Independence
  - Independence
    - 53. Use without autonomy or agency
      - a. **User may need their assistant to be notified if their site is going to change \*\*RN\*\***

## 2. REVIEWED (ST, added additional **\*\*RN\*\***) No results found/No system message

- User Action: User enters search query that does not yield result
- System Response/Unintended Result: System displays a results page with no content and no notification of no results found
- User Response:
  - User does not know that the search returned no results
  - User gives up search or searches again or tries other methods to find the resource (sitemap)
- Issue Severity: Significant (potentially Critical if resource cannot be found)
- **Scope: Correct errors**
  - **Error Message**
- Common User Needs
  - User needs a notification that the resource is not available using the search terms, so they can stop trying to access it using the search terms
  - User needs to know whether the resource they are search for is likely to exist, so they can decide whether to keep searching for it using other search terms
  - User needs to know if there are other ways to access the resource, so they can try to find the resource another way.
- Functional Needs: Essential
  - Essential
    1. Use without physical harm or risk (to self or others within a physical environment)
- Functional Needs: Sensory
  - Vision & Visual
    - 2. Use without vision**
      - a. User needs an accessible notification, so they can access the notification with a screen reader **\*\*RN\*\*****
    - 3. Use with limited vision**
      - a. User needs a visible notification, so they can see the notification within a magnified viewport **\*\*RN\*\*****
      - b. User needs a high-contrast notification, so they can distinguish the message text **\*\*RN\*\*****
    4. Use without color perception
    - 5. Use with limited color perception**
      - a. User needs a high-contrast notification, so they can distinguish the message text **\*\*RN\*\*****
    6. Use with limited depth perception
    7. Use with limited orientation or spatial tracking
    8. Use with photosensitivity (too much or too little)
- Hearing & Auditory

- 9. Use without hearing
- 10. Use with limited hearing
- 11. Use with limited auditory processing (speech)
- 12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time)
- Sensory Intersections
  - 13. Use without vision and hearing
    - a. **User needs a message with the key info presented up front in a short phrase or sentence, such as, “No results found for ‘lottery.’” since Braille displays will often show only a portion of a status message. In addition, the information should be persistent on the page. \*\*RN\***
  - 14. Use with vestibular issues
  - 15. Use without spatial auditory awareness or perception (needs diegetic sound)
- Functional Needs: Physical
  - **For all of these, the user needs focus to stay where it was so that they can quickly search again using different terms. \*\*RN\*\***
  - Mobility
    - 16. Use without mobility
    - 17. Use with limited mobility
    - 18. Use with limited reach or range
  - Motor
    - 19. Use without hands
    - 20. Use without multiple touchpoint gesture
    - 21. Use with limited strength
    - 22. Use without fine point control
    - 23. Use without physical tracking speed
    - 24. Use with tremors
  - Physical & Sensory Intersections
    - 25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
    - 26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
    - 27. Use with chronic pain impacting input or interaction modality
  - Speech
    - 28. Use without vocalization
    - 29. Use with limited vocalization or volume
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention
      - a. **User may need a list of terms that have been searched in that session along with the count, “lottery (0 pages found)” \*\*RN\*\***
    - 31. Use with limited ability to direct attention



- a. **User needs clear next steps to find the resource, so they can follow steps to find the resource \*\*RN\*\***
- 32. Use with limited ability to shift attention**
  - a. **User needs clear next steps to find the resource, so they can follow steps to find the resource \*\*RN\*\***
- Language & Communication
  - 33. Use with limited ability to comprehend spoken language
  - 34. Use without ability to read**
    - a. **User needs symbols in the notification, so they can recognize there was an error \*\*RN\*\***
  - 35. Use with limited ability to recognize written language**
    - a. **User needs symbols in the notification, so they can recognize there was an error \*\*RN\*\***
  - 36. Use with limited ability to comprehend written language**
    - a. **User needs clear language in the notification, so they can understand the nature of the error \*\*RN\*\***
  - 37. Use without ability to write
  - 38. Use with limited ability to correctly write (or type) words and use punctuation
    - a. **User may need suggestions of words similar to the string of characters they search for, which might return the results they are looking for \*\*RN\*\***
  - 39. Use without understanding symbols
  - 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
- Learning
  - 41. Use with limited ability of math and numeric concepts
  - 42. Use with limited compositional skill (simultaneous thinking and input)
  - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)
- Memory
  - 44. Use with limited short-term or working memory
    - a. **User may need a list of terms that have been searched in that session along with the count, "lottery (0 pages found)" \*\*RN\*\***
  - 45. Use with limited medium or long-term memory
  - 46. Use with limited sensory memory
- Executive
  - 47. Use with limited planning, organization, sequencing, and execution ability**
    - a. **User needs clear next steps to find the resource, so they can follow steps to find the resource \*\*RN\*\***
  - 48. Use with limited emotional control and self monitoring
    - a. **If the user's searches repeatedly result in no results, the user may need to be presented with a list pages that do exist,**

which might relate to the word they already entered, or the user may need to be directed to the table of contents instead, so that the user does not become frustrated by what may seem to them to be endless failures. **\*\*RN\*\***

- 49. Use with limited judgement
  - Mental Health
    - 50. Use with debilitating fear or anxiety
  - Cognitive & Sensory Intersections
    - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
    - 52. Use with limited phonological or phonemic awareness
- Functional Needs: Independence
  - Independence
    - 53. Use without autonomy or agency
      - a. **[Might not be relevant to errors.] Users may benefit from being able to save a list of found pages, so that they can search with their assistant, but visit the pages later on their own. (However, the Website probably does not need to provide this, unless it blocks bookmarking functionality.)**  
**\*\*RN\*\***
- 54. Use without privacy

### 3. TO REVIEW Error on form submit/No system message

- User Action: User does not enter data in required inputs and/or enters incorrect data (e.g., incorrect format, password confirmation does not match) before submitting form
- System Response/Unintended Result: System displays the same page with no error message
- User Response:
  - User does not know there was an error
  - User might infer there is an error
  - User completes inputs again and submits
- Severity: Significant (potentially Critical if error cycle repeats)
- **Scope: Correct errors**
  - **Error Message**
- Common User Needs:
  - User needs a notification that the information entered is incorrect or missing, so they can take corrective action
  - User needs to know, if applicable, what is specifically missing in their input to be able to address
  - User needs to know if there are alternative ways to complete the step
- Functional Needs: Essential
  - Essential

1. Use without physical harm or risk (to self or others within a physical environment)
- Functional Needs: Sensory
  - Vision & Visual
    2. Use without vision
      - a. **User needs notification to be associated with the input in error, so they can readily access the correct input to fix the error \*\*RN\*\***
    3. Use with limited vision
      - a. **User needs notification to be associated with the input in error, so they can readily access the correct input to fix the error \*\*RN\*\***
    4. Use without color perception
      - a. **User needs a notification that doesn't only use color, so they can distinguish the message \*\*RN\*\***
    5. Use with limited color perception
      - a. **User needs a high-contrast notification, so they can distinguish the message \*\*RN\*\***
    6. Use with limited depth perception
    7. Use with limited orientation or spatial tracking
    8. Use with photosensitivity (too much or too little)
  - Hearing & Auditory
    9. Use without hearing
      - a. **User needs a notification that is not just a sound to indicate error, so they can distinguish the message \*\*RN\*\***
    10. Use with limited hearing
    11. Use with limited auditory processing (speech)
    12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time)
  - Sensory Intersections
    13. Use without vision and hearing
    14. Use with vestibular issues
    15. Use without spatial auditory awareness or perception (needs diegetic sound)
- Functional Needs: Physical
  - Mobility
    16. Use without mobility
      - a. **User needs notification to be associated with the input in error, so they can readily access the correct input to fix the error \*\*RN\*\***
    17. Use with limited mobility
    18. Use with limited reach or range
  - Motor
    19. Use without hands

- 20. Use without multiple touchpoint gesture
- 21. Use with limited strength
- 22. Use without fine point control
- 23. Use without physical tracking speed
- 24. Use with tremors
- Physical & Sensory Intersections
  - 25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
  - 26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
  - 27. Use with chronic pain impacting input or interaction modality
- Speech
  - 28. Use without vocalization
  - 29. Use with limited vocalization or volume
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention
    - 31. Use with limited ability to direct attention
      - a. **User needs the notification and input to be proximate and visually associated, so they can follow the notification instructions to fix the error \*\*RN\*\***
    - 32. Use with limited ability to shift attention
      - a. **User needs the notification and input to be proximate and visually associated, so they can follow the notification instructions to fix the error \*\*RN\*\***
  - Language & Communication
    - 33. Use with limited ability to comprehend spoken language
    - 34. Use without ability to read
      - a. **User needs symbols in the notification and for the notification and input to be proximate and visually associated, so they can recognize there was an error and where there was an error \*\*RN\*\***
    - 35. Use with limited ability to recognize written language
      - a. **User needs symbols in the notification and for the notification and input to be proximate and visually associated, so they can recognize there was an error and where there was an error \*\*RN\*\***
    - 36. Use with limited ability to comprehend written language
      - a. **User needs symbols in the notification and for the notification and input to be proximate and visually associated, so they can recognize there was an error and where there was an error \*\*RN\*\***
    - 37. Use without ability to write

- 38. Use with limited ability to correctly write (or type) words and use punctuation
- 39. Use without understanding symbols
- 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
- Learning
  - 41. Use with limited ability of math and numeric concepts
  - 42. Use with limited compositional skill (simultaneous thinking and input)
  - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)
- Memory
  - 44. Use with limited short-term or working memory
  - 45. Use with limited medium or long-term memory
  - 46. Use with limited sensory memory
- Executive
  - 47. Use with limited planning, organization, sequencing, and execution ability
    - a. **User needs the notification and input to be proximate and visually associated, so they can follow the notification instructions to fix the error \*\*RN\*\***
  - 48. Use with limited emotional control and self monitoring
  - 49. Use with limited judgement
- Mental Health
  - 50. Use with debilitating fear or anxiety
- Cognitive & Sensory Intersections
  - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
  - 52. Use with limited phonological or phonemic awareness
- Functional Needs: Independence
  - Independence
    - 53. Use without autonomy or agency
    - 54. Use without privacy

#### 4. TO REVIEW Error on form submit/Image only message

- User Action: User does not enter data in required inputs and/or enters incorrect data (e.g., incorrect format, password confirmation does not match) before submitting form
- System Response/Unintended Result: System displays the same page with an alert icon and no text message
- User Response:
  - User knows there was an error but does not know where
  - User completes inputs again and submits
- Severity: Significant (potentially Critical if error cycle repeats)
- Scope: Correct errors
  - Error Message

- Common User Needs:
  - User needs to know where the error occurred, so they can locate the source of the error and attempt to fix it
  - User needs to know the nature of the error, so they can avoid repeating the error and successfully complete the task
  - User needs to know if there are alternative ways to complete the step
- Functional Needs: Essential
  - Essential
    1. Use without physical harm or risk (to self or others within a physical environment)
- Functional Needs: Sensory
  - Vision & Visual
    - 2. Use without vision**
      - a. User needs notification to be associated with the input in error, so they can readily access the correct input to fix the error \*\*RN\*\***
    - 3. Use with limited vision**
      - a. User needs the notification and input to be proximate, so they can see both within a magnified viewport \*\*RN\*\***
      - b. User needs a high-contrast notification, so they can distinguish the message \*\*RN\*\***
    4. Use without color perception
    - 5. Use with limited color perception**
      - a. User needs a high-contrast notification, so they can distinguish the message \*\*RN\*\***
    6. Use with limited depth perception
    7. Use with limited orientation or spatial tracking
    8. Use with photosensitivity (too much or too little)
  - Hearing & Auditory
    9. Use without hearing
    10. Use with limited hearing
    11. Use with limited auditory processing (speech)
    12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time)
  - Sensory Intersections
    13. Use without vision and hearing
    14. Use with vestibular issues
    15. Use without spatial auditory awareness or perception (needs diegetic sound)
- Functional Needs: Physical
  - Mobility
    16. Use without mobility
    17. Use with limited mobility
    18. Use with limited reach or range

- Motor
  - 19. Use without hands
  - 20. Use without multiple touchpoint gesture
  - 21. Use with limited strength
  - 22. Use without fine point control
  - 23. Use without physical tracking speed
  - 24. Use with tremors
- Physical & Sensory Intersections
  - 25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
  - 26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
  - 27. Use with chronic pain impacting input or interaction modality
- Speech
  - 28. Use without vocalization
  - 29. Use with limited vocalization or volume
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention
    - 31. Use with limited ability to direct attention**
      - a. User needs the notification and input to be proximate and visually associated, so they can follow the notification instructions to fix the error \*\*RN\*\***
    - 32. Use with limited ability to shift attention**
      - a. User needs the notification and input to be proximate and visually associated, so they can follow the notification instructions to fix the error \*\*RN\*\***
  - Language & Communication
    - 33. Use with limited ability to comprehend spoken language
    - 34. Use without ability to read**
      - a. User needs symbols in the notification and for the notification and input to be proximate and visually associated, so they can recognize there was an error and where there was an error \*\*RN\*\***
    - 35. Use with limited ability to recognize written language**
      - a. User needs symbols in the notification and for the notification and input to be proximate and visually associated, so they can recognize there was an error and where there was an error \*\*RN\*\***
    - 36. Use with limited ability to comprehend written language**
      - a. User needs symbols in the notification and for the notification and input to be proximate and visually associated, so they can recognize there was an error and where there was an error \*\*RN\*\***

- 37. Use without ability to write
- 38. Use with limited ability to correctly write (or type) words and use punctuation
- 39. Use without understanding symbols
- 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
- Learning
  - 41. Use with limited ability of math and numeric concepts
  - 42. Use with limited compositional skill (simultaneous thinking and input)
  - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)
- Memory
  - 44. Use with limited short-term or working memory
  - 45. Use with limited medium or long-term memory
  - 46. Use with limited sensory memory
- Executive
  - 47. Use with limited planning, organization, sequencing, and execution ability**
    - a. User needs the notification and input to be proximate and visually associated, so they can follow the notification instructions to fix the error \*\*RN\*\***
  - 48. Use with limited emotional control and self monitoring
  - 49. Use with limited judgement
- Mental Health
  - 50. Use with debilitating fear or anxiety
- Cognitive & Sensory Intersections
  - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
  - 52. Use with limited phonological or phonemic awareness
- Functional Needs: Independence
  - Independence
    - 53. Use without autonomy or agency
    - 54. Use without privacy

## 5. TO DO Error on form submit/Vague message

- User Action: User does not enter data in required inputs and/or enters incorrect data (e.g., incorrect format, password confirmation does not match) before submitting form
- System Response/Unintended Result: System displays a vague message (e.g., "Please enter login information," "There was an error," "You entered an incorrect login or password")
- User Response:
  - User does not know which input was in error
  - User completes inputs again and submits
- Severity: Significant (potentially Critical if error cycle repeats)



- **Scope: Correct errors**
  - **Error Message**
- Common User Needs:
  - TBC
- Functional Needs: Essential
  - Essential
    1. Use without physical harm or risk (to self or others within a physical environment)
- Functional Needs: Sensory
  - Vision & Visual
    2. Use without vision
    3. Use with limited vision
    4. Use without color perception
    5. Use with limited color perception
    6. Use with limited depth perception
    7. Use with limited orientation or spatial tracking
    8. Use with photosensitivity (too much or too little)
  - Hearing & Auditory
    9. Use without hearing
    10. Use with limited hearing
    11. Use with limited auditory processing (speech)
    12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time)
  - Sensory Intersections
    13. Use without vision and hearing
    14. Use with vestibular issues
    15. Use without spatial auditory awareness or perception (needs diegetic sound)
- Functional Needs: Physical
  - Mobility
    16. Use without mobility
    17. Use with limited mobility
    18. Use with limited reach or range
  - Motor
    19. Use without hands
    20. Use without multiple touchpoint gesture
    21. Use with limited strength
    22. Use without fine point control
    23. Use without physical tracking speed
    24. Use with tremors
  - Physical & Sensory Intersections
    25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)

- 26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
  - 27. Use with chronic pain impacting input or interaction modality
- Speech
  - 28. Use without vocalization
  - 29. Use with limited vocalization or volume
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention
    - 31. Use with limited ability to direct attention
    - 32. Use with limited ability to shift attention
  - Language & Communication
    - 33. Use with limited ability to comprehend spoken language
    - 34. Use without ability to read
    - 35. Use with limited ability to recognize written language
    - 36. Use with limited ability to comprehend written language
    - 37. Use without ability to write
    - 38. Use with limited ability to correctly write (or type) words and use punctuation
    - 39. Use without understanding symbols
    - 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
  - Learning
    - 41. Use with limited ability of math and numeric concepts
    - 42. Use with limited compositional skill (simultaneous thinking and input)
    - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)
  - Memory
    - 44. Use with limited short-term or working memory
    - 45. Use with limited medium or long-term memory
    - 46. Use with limited sensory memory
  - Executive
    - 47. Use with limited planning, organization, sequencing, and execution ability
    - 48. Use with limited emotional control and self monitoring
    - 49. Use with limited judgement
  - Mental Health
    - 50. Use with debilitating fear or anxiety
  - Cognitive & Sensory Intersections
    - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
    - 52. Use with limited phonological or phonemic awareness
- Functional Needs: Independence
  - Independence
    - 53. Use without autonomy or agency

## 6. TO-DO Error on form submit/Message not apparent

- User Action: User does not enter data in required inputs and/or enters incorrect data (e.g., incorrect format, password confirmation does not match) before submitting form
- System Response/Unintended Result: System displays the same page with an error message that is not apparent (e.g., not in viewport, not programmatically identified) when the page loads
- User Response:
  - User does not know there was an error
  - User searches the page for error message
  - User locates the error message
  - User completes inputs again and submits
- Severity: Minor (potentially Significant if message cannot be found)
- **Scope: Correct errors**
  - **Error Message**
- Common User Needs:
  - TBC
- Functional Needs: Essential
  - Essential
    1. Use without physical harm or risk (to self or others within a physical environment)
- Functional Needs: Sensory
  - Vision & Visual
    2. Use without vision
    3. Use with limited vision
    4. Use without color perception
    5. Use with limited color perception
    6. Use with limited depth perception
    7. Use with limited orientation or spatial tracking
    8. Use with photosensitivity (too much or too little)
  - Hearing & Auditory
    9. Use without hearing
    10. Use with limited hearing
    11. Use with limited auditory processing (speech)
    12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time)
  - Sensory Intersections
    13. Use without vision and hearing
    14. Use with vestibular issues
    15. Use without spatial auditory awareness or perception (needs diegetic sound)
- Functional Needs: Physical

- Mobility
  - 16. Use without mobility
  - 17. Use with limited mobility
  - 18. Use with limited reach or range
- Motor
  - 19. Use without hands
  - 20. Use without multiple touchpoint gesture
  - 21. Use with limited strength
  - 22. Use without fine point control
  - 23. Use without physical tracking speed
  - 24. Use with tremors
- Physical & Sensory Intersections
  - 25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
  - 26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
  - 27. Use with chronic pain impacting input or interaction modality
- Speech
  - 28. Use without vocalization
  - 29. Use with limited vocalization or volume
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention
    - 31. Use with limited ability to direct attention
    - 32. Use with limited ability to shift attention
  - Language & Communication
    - 33. Use with limited ability to comprehend spoken language
    - 34. Use without ability to read
    - 35. Use with limited ability to recognize written language
    - 36. Use with limited ability to comprehend written language
    - 37. Use without ability to write
    - 38. Use with limited ability to correctly write (or type) words and use punctuation
    - 39. Use without understanding symbols
    - 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
  - Learning
    - 41. Use with limited ability of math and numeric concepts
    - 42. Use with limited compositional skill (simultaneous thinking and input)
    - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)
  - Memory
    - 44. Use with limited short-term or working memory
    - 45. Use with limited medium or long-term memory

- 46. Use with limited sensory memory
- Executive
  - 47. Use with limited planning, organization, sequencing, and execution ability
  - 48. Use with limited emotional control and self monitoring
  - 49. Use with limited judgement
- Mental Health
  - 50. Use with debilitating fear or anxiety
- Cognitive & Sensory Intersections
  - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
  - 52. Use with limited phonological or phonemic awareness
- Functional Needs: Independence
  - Independence
    - 53. Use without autonomy or agency
    - 54. Use without privacy

## 7. TO BE COMPLETED Error on form submit/Message not associated

- User Action: User does not enter data in required inputs and/or enters incorrect data (e.g., incorrect format, password confirmation does not match) before submitting form
- System Response/Unintended Result: System displays the same page with a message at the top of the page listing multiple errors that are not associated (e.g., not proximate, not linked, not programmatically associated) with the inputs in error
- User Response:
  - User does not readily know which inputs are in error
  - User searches the page for the inputs in error
  - User completes inputs again and submits form
- Severity: Minor (potentially Significant if message cannot be found)
- **Scope: Correct errors**
  - **Error Message**
- Common User Needs:
  - User needs to know they are on the same page, so they know where they are
  - User needs to know there was an error, so they know why they are stuck
  - User needs to know which fields are in error, so they can correct the field entry
  - User needs to know the nature of the error and the requirements to fix it, so they can correct the field entry
  - User needs to know the field requirements, so they can enter the correct data
- Functional Needs: Essential
  - Essential
    - 1. Use without physical harm or risk (to self or others within a physical environment) **\*\*NA\*\***
- Functional Needs: Sensory
  - Vision & Visual
    - 2. Use without vision

- a. User needs field format requirements to be associated with inputs, so they know the format requirements and can follow them when entering data **\*\*RN\*\***
  - b. User needs notifications that are announced when the page reloads, so they know there was an error **\*\*RN\*\***
  - c. User needs an accessible notification, so they can access the notification with a screen reader **\*\*RN\*\***
  - d. User needs errors that are programmatically associated with inputs, so they can readily find and address the errors **\*\*RN\*\***
  - e. User needs errors that are linked to inputs, so they can readily move focus to invalid inputs and correct them **\*\*RN\*\***
  - f. User needs invalid inputs to be programmatically identified, so they know which inputs are invalid **\*\*RN\*\***
- 3. Use with limited vision
  - a. User needs a visible notification, so they can see the notification within a magnified viewport **\*\*RN\*\***
  - b. User needs a high-contrast notification, so they can distinguish the message text **\*\*RN\*\***
  - c. User needs inputs with errors to be visually identified, so they know which inputs are in error **\*\*RN\*\***
- 4. Use without color perception
  - a. User needs notification and input indicators that are identifiable without color, so they can distinguish the notification and inputs in error **\*\*RN\*\***
- 5. Use with limited color perception
  - a. User needs a high-contrast notification, so they can distinguish the message text **\*\*RN\*\***
- 6. Use with limited depth perception **\*\*NA\*\***
- 7. Use with limited orientation or spatial tracking **\*\*NA\*\***
- 8. Use with photosensitivity (too much or too little) **\*\*NA\*\***
- Hearing & Auditory
  - 9. Use without hearing **\*\*NA\*\***
  - 10. Use with limited hearing **\*\*NA\*\***
  - 11. Use with limited auditory processing (speech) **\*\*NA\*\***
  - 12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time) **\*\*NA\*\***
- Sensory Intersections
  - 13. Use without vision and hearing
    - a. User needs field format requirements to be associated with inputs, so they know the format requirements and can follow them when entering data **\*\*RN\*\***
    - b. User needs notifications that are focused when the page reloads, so they know there was an error **\*\*RN\*\***

- c. User needs an accessible notification, so they can access the notification with a screen reader and Braille device **\*\*RN\*\***
- d. User needs errors that are programmatically associated with inputs, so they can readily find and address the errors **\*\*RN\*\***
- e. User needs errors that are linked to inputs, so they can readily move focus to invalid inputs and correct them **\*\*RN\*\***
- f. User needs invalid inputs to be programmatically identified, so they know which inputs are invalid **\*\*RN\*\***

14. Use with vestibular issues **\*\*NA\*\***

15. Use without spatial auditory awareness or perception (needs diegetic sound) **\*\*NA\*\***

- Functional Needs: Physical

- **Mobility**

- 16. Use without mobility

- a. User needs notifications that are focused when the page reloads, so they know there was an error **\*\*RN\*\***
- b. User needs errors that are linked to inputs, so they can readily move focus to invalid inputs and correct them **\*\*RN\*\***

- 17. Use with limited mobility

- a. User needs notifications that are focused when the page reloads, so they know there was an error **\*\*RN\*\***
- b. User needs errors that are linked to inputs, so they can readily move focus to invalid inputs and correct them **\*\*RN\*\***

- 18. Use with limited reach or range

- a. User needs notifications that are focused when the page reloads, so they know there was an error **\*\*RN\*\***
- b. User needs errors that are linked to inputs, so they can readily move focus to invalid inputs and correct them **\*\*RN\*\***

- Motor

- 19. Use without hands

- a. User needs notifications that are focused when the page reloads, so they know there was an error **\*\*RN\*\***
- b. User needs errors that are linked to inputs, so they can readily move focus to invalid inputs and correct them **\*\*RN\*\***

20. Use without multiple touchpoint gesture **\*\*NA\*\***

21. Use with limited strength

- a. User needs notifications that are focused when the page reloads, so they know there was an error **\*\*RN\*\***
- b. User needs errors that are linked to inputs, so they can readily move focus to invalid inputs and correct them **\*\*RN\*\***

22. Use without fine point control **\*\*NA\*\***

23. Use without physical tracking speed **\*\*NA\*\***

24. Use with tremors

- a. User needs notifications that are focused when the page reloads, so they know there was an error **\*\*RN\*\***
    - b. User needs errors that are linked to inputs, so they can readily move focus to invalid inputs and correct them **\*\*RN\*\***
  - Physical & Sensory Intersections
    - 25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
    - 26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
    - 27. Use with chronic pain impacting input or interaction modality
      - a. User needs notifications that are focused when the page reloads, so they know there was an error **\*\*RN\*\***
      - b. User needs errors that are linked to inputs, so they can readily move focus to invalid inputs and correct them **\*\*RN\*\***
  - Speech
    - 28. Use without vocalization **\*\*NA\*\***
    - 29. Use with limited vocalization or volume **\*\*NA\*\***
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention
      - a. User needs inputs with errors to be visually identified, so they know which inputs are in error **\*\*RN\*\***
      - b. User needs clear instructions on how to correct errors to display near the inputs in error, so they can focus on the task at hand
    - 31. Use with limited ability to direct attention
      - a. User needs inputs with errors to be visually identified, so they know which inputs are in error **\*\*RN\*\***
      - b. User needs clear instructions on how to correct errors to display near the inputs in error, so they can focus on the task at hand
    - 32. Use with limited ability to shift attention
      - a. User needs inputs with errors to be visually identified, so they know which inputs are in error **\*\*RN\*\***
      - b. User needs clear instructions on how to correct errors to display near the inputs in error, so they can focus on the task at hand
  - Language & Communication
    - 33. Use with limited ability to comprehend spoken language **\*\*NA\*\***
    - 34. Use without ability to read
    - 35. Use with limited ability to recognize written language
    - 36. Use with limited ability to comprehend written language
    - 37. Use without ability to write



- 38. Use with limited ability to correctly write (or type) words and use punctuation
- 39. Use without understanding symbols
- 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
- Learning
  - 41. Use with limited ability of math and numeric concepts
  - 42. Use with limited compositional skill (simultaneous thinking and input)
  - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)
- Memory
  - 44. Use with limited short-term or working memory
  - 45. Use with limited medium or long-term memory
  - 46. Use with limited sensory memory
- Executive
  - 47. Use with limited planning, organization, sequencing, and execution ability
  - 48. Use with limited emotional control and self monitoring
  - 49. Use with limited judgement
- Mental Health
  - 50. Use with debilitating fear or anxiety
- Cognitive & Sensory Intersections
  - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
  - 52. Use with limited phonological or phonemic awareness
- Functional Needs: Independence
  - Independence
    - 53. Use without autonomy or agency
    - 54. Use without privacy

## 8. TO REVIEW Error on form submit/Data not preserved

- User Action: User does not enter data in required inputs and/or enters incorrect data (e.g., incorrect format, password confirmation does not match) before submitting form
- System Response/Unintended Result: System displays the same page with an error message and the blank form to be filled in again
- User Response:
  - User completes inputs again and submits
- Severity: Significant (potentially Critical if error cycle repeats)
- **Scope: Correct errors**
  - **Error Message**
  - **Data Capture**
- Common User Needs:
  - Users need to be able to control and manage the amount of time they have to spend to complete the form.

- Wherever possible, users need to be able to avoid entering information over and over
- Users need to know why they are being presented with this form again
- Wherever possible, users need to be able to avoid pressing submit when the form is not ready to be submitted
- Wherever possible, users need to be able to avoid having to re-orient themselves to the page
- Functional Needs: Essential
  - Essential
    1. Use without physical harm or risk (to self or others within a physical environment)
- Functional Needs: Sensory
  - Vision & Visual
    2. Use without vision
      - a. **User needs to be able to quickly understand if they have been presented with a blank form again, so that they fill in all fields and not just the fields listed in the error. (to avoid being stuck in a loop) \*\*RN\*\***
    3. Use with limited vision
      - a. **User may need some way to move the viewport to the error message, so that they are not present with just the blank corner of the page, in a magnifier without speech. (Some magnifiers will move to the corner of the HTML element that has a role of alert, with some settings, but can we count on this? And even with that feature, the corner of an error message can be blank.) \*\*RN\*\***
    4. Use without color perception
    5. Use with limited color perception
    6. Use with limited depth perception
    7. Use with limited orientation or spatial tracking
      - a. **User needs some mechanism to help find all of the fields, so that they do not have to scroll left and right and up and down trying to track what portions of the space they have and have not already reviewed. \*\*RN\*\***
    8. Use with photosensitivity (too much or too little)
  - Hearing & Auditory
    9. Use without hearing
    10. Use with limited hearing
    11. Use with limited auditory processing (speech)
    12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time)
  - Sensory Intersections
    13. Use without vision and hearing

- a. **The user will need any status or alert messages to be persistent on the page so that they can find and read the full message on a Braille Display. (Status messages appear for a short time on Braille displays and then disappear. The user then has to search to find the message on screen. In the case of a new form with an error at the top, placing focus on the error might be helpful for these users.) \*\*RN\*\***
  - 14. Use with vestibular issues
    - a. **The user may need the tasks for completing the form to be broken down into smaller actions, so that they can complete each task with the opportunity allows, and can avoid scrolling.\*\*RN\*\***
  - 15. Use without spatial auditory awareness or perception (needs diegetic sound)
- Functional Needs: Physical
  - Mobility
    - 16. Use without mobility
    - 17. Use with limited mobility
    - 18. Use with limited reach or range
  - Motor
    - 19. Use without hands
    - 20. Use without multiple touchpoint gesture
    - 21. Use with limited strength
    - 22. Use without fine point control
    - 23. Use without physical tracking speed
    - 24. Use with tremors
  - Physical & Sensory Intersections
    - 25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
    - 26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
    - 27. Use with chronic pain impacting input or interaction modality
  - Speech
    - 28. Use without vocalization
    - 29. Use with limited vocalization or volume
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention
    - 31. Use with limited ability to direct attention
      - a. **User may need to be given a sense of progress, so that they do not give up on the activity. For example, let's say they were signing up for an exercise club, but were reticent about this step to invest in themselves and improve their lives, a**

**blank form or a form that looks like a completely new form could stop this step from being taken. \*\*RN\*\***

- 32. Use with limited ability to shift attention
- Language & Communication -
  - 33. Use with limited ability to comprehend spoken language
    - a. **User may need to have only the fields in need of being completed appear in the new form, so that they don't need to follow the language in an error message. \*\*RN\*\***
  - 34. Use without ability to read
  - 35. Use with limited ability to recognize written language
  - 36. Use with limited ability to comprehend written language
    - a. **User needs the structure of the form itself to convey what needs to be done, rather than language conveying what needs to be done. \*\*RN\*\***
  - 37. Use without ability to write
    - a. **User needs to avoid refilling the form, and possibly having to wait for help from an assistant, again \*\*RN\*\***
  - 38. Use with limited ability to correctly write (or type) words and use punctuation
    - a. **User will benefit if spell checking and grammar checking from the user agent is not blocked, so that they can get that assistance completing the form \*\*RN\*\***
  - 39. Use without understanding symbols
  - 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
- Learning
  - 41. Use with limited ability of math and numeric concepts
    - a. **The user needs an error message that does not rely numbers, so that they do not have to keep a number in mind and count they work. Instructions like "For each diner, choose 3 side dishes." could be enhanced with messages that focus more on status and are provided step-by-step such as, "Choose another side dish for Ben" \*\*RN\*\***
  - 42. Use with limited compositional skill (simultaneous thinking and input)
    - a. **User may need direct and granular error messages about the specific field they are on, rather than one message about the form in overview, so that they can move through the form focusing on understanding and input for each field separately. \*\*RN\*\***
  - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)
- Memory
  - 44. Use with limited short-term or working memory

- a. (When the new (refreshed) form appears, they may not remember which form this is, or why they were filling it out. At the same time, the fact that they submitted a form to order dinner might be something that was committed to medium-term memory. They may expect dinner to arrive. ) The user needs whatever portion of the form that re-appears to be clearly labeled, for an overview error message and other visual clues about the task to be present, and for their current step in the process to be clearly conveyed. **\*\*RN\*\***
  - i. For example: **\*\*RN\*\***
    1. The branding / banner for the original site should be present.
    2. “Your dinner order at Acme Restaurant has **not** been placed.”
    3. To complete your order:
      - a. fill in your CVV code (info about this)
      - b. press submit
45. Use with limited medium or long-term memory
46. Use with limited sensory memory
- Executive
  47. Use with limited planning, organization, sequencing, and execution ability
  48. Use with limited emotional control and self monitoring
  49. Use with limited judgement
- Mental Health
  50. Use with debilitating fear or anxiety
- Cognitive & Sensory Intersections
  51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
  52. Use with limited phonological or phonemic awareness
- Functional Needs: Independence
  - Independence
    53. Use without autonomy or agency
    54. Use without privacy
      - a. The user needs the ability to show and hide different portions of the form, so that they can limit as much as possible how much of the form needs to be shared with an assistant. (The user might need help to complete the fields that were not filled in correctly, but might not want to share the full form with a helper. For example, they may have successfully completed the portions of the form with their bank information, but might want help with just those portions of the form that are in error, without also showing the bank info.) **\*\*RN\*\***

## 9. TO BE COMPLETED Network error/Page not updating

- User Action: User turns off wifi or internet connection to the device
- System Response/Unintended Result: System displays the same page from memory
- User Response:
  - User does not readily know that the page is not updating
  - User may require re-entering data for a form or re-starting an online course
- Severity: Significant (potentially Critical if error cycle repeats or if data or progress is lost)
- Scope: TBC
  - TBC
- Common User Needs:
  - To know and understand the status of their network connection and type
  - To be able to reconnect to a network
  - To be able to resume activity
  - To know and understand the status of timed events; session time; and expiry
  - To know and understand the status of page content
  - To know and understand the status of input selections
  - To know and understand the status of input data
  - To not be required to re-enter data
  - To predict and understand the result or potential result of refreshing the browser
  - To not have missed time based opportunities due to network interruption
  - To have the option to work offline when applicable
  - To know and understand how offline option(s) work

### ● Functional Needs: Essential

#### ○ Essential

1. Use without physical harm or risk (to self or others within a physical environment)

### ● Functional Needs: Sensory

#### ○ Vision & Visual

2. Use without vision
3. Use with limited vision
4. Use without color perception
5. Use with limited color perception
6. Use with limited depth perception
7. Use with limited orientation or spatial tracking
8. Use with photosensitivity (too much or too little)

#### ● Hearing & Auditory

9. Use without hearing
10. Use with limited hearing
11. Use with limited auditory processing (speech)

- 12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time)
- Sensory Intersections
  - 13. Use without vision and hearing
  - 14. Use with vestibular issues
  - 15. Use without spatial auditory awareness or perception (needs diegetic sound)
- Functional Needs: Physical
  - Mobility
    - 16. Use without mobility
    - 17. Use with limited mobility
    - 18. Use with limited reach or range
  - Motor
    - 19. Use without hands
    - 20. Use without multiple touchpoint gesture
    - 21. Use with limited strength
    - 22. Use without fine point control
    - 23. Use without physical tracking speed
    - 24. Use with tremors
  - Physical & Sensory Intersections
    - 25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
    - 26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
    - 27. Use with chronic pain impacting input or interaction modality
  - Speech
    - 28. Use without vocalization
    - 29. Use with limited vocalization or volume
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention
    - 31. Use with limited ability to direct attention
    - 32. Use with limited ability to shift attention
  - Language & Communication
    - 33. Use with limited ability to comprehend spoken language
    - 34. Use without ability to read
    - 35. Use with limited ability to recognize written language
    - 36. Use with limited ability to comprehend written language
    - 37. Use without ability to write
    - 38. Use with limited ability to correctly write (or type) words and use punctuation
    - 39. Use without understanding symbols
    - 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location

- Learning
  - 41. Use with limited ability of math and numeric concepts
  - 42. Use with limited compositional skill (simultaneous thinking and input)
  - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)
- Memory
  - 44. Use with limited short-term or working memory
  - 45. Use with limited medium or long-term memory
  - 46. Use with limited sensory memory
- Executive
  - 47. Use with limited planning, organization, sequencing, and execution ability
  - 48. Use with limited emotional control and self monitoring
  - 49. Use with limited judgement
- Mental Health
  - 50. Use with debilitating fear or anxiety
- Cognitive & Sensory Intersections
  - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
  - 52. Use with limited phonological or phonemic awareness
- Functional Needs: Independence
  - Independence
    - 53. Use without autonomy or agency
    - 54. Use without privacy

## Applicable Web Methods

Online State: [§7.11 Offline Web Applications — Browser State](#)

Connection Type and Speed: [Network Information API](#)

Offline Mode: [Service Workers](#)

User Idle: [Idle Detection API](#)

Web Storage: [§12 Web Storage](#); [Storage API](#)

## 10. TO BE COMPLETED Network error/No system message

- User Action: User turns off wifi or internet connection to the device
- System Response/Unintended Result: System displays blank page with no error message
- User Response:
  - User searches the page for error message and for input in error
  - User verifies connectivity and attempts to reload the page
  - User may require re-entering data for a form or re-starting an online course
- Severity: Significant (potentially Critical if error cycle repeats or if data or progress is lost)
- Scope: TBC
  - TBC



- Common User Needs:
  - To know and understand the status of page content
  - To know and understand the status of their network connection and type
  - To know and understand the relationship between network connection and page content
  - To be able to reconnect to a network
  - To know when the status of page content changes
  - To be informed of any resulting error and any loss of data
  - To be able to resume activity

- Functional Needs: Essential

- Essential

1. Use without physical harm or risk (to self or others within a physical environment)

- Functional Needs: Sensory

- Vision & Visual

2. Use without vision
3. Use with limited vision
4. Use without color perception
5. Use with limited color perception
6. Use with limited depth perception
7. Use with limited orientation or spatial tracking
8. Use with photosensitivity (too much or too little)

- Hearing & Auditory

9. Use without hearing
10. Use with limited hearing
11. Use with limited auditory processing (speech)
12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time)

- Sensory Intersections

13. Use without vision and hearing
14. Use with vestibular issues
15. Use without spatial auditory awareness or perception (needs diegetic sound)

- Functional Needs: Physical

- Mobility

16. Use without mobility
17. Use with limited mobility
18. Use with limited reach or range

- Motor

19. Use without hands

- 20. Use without multiple touchpoint gesture
- 21. Use with limited strength
- 22. Use without fine point control
- 23. Use without physical tracking speed
- 24. Use with tremors
- Physical & Sensory Intersections
  - 25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
  - 26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
  - 27. Use with chronic pain impacting input or interaction modality
- Speech
  - 28. Use without vocalization
  - 29. Use with limited vocalization or volume
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention
    - 31. Use with limited ability to direct attention
    - 32. Use with limited ability to shift attention
  - Language & Communication
    - 33. Use with limited ability to comprehend spoken language
    - 34. Use without ability to read
    - 35. Use with limited ability to recognize written language
    - 36. Use with limited ability to comprehend written language
    - 37. Use without ability to write
    - 38. Use with limited ability to correctly write (or type) words and use punctuation
    - 39. Use without understanding symbols
    - 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
  - Learning
    - 41. Use with limited ability of math and numeric concepts
    - 42. Use with limited compositional skill (simultaneous thinking and input)
    - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)
  - Memory
    - 44. Use with limited short-term or working memory
    - 45. Use with limited medium or long-term memory
    - 46. Use with limited sensory memory
  - Executive
    - 47. Use with limited planning, organization, sequencing, and execution ability
    - 48. Use with limited emotional control and self monitoring
    - 49. Use with limited judgement
  - Mental Health

- 50. Use with debilitating fear or anxiety
- Cognitive & Sensory Intersections
  - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
  - 52. Use with limited phonological or phonemic awareness
- Functional Needs: Independence
  - Independence
    - 53. Use without autonomy or agency
    - 54. Use without privacy

## 11. TO BE COMPLETED Network error/Vague error message

- User Action: User turns off wifi or internet connection to the device
- System Response/Unintended Result: System displays blank page with a 404 or other error message instead of missing internet connection
- User Response:
  - User searches the page for error message and for input in error
  - User goes to a different website/ browser to isolate issue to website or browser
  - User verifies connectivity and attempts to reload the page
  - User may require re-entering data for a form or re-starting an online course
- Severity: Significant (potentially Critical if error cycle repeats or if data or progress is lost)
- Scope: TBC
  - TBC
- Common User Needs:
  - To know and understand that an error has occurred
  - To know and understand the causality and actor (system or user)
  - To know and understand the impact of error
  - To be provided specific option(s) to remedy
  - To have clear feedback on result of remedy

- Functional Needs: Essential
  - Essential
    - 1. Use without physical harm or risk (to self or others within a physical environment)
- Functional Needs: Sensory
  - Vision & Visual
    - 2. Use without vision
    - 3. Use with limited vision
    - 4. Use without color perception
    - 5. Use with limited color perception

- 6. Use with limited depth perception
  - 7. Use with limited orientation or spatial tracking
  - 8. Use with photosensitivity (too much or too little)
- Hearing & Auditory
  - 9. Use without hearing
  - 10. Use with limited hearing
  - 11. Use with limited auditory processing (speech)
  - 12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time)
- Sensory Intersections
  - 13. Use without vision and hearing
  - 14. Use with vestibular issues
  - 15. Use without spatial auditory awareness or perception (needs diegetic sound)
- Functional Needs: Physical
  - Mobility
    - 16. Use without mobility
    - 17. Use with limited mobility
    - 18. Use with limited reach or range
  - Motor
    - 19. Use without hands
    - 20. Use without multiple touchpoint gesture
    - 21. Use with limited strength
    - 22. Use without fine point control
    - 23. Use without physical tracking speed
    - 24. Use with tremors
  - Physical & Sensory Intersections
    - 25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
    - 26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
    - 27. Use with chronic pain impacting input or interaction modality
  - Speech
    - 28. Use without vocalization
    - 29. Use with limited vocalization or volume
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention
    - 31. Use with limited ability to direct attention
    - 32. Use with limited ability to shift attention
  - Language & Communication
    - 33. Use with limited ability to comprehend spoken language
    - 34. Use without ability to read
    - 35. Use with limited ability to recognize written language

- 36. Use with limited ability to comprehend written language
- 37. Use without ability to write
- 38. Use with limited ability to correctly write (or type) words and use punctuation
- 39. Use without understanding symbols
- 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
- Learning
  - 41. Use with limited ability of math and numeric concepts
  - 42. Use with limited compositional skill (simultaneous thinking and input)
  - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)
- Memory
  - 44. Use with limited short-term or working memory
  - 45. Use with limited medium or long-term memory
  - 46. Use with limited sensory memory
- Executive
  - 47. Use with limited planning, organization, sequencing, and execution ability
  - 48. Use with limited emotional control and self monitoring
  - 49. Use with limited judgement
- Mental Health
  - 50. Use with debilitating fear or anxiety
- Cognitive & Sensory Intersections
  - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
  - 52. Use with limited phonological or phonemic awareness
- Functional Needs: Independence
  - Independence
    - 53. Use without autonomy or agency
    - 54. Use without privacy

## 12. TO BE COMPLETED Visual CAPTCHA error on submit/No system message

- User Action: User attempts visual challenge, answers incorrectly, and submits
- System Response/Unintended Result: System displays an another visual challenge (or error message after a certain number of tries)
- User Response:
  - User tries another visual challenge
  - User attempts the audio challenge instead
  - User must re-enter data (form) if step in process/task (e.g., user must restart online course or exam)
  - User must find alternate method to complete process/task (i.e., purchase (e-commerce))

- Severity: Significant (potentially Critical if error cycle repeats or if data or progress is lost or if user is blocked)
- **Scope: Correct Errors**
  - **Error Message**
  - **Alternative Approach**
- Common User Needs:
  - User needs a notification that their responses were incorrect, so they know what happened
  - User needs guidance on how to be successful and avoid frustration, so they can be successful on the next try
  - User needs an alternative approach to prove they are human, so they have other options if they can't make CAPTCHA work
  - User needs their data to be retained to reduce the need for repeating data entry, so they don't have to enter the data again
  - User needs the option to try multiple times before they are blocked, so they can keep trying
  - User needs smarter system to verify humanness, so they have a method that isn't as difficult
  - User needs CAPTCHA images to be clearly defined and have clear boundaries, so they can correctly select images
- Functional Needs: Essential
  - Essential
    1. Use without physical harm or risk (to self or others within a physical environment)
- Functional Needs: Sensory
  - Vision & Visual
    - 2. Use without vision**
      - a. User need an alternative method, so they have another way to validate their humanness \*\*RN\*\***
    - 3. Use with limited vision**
      - a. User needs a visible notification, so they can see the notification within a magnified viewport \*\*RN\*\***
      - b. User needs a high-contrast notification, so they can distinguish the message text \*\*RN\*\***
      - c. User needs an alternative to visual CAPTCHA so they have another approach to validate their humanness.\*\*RN\*\***
      - d. User needs clearly defined boundaries pertaining to each image in the grid that is framed as not to spill into other grid areas so that the User makes the right selection. \*\*RN\*\***
    - 4. Use without color perception**
      - a. User needs a notification that is distinguishable without color so they can recognize the notification. \*\*RN\*\***

- b. User needs an alternative to visual CAPTCHA so they have another approach to validate their humanness. **\*\*RN\*\***
    - 5. Use with limited color perception
      - a. User needs a high-contrast notification, so they can distinguish the message text **\*\*RN\*\***
      - b. User needs an alternative to visual CAPTCHA so they have another approach to validate their humanness. **\*\*RN\*\***
    - 6. Use with limited depth perception
      - a. User needs a clear picture to focus on when attempting to correctly mark off boxes pertaining to CAPTCHA challenge (cognitive overload?) (e.g.: grainy photos, “busy” photos, photos with small, hidden amounts of ‘crosswalk’ for example). **\*\*RN\*\***
    - 7. Use with limited orientation or spatial tracking **\*\*NA\*\***
    - 8. Use with photosensitivity (too much or too little) **\*\*NA\*\***
  - Hearing & Auditory
    - 9. Use without hearing **\*\*NA\*\***
    - 10. Use with limited hearing **\*\*NA\*\***
    - 11. Use with limited auditory processing (speech) **\*\*NA\*\***
    - 12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time) **\*\*NA\*\***
  - Sensory Intersections
    - 13. Use without vision and hearing
      - a. User needs an alternative to visual CAPTCHA so they have another approach to validate their humanness. **\*\*RN\*\***
      - b. User needs an alternative to audio CAPTCHA so they have another approach to validate their humanness. **\*\*RN\*\***
    - 14. Use with vestibular issues
      - a. User needs an alternative to visual CAPTCHA so they have another approach to validate their humanness. **\*\*RN\*\***
    - 15. Use without spatial auditory awareness or perception (needs diegetic sound) **\*\*NA\*\***
  - Functional Needs: Physical
    - Mobility
      - 16. Use without mobility
        - a. User needs CAPTCHA to be keyboard operable so they can successfully complete the CAPTCHA using something other than a pointing device(such as keyboard or joystick) **\*\*RN\*\***
      - 17. Use with limited mobility
        - a. User needs CAPTCHA to be keyboard operable so they can successfully complete the CAPTCHA using something other than a pointing device(such as keyboard or joystick) **\*\*RN\*\***
      - 18. Use with limited reach or range

- a. User needs CAPTCHA to be keyboard operable so they can successfully complete the CAPTCHA using something other than a pointing device(such as keyboard or joystick) **\*\*RN\*\***
- Motor
  - 19. Use without hands
    - a. User needs CAPTCHA to be keyboard operable so they can successfully complete the CAPTCHA using something other than a pointing device(such as keyboard or joystick) **\*\*RN\*\***
  - 20. Use without multiple touchpoint gesture
    - a. User needs CAPTCHA to be keyboard operable so they can successfully complete the CAPTCHA using something other than a pointing device(such as keyboard or joystick) **\*\*RN\*\***
  - 21. Use with limited strength
    - a. User needs CAPTCHA to be keyboard operable so they can successfully complete the CAPTCHA using something other than a pointing device(such as keyboard or joystick) **\*\*RN\*\***
  - 22. Use without fine point control
    - a. User needs CAPTCHA to be keyboard operable so they can successfully complete the CAPTCHA using something other than a pointing device(such as keyboard or joystick) **\*\*RN\*\***
  - 23. Use without physical tracking speed
    - a. User needs CAPTCHA to be keyboard operable so they can successfully complete the CAPTCHA using something other than a pointing device(such as keyboard or joystick) **\*\*RN\*\***
    - b.
  - 24. Use with tremors
    - a. User needs CAPTCHA to be keyboard operable so they can successfully complete the CAPTCHA using something other than a pointing device(such as keyboard or joystick) **\*\*RN\*\***
- Physical & Sensory Intersections
  - 25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
  - 26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
  - 27. Use with chronic pain impacting input or interaction modality
    - a. User needs CAPTCHA to be keyboard operable so they can successfully complete the CAPTCHA using something other than a pointing device(such as keyboard or joystick) **\*\*RN\*\***
- Speech
  - 28. Use without vocalization **\*\*NA\*\***
  - 29. Use with limited vocalization or volume **\*\*NA\*\***
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention



- a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
  - 31. Use with limited ability to direct attention
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
  - 32. Use with limited ability to shift attention
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
- Language & Communication
  - 33. Use with limited ability to comprehend spoken language **\*\*NA\*\***
  - 34. Use without ability to read
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
  - 35. Use with limited ability to recognize written language
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
  - 36. Use with limited ability to comprehend written language
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
  - 37. Use without ability to write **\*\*NA\*\***
  - 38. Use with limited ability to correctly write (or type) words and use punctuation **\*\*NA\*\***
  - 39. Use without understanding symbols **\*\*NA\*\***
  - 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
- Learning
  - 41. Use with limited ability of math and numeric concepts **\*\*NA\*\***
  - 42. Use with limited compositional skill (simultaneous thinking and input) **\*\*NA\*\***
  - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social) **\*\*NA\*\***
- Memory
  - 44. Use with limited short-term or working memory
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
  - 45. Use with limited medium or long-term memory
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
  - 46. Use with limited sensory memory
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
- Executive

- 47. Use with limited planning, organization, sequencing, and execution ability
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
  - 48. Use with limited emotional control and self monitoring
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
  - 49. Use with limited judgement
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
- Mental Health
  - 50. Use with debilitating fear or anxiety
    - a. User needs an alternative to visual CAPTCHA so they have another approach to validate their humanness. **\*\*RN\*\***
- Cognitive & Sensory Intersections
  - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
    - a. User needs an alternative to visual CAPTCHA so they have another approach to validate their humanness. **\*\*RN\*\***
  - 52. Use with limited phonological or phonemic awareness **\*\*NA\*\***
- Functional Needs: Independence
  - Independence
    - 53. Use without autonomy or agency **\*\*NA\*\***
    - 54. Use without privacy **\*\*NA\*\***

### 13. TO REVIEW Audio CAPTCHA error on input/No system message

- User Action: User attempts audio challenge and answers incorrectly
- System Response/Unintended Result: System displays an alternative challenge (or error message after a certain number of tries)
- User Response:
  - User tries another audio challenge
  - User attempts the visual challenge instead
  - User must re-enter data (form) if CAPTCHA is a step in process/task (e.g., user must restart online course or exam)
  - User must find alternate method to complete process/task (i.e., purchase (e-commerce))
- Severity: Significant (potentially Critical if error cycle repeats or if data or progress is lost or if user is blocked)
- Scope: Correct Errors
  - Error Message
  - Alternative Approaches

- Common User Needs:
  - User needs a notification that their responses were incorrect, so they know what happened
  - User needs guidance on how to be successful and avoid frustration, so they can be successful on the next try
  - User needs an alternative approach to prove they are human, so they have other options if they can't make CAPTCHA work
  - User needs their data to be retained to reduce the need for repeating data entry, so they don't have to enter the data again
  - User needs the option to try multiple times before they are blocked, so they can keep trying
  - User needs smarter system to verify humanness, so they have a method that isn't as difficult
  - User needs options to control volume of audio, so they can adjust the volume to make it more decipherable
  - User needs to be able to comprehend what is spoken, so they can transcribe it accurately
- Functional Needs: Essential
  - Essential
    1. Use without physical harm or risk (to self or others within a physical environment)
- Functional Needs: Sensory
  - Vision & Visual
    2. Use without vision **\*\*NA\*\***
    3. Use with limited vision **\*NA\*\***
    4. Use without color perception **\*NA\*\***
    5. Use with limited color perception **\*NA\*\***
    6. Use with limited depth perception **\*\*NA\*\***
    7. Use with limited orientation or spatial tracking **\*\*NA\*\***
    8. Use with photosensitivity (too much or too little) **\*\*NA\*\***
  - Hearing & Auditory
    9. **Use without hearing**
      - a. **User needs an alternative method, so they have another way to input data **\*\*RN\*\*****
      - b. **User needs notification to be associated with the input in error, so they can readily access the correct input to fix the error instead of all errors at the end **\*\*RN\*\*****
    10. **Use with limited hearing**
      - a. **User needs an alternative method, so they have another way to validate their humanness **\*\*RN\*\*****
    11. Use with limited auditory processing (speech)
      - a. **User needs an alternative method, so they have another way to validate their humanness **\*\*RN\*\*****

12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time)
  - a. **User needs an alternative method, so they have another way to validate their humanness \*\*RN\*\***
  - b. **User needs adjustable pitch and volume, so they can hear within limitations \*\*RN\*\***
- Sensory Intersections
  13. Use without vision and hearing
    - a. **User needs an alternative to visual CAPTCHA so they have another approach to validate their humanness.\*\*RN\*\***
    - b. **User needs an alternative to audio CAPTCHA so they have another approach to validate their humanness.\*\*RN\*\***
  14. Use with vestibular issues
    - a. **User needs an alternative to audio CAPTCHA so they have another approach to validate their humanness.\*\*RN\*\***
  15. Use without spatial auditory awareness or perception (needs diegetic sound)
    - a. **User needs an alternative to audio CAPTCHA so they have another approach to validate their humanness.\*\*RN\*\***
- Functional Needs: Physical
  - Mobility
    16. Use without mobility
      - a. **User needs CAPTCHA to be keyboard operable so they can successfully complete the CAPTCHA using something other than a pointing device(such as keyboard or joystick) \*\*RN\*\***
    17. Use with limited mobility
      - a. **User needs CAPTCHA to be keyboard operable so they can successfully complete the CAPTCHA using something other than a pointing device(such as keyboard or joystick) \*\*RN\*\***
    18. Use with limited reach or range
      - a. **User needs CAPTCHA to be keyboard operable so they can successfully complete the CAPTCHA using something other than a pointing device(such as keyboard or joystick) \*\*RN\*\***
  - Motor
    - **User needs CAPTCHA to be keyboard operable so they can successfully complete the CAPTCHA using something other than a pointing device(such as keyboard or joystick) \*\*RN\*\***
    19. Use without hands
    20. Use without multiple touchpoint gesture
    21. Use with limited strength
    22. Use without fine point control
    23. Use without physical tracking speed
    24. Use with tremors
- Physical & Sensory Intersections

- **User needs CAPTCHA to be keyboard operable so they can successfully complete the CAPTCHA using something other than a pointing device(such as keyboard or joystick) \*\*RN\*\***
- **User needs CAPTCHA to be operable by voice so they can successfully complete the CAPTCHA using something other than a pointing device(such as keyboard or joystick) \*\*RN\*\***
  - 25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
  - 26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
  - 27. Use with chronic pain impacting input or interaction modality
- **Speech**
  - 28. Use without vocalization \*\*NA\*\*
  - 29. Use with limited vocalization or volume \*\*NA\*\*
- **Functional Needs: Cognitive**
  - **Attention**
    - 30. Use with limited ability to focus attention
      - a. **User needs clear instructions via text and non-text means, so they can take measures to resolve the error. \*\*RN\*\***
    - 31. Use with limited ability to direct attention
      - a. **User needs clear instructions via text and non-text means, so they can take measures to resolve the error. \*\*RN\*\***
    - 32. Use with limited ability to shift attention
      - a. **User needs clear instructions via text and non-text means, so they can take measures to resolve the error. \*\*RN\*\***
  - **Language & Communication**
    - 33. Use with limited ability to comprehend spoken language \*\*NA\*\*
      - a. **User needs clear instructions via text, so they can take measures to resolve the error. \*\*RN\*\***
    - 34. Use without ability to read
      - a. **User needs clear instructions via text and non-text means, so they can take measures to resolve the error. \*\*RN\*\***
    - 35. Use with limited ability to recognize written language
      - a. **User needs clear instructions via text and non-text means, so they can take measures to resolve the error. \*\*RN\*\***
    - 36. Use with limited ability to comprehend written language
      - a. **User needs clear instructions via text and non-text means, so they can take measures to resolve the error. \*\*RN\*\***
    - 37. Use without ability to write
      - a. **User needs CAPTCHA to be operable by voice so they can successfully complete the CAPTCHA using something other than a pointing device(such as keyboard or joystick) \*\*RN\*\***
    - 38. Use with limited ability to correctly write (or type) words and use punctuation

- a. User needs CAPTCHA to be operable by voice so they can successfully complete the CAPTCHA using something other than a pointing device(such as keyboard or joystick) **\*\*RN\*\***
- 39. Use without understanding symbols **\*\*NA\*\***
- 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
  - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
- Learning
  - 41. Use with limited ability of math and numeric concepts **\*\*NA\*\***
  - 42. Use with limited compositional skill (simultaneous thinking and input) **\*\*NA\*\***
  - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social) **\*\*NA\*\***
- Memory
  - 44. Use with limited short-term or working memory
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
  - 45. Use with limited medium or long-term memory
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
  - 46. Use with limited sensory memory
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
- Executive
  - 47. Use with limited planning, organization, sequencing, and execution ability
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
  - 48. Use with limited emotional control and self monitoring
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
  - 49. Use with limited judgement
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
- Mental Health
  - 50. Use with debilitating fear or anxiety
    - a. User needs an alternative to audio CAPTCHA so they have another approach to validate their humanness. **\*\*RN\*\***
- Cognitive & Sensory Intersections
  - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye) **\*\*NA\*\***
  - 52. Use with limited phonological or phonemic awareness

a. **User needs an alternative to audio CAPTCHA so they have another approach to validate their humanness.\*\*RN\*\***

- Functional Needs: Independence
  - Independence
    - 53. Use without autonomy or agency \*\*NA\*\*
    - 54. Use without privacy \*\*NA\*\*

## 14. TO REVIEW Error on voice request/No system message

- User Action: User requests using voice command that the service is unable to fulfill
- System Response/Unintended Result: System displays no message
- User Response:
  - User waits thinking there is a delay in response
  - User retries another phrase
  - User tries keyboard input if that is an option
- Severity: Significant (potentially Critical if error cycle repeats or if data or progress is lost)
- **Scope: TBC**
  - **TBC**
- Common User Needs:
  - User needs a notification that their responses were incorrect, so they know what happened
  - User needs guidance on how to be successful and avoid frustration, so they can be successful on the next try
  - User needs their data to be retained to reduce the need for repeating data entry, so they don't have to enter the data again
  - User needs the option to try multiple times before they are blocked, so they can keep trying
  - User needs fallback methods to complete the task if audio requests don't work
  - User needs options to control volume of audio, so they can adjust the volume to make it more decipherable
  - User needs to be able to comprehend what is spoken, so they can transcribe it accurately
- Functional Needs: Essential
  - Essential
    - 1. Use without physical harm or risk (to self or others within a physical environment)
- Functional Needs: Sensory
  - Vision & Visual
    - 2. Use without vision \*\*NA\*\*
    - 3. Use with limited vision \*NA\*\*
    - 4. Use without color perception \*NA\*\*
    - 5. Use with limited color perception\*NA\*\*

- 6. Use with limited depth perception \*\*NA\*\*
- 7. Use with limited orientation or spatial tracking \*\*NA\*\*
- 8. Use with photosensitivity (too much or too little) \*\*NA\*\*
- Hearing & Auditory
  - 9. Use without hearing
    - a. User needs an accessible notification with clear information on the error so they can find alternative ways to request information\*\*RN\*\*
    - b. User needs an alternative method, so they have another way to request information \*\*RN\*\*
  - 10. Use with limited hearing
    - a. User needs an alternative method, so they have another way to request information \*\*RN\*\*
  - 11. Use with limited auditory processing (speech)
    - a. User needs an alternative method, so they have another way to request information \*\*RN\*\*
  - 12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time)
    - a. User needs an alternative method, so they have another way to request information \*\*RN\*\*
    - b. User needs adjustable pitch and volume, so they can hear within limitations \*\*RN\*\*
- Sensory Intersections
  - 13. Use without vision and hearing
    - a. User needs an alternative method, so they have another way to request information \*\*RN\*\*
  - 14. Use with vestibular issues
    - a. User needs an accessible notification with clear information on the error so they can find alternative ways to request information\*\*RN\*\*
    - b. User needs adjustable pitch and volume, so they can hear within limitations \*\*RN\*\*
  - 15. Use without spatial auditory awareness or perception (needs diegetic sound)
    - a. User needs an accessible notification with clear information on the error so they can find alternative ways to request information\*\*RN\*\*
- Functional Needs: Physical
  - Mobility
    - 16. Use without mobility \*\*NA\*\*
    - 17. Use with limited mobility \*\*NA\*\*
    - 18. Use with limited reach or range \*\*NA\*\*
  - Motor



- 19. Use without hands \*\*NA\*\*
- 20. Use without multiple touchpoint gesture \*\*NA\*\*
- 21. Use with limited strength \*\*NA\*\*
- 22. Use without fine point control \*\*NA\*\*
- 23. Use without physical tracking speed \*\*NA\*\*
- 24. Use with tremors \*\*NA\*\*
- Physical & Sensory Intersections
  - 25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement) \*NA\*\*
  - 26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity \*NA\*\*
  - 27. Use with chronic pain impacting input or interaction modality \*NA\*\*
- Speech
  - 28. Use without vocalization \*\*NA\*\*
  - 29. Use with limited vocalization or volume \*\*NA\*\*
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention**
      - a. **User needs clear instructions via text and non-text means, so they can take measures to resolve the error. \*\*RN\*\***
    - 31. Use with limited ability to direct attention**
      - a. **User needs clear instructions via text and non-text means, so they can take measures to resolve the error. \*\*RN\*\***
    - 32. Use with limited ability to shift attention**
      - a. **User needs clear instructions via text and non-text means, so they can take measures to resolve the error. \*\*RN\*\***
  - Language & Communication
    - 33. Use with limited ability to comprehend spoken language \*\*NA\*\*
      - a. **User needs clear instructions via text, so they can take measures to resolve the error. \*\*RN\*\***
    - 34. Use without ability to read**
      - a. **User needs clear instructions via text and non-text means, so they can take measures to resolve the error. \*\*RN\*\***
    - 35. Use with limited ability to recognize written language**
      - a. **User needs clear instructions via text and non-text means, so they can take measures to resolve the error. \*\*RN\*\***
    - 36. Use with limited ability to comprehend written language**
      - a. **User needs clear instructions via text and non-text means, so they can take measures to resolve the error. \*\*RN\*\***
    - 37. Use without ability to write \*\*NA\*\*
    - 38. Use with limited ability to correctly write (or type) words and use punctuation \*\*NA\*\*
    - 39. Use without understanding symbols \*\*NA\*\*

- 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
- Learning
  - 41. Use with limited ability of math and numeric concepts **\*\*NA\*\***
  - 42. Use with limited compositional skill (simultaneous thinking and input) **\*\*NA\*\***
  - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social) **\*\*NA\*\***
- Memory
  - 44. Use with limited short-term or working memory
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
  - 45. Use with limited medium or long-term memory
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
  - 46. Use with limited sensory memory
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
- Executive
  - 47. Use with limited planning, organization, sequencing, and execution ability
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
  - 48. Use with limited emotional control and self monitoring
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
  - 49. Use with limited judgement
    - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
- Mental Health
  - 50. Use with debilitating fear or anxiety
    - a. User needs an accessible notification with clear information on the error so they can find alternative ways to request information **\*\*RN\*\***
- Cognitive & Sensory Intersections
  - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye) **\*\*NA\*\***
  - 52. Use with limited phonological or phonemic awareness
    - a. User needs an alternative to audio CAPTCHA so they have another approach to validate their humanness. **\*\*RN\*\***
- Functional Needs: Independence
  - Independence

53. Use without autonomy or agency \*\*NA\*\*

54. Use without privacy \*\*NA\*\*

## 15. TO REVIEW Error on voice request/Vague error message

- User Action: User requests using voice command that the service is unable to fulfill
- System Response/Unintended Result: System reads back error message such as “did not understand”
- User Response:
  - User retries another phrase
  - User tries to speak more loudly
  - User tries keyboard input if that is an option
- Severity: Significant (potentially Critical if error cycle repeats or if data or progress is lost)
- **Scope: TBC**
  - **TBC**
- System Response/Unintended Result: System displays no message
- Common User Needs:
  - User needs a notification that their responses were incorrect, so they know what happened
  - User needs guidance on how to be successful and avoid frustration, so they can be successful on the next try
  - User needs their data to be retained to reduce the need for repeating data entry, so they don't have to enter the data again
  - User needs the option to try multiple times before they are blocked, so they can keep trying
  - User needs fallback methods to complete the task if audio requests don't work
  - User needs options to control volume of audio, so they can adjust the volume to make it more decipherable
  - User needs to be able to comprehend what is spoken, so they can transcribe it accurately
- 
- Functional Needs: Essential
  - Essential
    1. Use without physical harm or risk (to self or others within a physical environment)
- Functional Needs: Sensory
  - Vision & Visual
    2. Use without vision \*\*NA\*\*
    3. Use with limited vision \*NA\*\*
    4. Use without color perception \*NA\*\*
    5. Use with limited color perception\*NA\*\*
    6. Use with limited depth perception \*\*NA\*\*

- 7. Use with limited orientation or spatial tracking **\*\*NA\*\***
- 8. Use with photosensitivity (too much or too little) **\*\*NA\*\***
- Hearing & Auditory
  - 9. Use without hearing
    - a. User needs an accessible notification with clear information on the error so they can find alternative ways to request information **\*\*RN\*\***
    - b. User needs an alternative method, so they have another way to request information **\*\*RN\*\***
  - 10. Use with limited hearing
    - a. User needs an alternative method, so they have another way to request information **\*\*RN\*\***
  - 11. Use with limited auditory processing (speech)
    - a. User needs an alternative method, so they have another way to request information **\*\*RN\*\***
  - 12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time)
    - a. User needs an alternative method, so they have another way to request information **\*\*RN\*\***
    - b. User needs adjustable pitch and volume, so they can hear within limitations **\*\*RN\*\***
- Sensory Intersections
  - 13. Use without vision and hearing
    - a. User needs an alternative method, so they have another way to request information **\*\*RN\*\***
  - 14. Use with vestibular issues
    - a. User needs an accessible notification with clear information on the error so they can find alternative ways to request information **\*\*RN\*\***
    - b. User needs adjustable pitch and volume, so they can hear within limitations **\*\*RN\*\***
  - 15. Use without spatial auditory awareness or perception (needs diegetic sound)
    - a. User needs an accessible notification with clear information on the error so they can find alternative ways to request information **\*\*RN\*\***
- Functional Needs: Physical
  - Mobility
    - 16. Use without mobility **\*\*NA\*\***
    - 17. Use with limited mobility **\*\*NA\*\***
    - 18. Use with limited reach or range **\*\*NA\*\***
  - Motor
    - 19. Use without hands **\*\*NA\*\***

- 20. Use without multiple touchpoint gesture \*\*NA\*\*
- 21. Use with limited strength \*\*NA\*\*
- 22. Use without fine point control \*\*NA\*\*
- 23. Use without physical tracking speed \*\*NA\*\*
- 24. Use with tremors \*\*NA\*\*
- Physical & Sensory Intersections
  - 25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement) \*NA\*\*
  - 26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity \*NA\*\*
  - 27. Use with chronic pain impacting input or interaction modality \*NA\*\*
- Speech
  - 28. Use without vocalization \*\*NA\*\*
  - 29. Use with limited vocalization or volume \*\*NA\*\*
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention**
      - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. \*\*RN\*\***
    - 31. Use with limited ability to direct attention**
      - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. \*\*RN\*\***
    - 32. Use with limited ability to shift attention**
      - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. \*\*RN\*\***
  - Language & Communication
    - 33. Use with limited ability to comprehend spoken language \*\*NA\*\*
      - a. User needs clear instructions via text, so they can take measures to resolve the error. \*\*RN\*\***
    - 34. Use without ability to read**
      - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. \*\*RN\*\***
    - 35. Use with limited ability to recognize written language**
      - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. \*\*RN\*\***
    - 36. Use with limited ability to comprehend written language**
      - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. \*\*RN\*\***
    - 37. Use without ability to write \*\*NA\*\*
    - 38. Use with limited ability to correctly write (or type) words and use punctuation \*\*NA\*\*
    - 39. Use without understanding symbols \*\*NA\*\*
    - 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location**

- a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
  - Learning
    - 41. Use with limited ability of math and numeric concepts **\*\*NA\*\***
    - 42. Use with limited compositional skill (simultaneous thinking and input) **\*\*NA\*\***
    - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social) **\*\*NA\*\***
  - Memory
    - 44. Use with limited short-term or working memory
      - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
    - 45. Use with limited medium or long-term memory
      - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
    - 46. Use with limited sensory memory
      - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
  - Executive
    - 47. Use with limited planning, organization, sequencing, and execution ability
      - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
    - 48. Use with limited emotional control and self monitoring
      - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
    - 49. Use with limited judgement
      - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
  - Mental Health
    - 50. Use with debilitating fear or anxiety
      - a. User needs an accessible notification with clear information on the error so they can find alternative ways to request information **\*\*RN\*\***
  - Cognitive & Sensory Intersections
    - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye) **\*\*NA\*\***
    - 52. Use with limited phonological or phonemic awareness
      - a. User needs an alternative to audio CAPTCHA so they have another approach to validate their humanness. **\*\*RN\*\***
  - Functional Needs: Independence
    - Independence
      - 53. Use without autonomy or agency **\*\*NA\*\***
      - 54. Use without privacy **\*\*NA\*\***

## 16. TO REVIEW Error on form input/Message not apparent

- User Action: User does not enter data in required input before moving focus to next input
- System Response/Unintended Result: System displays error message that is not apparent (e.g., not in viewport, not programmatically identified) when input loses focus (blur event) (Submit button is disabled (see Error 17))
- User Response:
  - User does not know there was an error
  - User notices the Submit button is disabled and deduces there is a mistake or omission in the form data (see Error 17)
  - User searches the page for error message
  - User locates the error message
  - User locates the inputs in error
  - User completes inputs and submits
- Severity: Significant (potentially Critical if message cannot be found)
- Scope: Correct
  - Avoid Errors: Error Message
  - Avoid Errors: Input Attributes
  - Correct Errors: Input Attributes
- Common User Needs:
  - User needs to know which fields are required, so they know to complete the fields **\*\*RN\*\*** (Input Attributes, Avoid errors, Identify required inputs)
  - User needs to perceive the error message, so they know there was an error **\*\*RN\*\*** ( Error Messages, Correct errors, Inform user of error)
  - User needs to know which field is in error, so they can correct the field entry **\*\*RN\*\*** (Input Attributes, Correct errors, Identify invalid inputs)
  - User needs to know what remedy is, so they know how to fix it **\*\*RN\*\*** (Error Messages, Correct errors, Help user fix error)
  - User needs an error message that is provided when the error occurs, so they can readily refocus on the source of the error **\*\*RN\*\*** (Error Messages, Correct errors, Guide user to source of error)
  - User needs an error message that persists until the error is remedied, so they have guidance for as long as it takes to address the error (Error Messages, Correct errors, Inform user of error)
- Functional Needs: Essential
  - Essential
    1. Use without physical harm or risk (to self or others within a physical environment): NA
- Functional Needs: Sensory
  - Vision & Visual
    2. Use without vision

- a. User needs an accessible error message, so they can access the message with a screen reader **\*\*RN\*\*** (Error Messages, Correct errors, Inform user of error)
    - b. User needs an error message provided right away, so they can readily refocus on the input and correct the error **\*\*RN\*\*** (Error Messages, Correct errors, Guide user to source of error)
  - 3. Use with limited vision
    - a. User needs an error message that is proximate to input, so they can see the message within a magnified viewport **\*\*RN\*\*** (Correct: Error Message)
    - b. User needs an error message provided right away, so they can readily refocus on the input and correct the error **\*\*RN\*\*** (Correct: Error Message)
  - 4. Use without color perception
    - a. User needs an error message distinguished using another means to color, so they can identify the element as an error message **\*\*RN\*\*** (Correct: Error Message)
  - 5. Use with limited color perception
    - a. User needs an error message provided using high-contrast colors, so they can identify the element as an error message and distinguish the error message text **\*\*RN\*\*** (Correct: Error Message)
  - 6. Use with limited depth perception
  - 7. Use with limited orientation or spatial tracking
  - 8. Use with photosensitivity (too much or too little)
- Hearing & Auditory
  - 9. Use without hearing
  - 10. Use with limited hearing
  - 11. Use with limited auditory processing (speech)
  - 12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time)
- Sensory Intersections
  - 13. Use without vision and hearing
    - a. User needs an accessible error message, so they can identify the error message and access the content with a screen reader and Braille display **\*\*RN\*\*** (Correct: Error Message)
  - 14. Use with vestibular issues
  - 15. Use without spatial auditory awareness or perception (needs diegetic sound)
- Functional Needs: Physical
  - Mobility
    - 16. Use without mobility



- a. User needs an error message that is proximate to the input, so they can readily move focus to the input and resolve the error **\*\*RN\*\* (Correct: Error Message)**
  - 17. Use with limited mobility
    - a. User needs an error message that is proximate to the input, so they can readily move focus to the input and resolve the error **\*\*RN\*\* (Correct: Error Message)**
  - 18. Use with limited reach or range
    - a. User needs an error message that is proximate to the input, so they can readily move focus to the input and resolve the error **\*\*RN\*\* (Correct: Error Message)**
- Motor
  - 19. Use without hands
    - a. User needs an error message that is proximate to the input, so they can readily move focus to the input and resolve the error **\*\*RN\*\* (Correct: Error Message)**
  - 20. Use without multiple touchpoint gesture
  - 21. Use with limited strength
    - a. User needs an error message that is proximate to the input, so they can readily move focus to the input and resolve the error **\*\*RN\*\* (Correct: Error Message)**
  - 22. Use without fine point control
  - 23. Use without physical tracking speed
  - 24. Use with tremors
    - a. User needs an error message that is proximate to the input, so they can readily move focus to the input and resolve the error **\*\*RN\*\* (Correct: Error Message)**
- Physical & Sensory Intersections
  - 25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
  - 26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
  - 27. Use with chronic pain impacting input or interaction modality
    - a. User needs an error message that is proximate to the input, so they can readily move focus to the input and resolve the error **\*\*RN\*\* (Correct: Error Message)**
- Speech
  - 28. Use without vocalization
  - 29. Use with limited vocalization or volume
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention

- a. User needs clear instructions via text or non-text means, so they can take measures to resolve the error **\*\*RN\*\*** (Correct: Error Message)
  - b. User needs an error message that is proximate to the input, so they can see the error message while resolving the error **\*\*RN\*\*** (Correct: Error Message)
  - c. User needs an error message that is provided when the error occurs, so they can readily refocus on the source of the error **\*\*RN\*\*** (Correct: Error Message)
- 31. Use with limited ability to direct attention
  - a. User needs clear instructions via text or non-text means, so they can take measures to resolve the error **\*\*RN\*\*** (Correct: Error Message)
  - b. User needs an error message that is proximate to the input, so they can see the error message while resolving the error **\*\*RN\*\*** (Correct: Error Message)
  - c. User needs an error message that is provided when the error occurs, so they can readily refocus on the source of the error **\*\*RN\*\*** (Correct: Error Message)
- 32. Use with limited ability to shift attention
  - a. User needs clear instructions via text or non-text means, so they can take measures to resolve the error **\*\*RN\*\*** (Correct: Error Message)
  - b. User needs an error message that is proximate to the input, so they can see the error message while resolving the error **\*\*RN\*\*** (Correct: Error Message)
  - c. User needs an error message that is provided when the error occurs, so they can readily refocus on the source of the error **\*\*RN\*\*** (Correct: Error Message)
- Language & Communication
  - 33. Use with limited ability to comprehend spoken language
  - 34. Use without ability to read
    - a. User needs non-text prompts (e.g., symbols, color) to identify the error and input in error, so they can identify which input is in error and take steps to fix the error **\*\*RN\*\***
    - b. User needs an error message that is proximate to the input, so they can see the message while resolving the error **\*\*RN\*\***
  - 35. Use with limited ability to recognize written language
    - a. User needs non-text prompts (e.g., symbols, color) to identify the error and input in error, so they can identify which input is in error and take steps to fix the error **\*\*RN\*\***
    - b. User needs an error message that is proximate to the input, so they can see the message while resolving the error **\*\*RN\*\***
  - 36. Use with limited ability to comprehend written language

- a. User needs non-text prompts (e.g., symbols, color) to identify the error and input in error, so they can identify which input is in error and take steps to fix the error **\*\*RN\*\***
  - b. User needs clear instructions via text and non-text means, so they can take measures to resolve the error **\*\*RN\*\***
  - c. User needs an error message that is proximate to the input, so they can see the message while resolving the error **\*\*RN\*\***
- 37. Use without ability to write
  - a. User needs an error message that is proximate to the input, so they can see the message while resolving the error **\*\*RN\*\***
- 38. Use with limited ability to correctly write (or type) words and use punctuation
  - a. User needs an error message that is proximate to the input, so they can see the message while resolving the error **\*\*RN\*\***
- 39. Use without understanding symbols
  - a. User needs text prompts to identify the error and input in error, so they can identify which input is in error and take steps to fix the error **\*\*RN\*\***
- 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
  - a. User needs clear instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
- Learning
  - 41. Use with limited ability of math and numeric concepts
  - 42. Use with limited compositional skill (simultaneous thinking and input)
    - a. User needs an error message that displays at the source of the error, so they can access the error message content and the source of the error at the same time **\*\*RN\*\***
  - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)
    - a. User needs an error message that is provided when the error occurs, so they can readily refocus on the source of the error **\*\*RN\*\***
    - b. User needs an error message that displays at the source of the error, so they can access the error message content and the source of the error at the same time **\*\*RN\*\***
- Memory
  - 44. Use with limited short-term or working memory
    - a. User needs an error message that is provided when the error occurs, so they can readily refocus on the source of the error **\*\*RN\*\***
    - b. User needs an error message that is proximate to the input, so they can see the message while resolving the error. **\*\*RN\*\***

- 45. Use with limited medium or long-term memory
    - a. User needs an error message that is provided when the error occurs, so they can readily refocus on the source of the error **\*\*RN\*\***
    - b. User needs an error message that is proximate to the input, so they can see the message while resolving the error. **\*\*RN\*\***
  - 46. Use with limited sensory memory
- Executive
  - 47. Use with limited planning, organization, sequencing, and execution ability
    - a. User needs an error message that is provided when the error occurs, so they can readily refocus on the source of the error **\*\*RN\*\***
    - b. User needs an error message that displays at the source of the error, so they can access the error message content and the source of the error at the same time **\*\*RN\*\***
  - 48. Use with limited emotional control and self monitoring
  - 49. Use with limited judgement
- Mental Health
  - 50. Use with debilitating fear or anxiety
    - a. User needs clear and easy-to-follow instructions via text and non-text means, so they can take measures to resolve the error. **\*\*RN\*\***
- Cognitive & Sensory Intersections
  - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
  - 52. Use with limited phonological or phonemic awareness
- Functional Needs: Independence
  - Independence
    - 53. Use without autonomy or agency
    - 54. Use without privacy

## 17. TO REVIEW Error on form input/Submit button disabled

- User Action: User does not enter data in required inputs and attempts to submit form
- System Response/Unintended Result: Submit button is disabled until all required inputs are complete
- User Response:
  - User does not know there was an error but is unable to submit form
  - User deduces there is a problem with the inputs that is causing the Submit button to be disabled
  - User searches the page for error message and/or incomplete inputs
  - User locates the error message and/or incomplete inputs
  - User completes inputs and submits

- Severity: Significant (potentially Critical if user cannot take action to enable Submit)
- **Scope: Correct Error**
  - **Error Message**
- Common User Needs:
  - User needs to know that the Submit button is disabled
  - User needs to know that the Submit button will remain disabled until conditions are met in the form
  - User needs to know which inputs have conditions that must be met
  - User needs to know what conditions must be met to enable the Submit button
  - User needs to know that they have met the conditions for each input with conditions
- Functional Needs: Essential
  - **Essential**
    1. Use without physical harm or risk (to self or others within a physical environment): **\*\*NA\*\***
- Functional Needs: Sensory
  - Vision & Visual
    2. **Use without vision**
      - a. **User needs inputs with accessibility attributes, so they are notified of the conditions (e.g., required) to be met to enable the Submit button **\*\*RN\*\*****
      - b. **User needs a Submit button with accessibility attributes, so they know whether the button is enabled or disabled **\*\*RN\*\*****
      - c. **User needs an accessible notification of why the button is disabled, so they can take steps to enable the button **\*\*RN\*\*****
    3. **Use with limited vision**
      - a. **User needs labels and instructions communicating conditions to be proximate to their inputs, so they can access the information in a magnified viewport **\*\*RN\*\*****
    4. **Use without color perception**
      - a. **User needs the disabled button to be visually distinguishable, so they know the button is disabled **\*\*RN\*\*****
    5. **Use with limited color perception**
      - a. **User needs the disabled button to be visually distinguishable, so they know the button is disabled **\*\*RN\*\*****
    6. Use with limited depth perception **\*\*NA\*\***
    7. Use with limited orientation or spatial tracking **\*\*NA\*\***
    8. Use with photosensitivity (too much or too little) **\*\*NA\*\***
  - Hearing & Auditory
    9. Use without hearing **\*\*NA\*\***
    10. Use with limited hearing **\*\*NA\*\***
    11. Use with limited auditory processing (speech) **\*\*NA\*\***

- 12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time) **\*\*NA\*\***
- Sensory Intersections
  - 13. Use without vision and hearing
    - a. User needs inputs with accessibility attributes, so they are notified of the conditions (e.g., required) to be met to enable the Submit button **\*\*RN\*\***
    - b. User needs a Submit button with accessibility attributes, so they know whether the button is enabled or disabled **\*\*RN\*\***
    - c. User needs an accessible notification of why the button is disabled, so they can take steps to enable the button **\*\*RN\*\***
  - 14. Use with vestibular issues **\*\*NA\*\***
  - 15. Use without spatial auditory awareness or perception (needs diegetic sound) **\*\*NA\*\***
- Functional Needs: Physical
  - Mobility
    - 16. Use without mobility
    - 17. Use with limited mobility
    - 18. Use with limited reach or range
  - Motor
    - 19. Use without hands
    - 20. Use without multiple touchpoint gesture
    - 21. Use with limited strength
    - 22. Use without fine point control
    - 23. Use without physical tracking speed
    - 24. Use with tremors
  - Physical & Sensory Intersections
    - 25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
    - 26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
    - 27. Use with chronic pain impacting input or interaction modality
  - Speech
    - 28. Use without vocalization
    - 29. Use with limited vocalization or volume
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention
      - a. User needs a notification of why the button is disabled, so they know they need to take action **\*\*RN\*\***
      - b. User needs labels and instructions communicating conditions to be proximate to their inputs, so they can access the information as they complete the form **\*\*RN\*\***
    - 31. Use with limited ability to direct attention

- a. User needs a notification of why the button is disabled, so they know they need to take action **\*\*RN\*\***
  - b. User needs labels and instructions communicating conditions to be proximate to their inputs, so they can access the information as they complete the form **\*\*RN\*\***
- 32. Use with limited ability to shift attention
  - a. User needs a notification of why the button is disabled, so they know they need to take action **\*\*RN\*\***
  - b. User needs labels and instructions communicating conditions to be proximate to their inputs, so they can access the information as they complete the form **\*\*RN\*\***
- Language & Communication
  - 33. Use with limited ability to comprehend spoken language **\*\*NA\*\***
  - 34. Use without ability to read
    - a. User needs non-text prompts (e.g., symbols, color) to identify the disabled button and explain why it's disabled, so they know they need to take action **\*\*RN\*\***
  - 35. Use with limited ability to recognize written language
    - a. User needs non-text prompts (e.g., symbols, color) to identify the disabled button and explain why it's disabled, so they know they need to take action **\*\*RN\*\***
  - 36. Use with limited ability to comprehend written language
    - a. User needs non-text prompts (e.g., symbols, color) to identify the disabled button and explain why it's disabled, so they know they need to take action **\*\*RN\*\***
    - b. User needs clear instructions on what's needed to enable the button, so they can take steps **\*\*RN\*\***
  - 37. Use without ability to write
  - 38. Use with limited ability to correctly write (or type) words and use punctuation
  - 39. Use without understanding symbols
    - a. User needs a text notification of why the button is disabled, so they know they need to take action **\*\*RN\*\***
  - 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
    - a. User needs clear guidance via text and non-text means , so they understand why the button is disabled. **\*\*RN\*\***
- Learning
  - 41. Use with limited ability of math and numeric concepts **\*\*NA\*\***
  - 42. Use with limited compositional skill (simultaneous thinking and input)
  - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)
- Memory
  - 44. Use with limited short-term or working memory



- a. **User needs labels and instructions communicating conditions to be proximate to their inputs, so they can access the information as they complete the form \*\*RN\*\***
- 45. Use with limited medium or long-term memory
  - a. **User needs labels and instructions communicating conditions to be proximate to their inputs, so they can access the information as they complete the form \*\*RN\*\***
- 46. Use with limited sensory memory
- Executive
  - 47. Use with limited planning, organization, sequencing, and execution ability
    - a. **User needs labels and instructions communicating conditions to be proximate to their inputs, so they can access the information as they complete the form \*\*RN\*\***
  - 48. Use with limited emotional control and self monitoring
  - 49. Use with limited judgement
- Mental Health
  - 50. Use with debilitating fear or anxiety
- Cognitive & Sensory Intersections
  - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
  - 52. Use with limited phonological or phonemic awareness
- Functional Needs: Independence
  - Independence
    - 53. Use without autonomy or agency
    - 54. Use without privacy

## **18. TO BE COMPLETED Semantically incorrect result returned/No system message**

- User action: User enters semantically incorrect but syntactically “correct” input (e.g., misspelled query but legitimate query syntactically, mistyped input in input field but a valid input syntactically) such that the wrong result is returned, according to the user
- System Response/Unintended Result: System returns response corresponding to what the user entered – system “thinks” it behaved correctly, so no standard error message is returned by the system, although individual errors may be returned according to the perceived “correct” behavior of the system (for example., if the user enters “\$1500” instead of “\$150” for a withdrawal amount, the system may respond with an “insufficient funds” message). The accessibility issue is that there is a mismatch, or a “disconnect”, between what the user wants to happen and what actually happens, which can lead to unintended and possibly dangerous consequences, particularly if the user acts on this incorrect information further.
- User Response:
  - User recognizes that the system response is semantically incorrect, but is not sure whether the problem is what the user entered, or what the system did in returning the response.



- The user does not know at this point what caused the problem
- The user may delete the previous input/response , and go back to try again (entering the input again and examining the response to this input)
- The user may seek additional knowledge about the system being queried, to determine if a misunderstanding occurred
- After several attempts re: the above, the user may seek “outside guidance” to resolve the issue.
- Severity: Significant (possibly critical)
- **Scope: Correct Error**
  - **Error Message**
- Common User Needs:
  - Users need a notification if possible before submitting the input that the input is different from what is normally submitted (for example, “this amount is higher than your typical withdrawal request”). Failing that, users need a way of undoing a transaction that returns semantically incorrect results, erasing all the data and any side effects caused, and starting over in the same state as before. Users need a large, possibly unlimited, number of such attempts, with responses “learned” from each attempt. Users need to determine if there is another way to get the information needed.
- Functional Needs: Essential
  - Essential
    1. Use without physical harm or risk (to self or others within a physical environment): NA
- Functional Needs: Sensory
  - Vision & Visual
    2. Use without vision
      - a. Users need accessible notifications, accessible means of undo/redo, and accessible system responses/help options that can be accessed with a screen reader
    3. Use with limited vision
      - a. Users need visible notifications, visible undo/redo options, and visible system responses/help features so they can see these items with a magnified viewport. Users need high-contrast notifications, high-contrast undo/redo options, and high-contrast system responses/help features so these items can be distinguished.
    4. Use without color perception - Users need all notifications, undo/redo functions, and system responses to not only use color, so that they can be recognized
    5. Use with limited depth perception - Users need all notifications, undo/redo functions, and system responses to use high-contrast, so that they may be distinguished

6. Use with limited orientation or spatial tracking - Users need all notifications, undo/redo functions, and system responses to be in a fixed, known position on the viewport
7. Use with photosensitivity (too much or too little) - Users need to be able to set the photosensitivity requirements of the display
- Hearing & Auditory
  8. Use without hearing - Users need all notifications, undo/redo functions, and system responses to not just use sounds, so that they can be distinguished
  9. Use with limited hearing - Users need all notifications, undo/redo functions, and system responses to not just use sounds, so that they can be distinguished
  10. Use with limited auditory processing (speech) - Users need all interactions to be not spoken
  11. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time) - Users need the ability to set the frequency range of responses
- Sensory Intersections
  12. Use without vision and hearing - Users need all interactions to not use visual or auditory cues
  13. Use with vestibular issues
  14. Use without spatial auditory awareness or perception (needs diegetic sound)
- Functional Needs: Physical - for all of these, users need to be able to read the notifications, instructions for undo/redo functions, and system responses, in order to be placed back to a likely location to continue their attempt to find the correct information corresponding to their input.
  - Mobility
    15. Use without mobility - Users need notifications, undo/redo functions, and system responses to be directly associated with the inputs in error, so that they can readily access the correct input to fix the error(s)
    16. Use with limited mobility
    17. Use with limited reach or range
  - Motor
    18. Use without hands
    19. Use without multiple touchpoint gesture
    20. Use with limited strength
    21. Use without fine point control
    22. Use without physical tracking speed
    23. Use with tremors
  - Physical & Sensory Intersections
    24. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)

- 25. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
- 26. Use with chronic pain impacting input or interaction modality
- Speech
  - 27. Use without vocalization
  - 28. Use with limited vocalization or volume
- Functional Needs: Cognitive - for all of these, users need clear next steps (so they can follow them) in order to locate the correct information corresponding to their input
  - Attention
    - 29. Use with limited ability to focus attention - Users need the notifications, undo/redo functions, and system responses to be proximate to the input and visually associated, so they can follow any instructions to locate the correct information
    - 30. Use with limited ability to direct attention - Users need the notifications, undo/redo functions, and system responses to be proximate to the input and visually associated, so they can follow any instructions to locate the correct information
    - 31. Use with limited ability to shift attention - Users need the notifications, undo/redo functions, and system responses to be proximate to the input and visually associated, so they can follow any instructions to locate the correct information
  - Language & Communication
    - 32. Use with limited ability to comprehend spoken language
    - 33. Use without ability to read - Users need symbols in the notifications, undo/redo functions, and system responses to be proximate and visually associated to the input, so they can recognize there was an error and where there was an error
    - 34. Use with limited ability to recognize written language - Users need symbols in the notifications, undo/redo functions, and system responses to be proximate and visually associated to the input, so they can recognize that there was an error and where the error is
    - 35. Use with limited ability to comprehend written language - Users may need the notifications, undo/redo function instructions, and system responses to be spoken. Users may need the notifications, undo/redo instructions, and system responses to be presented in clear, simplified language, and perhaps several times in succession over an extended period of time, in order for this information to be understood. Resources need to be examined regularly for adherence to working order.
    - 36. Use without ability to write
    - 37. Use with limited ability to correctly write (or type) words and use punctuation
    - 38. Use without understanding symbols
    - 39. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location - Users need notifications, undo/redo

instructions, and system responses to be clear and unambiguous, so they can recognize and understand these items

40. Use with limited ability of math and numeric concepts

41. Use with limited compositional skill (simultaneous thinking and input)

42. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)

- Memory

43. Use with limited short-term or working memory - Users need the notifications, undo/redo instructions, and system responses to be concise, prominent and available for long periods of time, so that memory retention is not needed

44. Use with limited medium or long-term memory

45. Use with limited sensory memory

- Executive for all, users need the notifications, undo/redo instructions, and system responses to be concise, prominent and available for long periods of time, so that memory retention is not needed

- 

46. Use with limited planning, organization, sequencing, and execution ability

47. Use with limited emotional control and self monitoring

48. Use with limited judgement

- Mental Health

49. Use with debilitating fear or anxiety - Users need the “look and feel” of notifications, undo/redo runctions, and system responses to be familiar to them (have the same design as the interface they’re used to)

- Cognitive & Sensory Intersections

50. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)

51. Use with limited phonological or phonemic awareness

- Functional Needs: Independence

- Independence

52. Use without autonomy or agency

53. Use without privacy

## 19. TO DO Error on form input/System does not accept input value

- User action: User enters invalid/unaccepted character into new password input
- System Response/Unintended Result: System does not accept the invalid/unaccepted character
- User Response:
  -
- Severity:
- **Scope: Prevent Errors**
  - **TBC**
- Common User Needs:
  - TBC

- Functional Needs: Essential
  - Essential
    1. Use without physical harm or risk (to self or others within a physical environment)
- Functional Needs: Sensory
  - Vision & Visual
    2. Use without vision
    3. Use with limited vision
    4. Use without color perception
    5. Use with limited color perception
    6. Use with limited depth perception
    7. Use with limited orientation or spatial tracking
    8. Use with photosensitivity (too much or too little)
  - Hearing & Auditory
    9. Use without hearing
    10. Use with limited hearing
    11. Use with limited auditory processing (speech)
    12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time)
  - Sensory Intersections
    13. Use without vision and hearing
    14. Use with vestibular issues
    15. Use without spatial auditory awareness or perception (needs diegetic sound)
- Functional Needs: Physical
  - Mobility
    16. Use without mobility
    17. Use with limited mobility
    18. Use with limited reach or range
  - Motor
    19. Use without hands
    20. Use without multiple touchpoint gesture
    21. Use with limited strength
    22. Use without fine point control
    23. Use without physical tracking speed
    24. Use with tremors
  - Physical & Sensory Intersections
    25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
    26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
    27. Use with chronic pain impacting input or interaction modality
  - Speech
    28. Use without vocalization

- 29. Use with limited vocalization or volume
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention
    - 31. Use with limited ability to direct attention
    - 32. Use with limited ability to shift attention
  - Language & Communication
    - 33. Use with limited ability to comprehend spoken language
    - 34. Use without ability to read
    - 35. Use with limited ability to recognize written language
    - 36. Use with limited ability to comprehend written language
    - 37. Use without ability to write
    - 38. Use with limited ability to correctly write (or type) words and use punctuation
    - 39. Use without understanding symbols
    - 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
  - Learning
    - 41. Use with limited ability of math and numeric concepts
    - 42. Use with limited compositional skill (simultaneous thinking and input)
    - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)
  - Memory
    - 44. Use with limited short-term or working memory
    - 45. Use with limited medium or long-term memory
    - 46. Use with limited sensory memory
  - Executive
    - 47. Use with limited planning, organization, sequencing, and execution ability
    - 48. Use with limited emotional control and self monitoring
    - 49. Use with limited judgement
  - Mental Health
    - 50. Use with debilitating fear or anxiety
  - Cognitive & Sensory Intersections
    - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
    - 52. Use with limited phonological or phonemic awareness
- Functional Needs: Independence
  - Independence
    - 53. Use without autonomy or agency
    - 54. Use without privacy

## 20. TO BE COMPLETED Error on form input/Vague instructions and error message

- User action: User enters phone number using invalid format into phone number input field
- System Response/Unintended Result: System displays format requirements (e.g., “no special characters or spaces”) but does not provide an example; system displays error message when input loses focus (e.g., “phone number is invalid”)
- User Response:
  - User does not notice formatting instructions
  - User enters phone number following conventions (e.g., xxx xxx-xxxx)
  - User moves focus away from input and sees error message, “phone number is invalid”
  - User returns focus to input and looks for formatting instructions
  - User finds and reviews formatting instructions
  - User is unsure whether hyphens are special characters
  - User re-enters phone number without spaces (e.g., xxxxxx-xxxx)
  - User moves focus away from input and sees error message, “phone number is invalid”
  - User returns focus to input
  - User re-enters phone number without hyphen (e.g., xxxxxxxxxx)
  - User reviews phone number without spaces and hyphens to confirm it is the correct phone number (it’s harder to recognize without spaces and hyphens)
  - User moves focus away from input and does not see error message
- Severity:
- **Scope: Correct Errors**
  - **Error Message**
- **Scope: Avoid Errors**
  - **Input Instructions**
- **Scope: Prevent Errors**
  -
- Common User Needs:
  - User needs instructions for inputs that have requirements, so they can provide data in the correct format
  - User needs examples for inputs that have requirements, so they can follow the example to provide the data in the correct format
- Functional Needs: Essential
  - Essential
    1. Use without physical harm or risk (to self or others within a physical environment)
- Functional Needs: Sensory
  - Vision & Visual
    2. Use without vision
    3. Use with limited vision

- 4. Use without color perception
  - 5. Use with limited color perception
  - 6. Use with limited depth perception
  - 7. Use with limited orientation or spatial tracking
  - 8. Use with photosensitivity (too much or too little)
- Hearing & Auditory
  - 9. Use without hearing
  - 10. Use with limited hearing
  - 11. Use with limited auditory processing (speech)
  - 12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time)
- Sensory Intersections
  - 13. Use without vision and hearing
  - 14. Use with vestibular issues
  - 15. Use without spatial auditory awareness or perception (needs diegetic sound)
- Functional Needs: Physical
  - Mobility
    - 16. Use without mobility
    - 17. Use with limited mobility
    - 18. Use with limited reach or range
  - Motor
    - 19. Use without hands
    - 20. Use without multiple touchpoint gesture
    - 21. Use with limited strength
    - 22. Use without fine point control
    - 23. Use without physical tracking speed
    - 24. Use with tremors
  - Physical & Sensory Intersections
    - 25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
    - 26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
    - 27. Use with chronic pain impacting input or interaction modality
  - Speech
    - 28. Use without vocalization
    - 29. Use with limited vocalization or volume
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention
    - 31. Use with limited ability to direct attention
    - 32. Use with limited ability to shift attention
  - Language & Communication
    - 33. Use with limited ability to comprehend spoken language



- 34. Use without ability to read
- 35. Use with limited ability to recognize written language
- 36. Use with limited ability to comprehend written language
- 37. Use without ability to write
- 38. Use with limited ability to correctly write (or type) words and use punctuation
- 39. Use without understanding symbols
- 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
- Learning
  - 41. Use with limited ability of math and numeric concepts
  - 42. Use with limited compositional skill (simultaneous thinking and input)
  - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)
- Memory
  - 44. Use with limited short-term or working memory
  - 45. Use with limited medium or long-term memory
  - 46. Use with limited sensory memory
- Executive
  - 47. Use with limited planning, organization, sequencing, and execution ability
  - 48. Use with limited emotional control and self monitoring
  - 49. Use with limited judgement
- Mental Health
  - 50. Use with debilitating fear or anxiety
- Cognitive & Sensory Intersections
  - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
  - 52. Use with limited phonological or phonemic awareness
- Functional Needs: Independence
  - Independence
    - 53. Use without autonomy or agency
    - 54. Use without privacy

## 21. TO DO Visual Alphanumeric CAPTCHA on input/No system message

- User action:
- System Response/Unintended Result:
- User Response:
- Severity:
- **Scope: TBC**
  - **TBC**
- Common User Needs:
  - TBC

- Functional Needs: Essential
  - Essential
    1. Use without physical harm or risk (to self or others within a physical environment)
- Functional Needs: Sensory
  - Vision & Visual
    2. Use without vision
    3. Use with limited vision
    4. Use without color perception
    5. Use with limited color perception
    6. Use with limited depth perception
    7. Use with limited orientation or spatial tracking
    8. Use with photosensitivity (too much or too little)
  - Hearing & Auditory
    9. Use without hearing
    10. Use with limited hearing
    11. Use with limited auditory processing (speech)
    12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time)
  - Sensory Intersections
    13. Use without vision and hearing
    14. Use with vestibular issues
    15. Use without spatial auditory awareness or perception (needs diegetic sound)
- Functional Needs: Physical
  - Mobility
    16. Use without mobility
    17. Use with limited mobility
    18. Use with limited reach or range
  - Motor
    19. Use without hands
    20. Use without multiple touchpoint gesture
    21. Use with limited strength
    22. Use without fine point control
    23. Use without physical tracking speed
    24. Use with tremors
  - Physical & Sensory Intersections
    25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
    26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
    27. Use with chronic pain impacting input or interaction modality
  - Speech
    28. Use without vocalization

- 29. Use with limited vocalization or volume
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention
    - 31. Use with limited ability to direct attention
    - 32. Use with limited ability to shift attention
  - Language & Communication
    - 33. Use with limited ability to comprehend spoken language
    - 34. Use without ability to read
    - 35. Use with limited ability to recognize written language
    - 36. Use with limited ability to comprehend written language
    - 37. Use without ability to write
    - 38. Use with limited ability to correctly write (or type) words and use punctuation
    - 39. Use without understanding symbols
    - 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
  - Learning
    - 41. Use with limited ability of math and numeric concepts
    - 42. Use with limited compositional skill (simultaneous thinking and input)
    - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)
  - Memory
    - 44. Use with limited short-term or working memory
    - 45. Use with limited medium or long-term memory
    - 46. Use with limited sensory memory
  - Executive
    - 47. Use with limited planning, organization, sequencing, and execution ability
    - 48. Use with limited emotional control and self monitoring
    - 49. Use with limited judgement
  - Mental Health
    - 50. Use with debilitating fear or anxiety
  - Cognitive & Sensory Intersections
    - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
    - 52. Use with limited phonological or phonemic awareness
- Functional Needs: Independence
  - Independence
    - 53. Use without autonomy or agency
    - 54. Use without privacy

## 22. TO BE COMPLETED Error on form input/System displays

### instructions in error notification

- User action: User enters phone number in Phone input; input does not include formatting instructions
- System Response/Unintended Result: System displays error message with formatting instructions
- User Response:
  - User re-enters phone number following formatting instructions
- Severity: Minor
- **Scope: Correct Errors**
  - **Error Message**
- Common User Needs:
  - User needs to know formatting instructions before entering data for inputs that have required formats
  - User needs to know when they have entered data that does not match format
  - User needs systems that will validate and correct formatting when possible
- Functional Needs: Essential
  - Essential
    1. Use without physical harm or risk (to self or others within a physical environment)
- Functional Needs: Sensory
  - Vision & Visual
    2. Use without vision
    3. Use with limited vision
    4. Use without color perception
    5. Use with limited color perception
    6. Use with limited depth perception
    7. Use with limited orientation or spatial tracking
    8. Use with photosensitivity (too much or too little)
  - Hearing & Auditory
    9. Use without hearing
    10. Use with limited hearing
    11. Use with limited auditory processing (speech)
    12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time)
  - Sensory Intersections
    13. Use without vision and hearing
    14. Use with vestibular issues
    15. Use without spatial auditory awareness or perception (needs diegetic sound)
- Functional Needs: Physical
  - Mobility
    16. Use without mobility

- 17. Use with limited mobility
- 18. Use with limited reach or range
- Motor
  - 19. Use without hands
  - 20. Use without multiple touchpoint gesture
  - 21. Use with limited strength
  - 22. Use without fine point control
  - 23. Use without physical tracking speed
  - 24. Use with tremors
- Physical & Sensory Intersections
  - 25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
  - 26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
  - 27. Use with chronic pain impacting input or interaction modality
- Speech
  - 28. Use without vocalization
  - 29. Use with limited vocalization or volume
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention
    - 31. Use with limited ability to direct attention
    - 32. Use with limited ability to shift attention
  - Language & Communication
    - 33. Use with limited ability to comprehend spoken language
    - 34. Use without ability to read
    - 35. Use with limited ability to recognize written language
    - 36. Use with limited ability to comprehend written language
    - 37. Use without ability to write
    - 38. Use with limited ability to correctly write (or type) words and use punctuation
    - 39. Use without understanding symbols
    - 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
  - Learning
    - 41. Use with limited ability of math and numeric concepts
    - 42. Use with limited compositional skill (simultaneous thinking and input)
    - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)
  - Memory
    - 44. Use with limited short-term or working memory
    - 45. Use with limited medium or long-term memory
    - 46. Use with limited sensory memory
  - Executive

- 47. Use with limited planning, organization, sequencing, and execution ability
- 48. Use with limited emotional control and self monitoring
- 49. Use with limited judgement
- Mental Health
  - 50. Use with debilitating fear or anxiety
- Cognitive & Sensory Intersections
  - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
  - 52. Use with limited phonological or phonemic awareness
- Functional Needs: Independence
  - Independence
    - 53. Use without autonomy or agency
    - 54. Use without privacy

## 23. TO BE COMPLETED Error on password input/System does not notify

- User action: User enters invalid password in password input and enters non-matching password in password confirmation input
- System Response/Unintended Result: System does nothing
- User Response:
  - User completes form fill-in and submits the form
  - System reloads page with error notifications (at the top and/or inline)
  - User corrects incorrect password and resubmits the form
- Severity: Significant (potentially Critical)
- **Scope: Correct Errors**
  - **Error Message**
- Common User Needs:
  - User needs notifications to display during form fill-in, so they can correct mistakes as they go
  - User needs a way to review and verify a password, so they can be sure they have provided the desired password in both inputs
- Functional Needs: Essential
  - Essential
    - 1. Use without physical harm or risk (to self or others within a physical environment)
- Functional Needs: Sensory
  - Vision & Visual
    - 2. Use without vision**
      - a. User needs an accessible notification, so they can access the notification with a screen reader \*\*RN\*\***
    - 3. Use with limited vision**
      - a. User needs a visible notification, so they can see the notification within a magnified viewport \*\*RN\*\***

- b. User needs a high-contrast notification, so they can distinguish the message text **\*\*RN\*\***
    - 4. Use without color perception
      - a. User needs a notification that is distinguishable without color, so they can recognize the notification **\*\*RN\*\***
    - 5. Use with limited color perception
      - a. User needs a high-contrast notification, so they can distinguish the message text **\*\*RN\*\***
    - 6. Use with limited depth perception **\*\*NA\*\***
    - 7. Use with limited orientation or spatial tracking **\*\*NA\*\***
    - 8. Use with photosensitivity (too much or too little) **\*\*NA\*\***
  - Hearing & Auditory
    - 9. Use without hearing **\*\*NA\*\***
    - 10. Use with limited hearing **\*\*NA\*\***
    - 11. Use with limited auditory processing (speech) **\*\*NA\*\***
    - 12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time) **\*\*NA\*\***
  - Sensory Intersections
    - 13. Use without vision and hearing
    - 14. Use with vestibular issues
    - 15. Use without spatial auditory awareness or perception (needs diegetic sound)
  - Functional Needs: Physical
    - Mobility
      - 16. Use without mobility
      - 17. Use with limited mobility
      - 18. Use with limited reach or range
    - Motor
      - 19. Use without hands
      - 20. Use without multiple touchpoint gesture
      - 21. Use with limited strength
      - 22. Use without fine point control
      - 23. Use without physical tracking speed
      - 24. Use with tremors
    - Physical & Sensory Intersections
      - 25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
      - 26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
      - 27. Use with chronic pain impacting input or interaction modality
    - Speech
      - 28. Use without vocalization
      - 29. Use with limited vocalization or volume
  - Functional Needs: Cognitive

- Attention
  - 30. Use with limited ability to focus attention**
    - a. User needs errors identified right away, so they can focus on fixing them. \*\*RN\*\***
  - 31. Use with limited ability to direct attention**
    - a. User needs errors identified right away, so they can focus on fixing them. \*\*RN\*\***
  - 32. Use with limited ability to shift attention**
    - a. User needs errors identified right away, so they can focus on fixing them. \*\*RN\*\***
- Language & Communication
  - 33. Use with limited ability to comprehend spoken language
  - 34. Use without ability to read**
    - a. User needs password requirements that are clearly presented, so they can enter a valid password \*\*RN\*\***
  - 35. Use with limited ability to recognize written language
  - 36. Use with limited ability to comprehend written language
  - 37. Use without ability to write
  - 38. Use with limited ability to correctly write (or type) words and use punctuation
  - 39. Use without understanding symbols
  - 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
- Learning
  - 41. Use with limited ability of math and numeric concepts
  - 42. Use with limited compositional skill (simultaneous thinking and input)
  - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)
- Memory
  - 44. Use with limited short-term or working memory
  - 45. Use with limited medium or long-term memory
  - 46. Use with limited sensory memory
- Executive
  - 47. Use with limited planning, organization, sequencing, and execution ability
  - 48. Use with limited emotional control and self monitoring
  - 49. Use with limited judgement
- Mental Health
  - 50. Use with debilitating fear or anxiety
- Cognitive & Sensory Intersections
  - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
  - 52. Use with limited phonological or phonemic awareness
- Functional Needs: Independence
  - Independence



**53. Use without autonomy or agency**

- a. **User needs the interface for entering and validating a password to be straightforward, so they can be successful independently, without requiring assistance \*\*RN\*\***

**54. Use without privacy**

**24. COMPLETE (but with only new/unique user needs listed)**

**Animation Illustrates an Error in a UI that Presents a Mental Model that Mirrors the Physical World**

- User Action: The user tries to take an action that has a physical mental model, such as open/close/slide/drag/move, but that particular action is not allowed at the time.
- System Response/Unintended Result: an animation related to the physical mental model illustrates, without language, why the action can't be taken.
- User Response: The user sees the animation and realizes that they have to move one item out of the way of another item to continue.
- Issue Severity: Significant (potentially Critical)
- **Scope: TBC**
  - **TBC**
- Common User Needs:
  - **The user needs the animation to occur within their current viewport, so they do not miss the information \*\*NRN\*\***
  - **The user needs the animation to be to universal to a reasonable extent for the target audience, so they can understand the issue regardless of their background and prior exposure to animations \*\*NRN\*\***
  - **The user may need further information or hints, so they can understand how to respond to the condition illustrated in the animation \*\*NRN\*\***
- Functional Needs: Essential
  - Essential
    1. Use without physical harm or risk (to self or others within a physical environment)
- Functional Needs: Sensory
  - Vision & Visual
    2. Use without vision The user needs a notification
      - **The user needs the accessible alternative to the animation to be presented in real time (e.g. as a status message or notification), so that they can understand that the animation was in response to their action \*\*NRN\*\***
    3. Use with limited vision
      - **The user with limited vision *but who does not use AT* may need the animation to be smaller than their viewport, so that they can see enough of the animation to understand its meaning \*\*NRN\*\***

- The user with limited vision *but who does not use AT* may need the accessible alternative to the animation to spoken aloud, so that they can get the information without having to scroll to try to find it **\*\*NRN\*\***
  - The user with limited vision *but who does not use AT* may need the accessible alternative to the animation to be presented as on reflowable on-screen text, so that they can get the information even if they can't view a large enough area to take in the full animation while it is happening **\*\*NRN\*\***
- 4. Use without color perception
- 5. Use with limited color perception
- 6. Use with limited depth perception
- 7. Use with limited orientation or spatial tracking
- 8. Use with photosensitivity (too much or too little)
- Hearing & Auditory
  - 9. Use without hearing
  - 10. Use with limited hearing
  - 11. Use with limited auditory processing (speech)
  - 12. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time)
- Sensory Intersections
  - 13. Use without vision and hearing
  - 14. Use with vestibular issues
  - 15. Use without spatial auditory awareness or perception (needs diegetic sound)
- Functional Needs: Physical
  - Mobility
    - 16. Use without mobility
    - 17. Use with limited mobility
    - 18. Use with limited reach or range
  - Motor
    - 19. Use without hands
    - 20. Use without multiple touchpoint gesture
    - 21. Use with limited strength
    - 22. Use without fine point control
    - 23. Use without physical tracking speed
    - 24. Use with tremors
  - Physical & Sensory Intersections
    - 25. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
    - 26. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
    - 27. Use with chronic pain impacting input or interaction modality
- Speech

- 28. Use without vocalization
- 29. Use with limited vocalization or volume
- Functional Needs: Cognitive
  - Attention
    - 30. Use with limited ability to focus attention
      - **The user may need a simple way to see the animation again, so that they can take in the animation if they are distracted and miss it. \*\*NRN\*\***
    - 31. Use with limited ability to direct attention
    - 32. Use with limited ability to shift attention
  - Language & Communication
    - 33. Use with limited ability to comprehend spoken language
    - 34. Use without ability to read
    - 35. Use with limited ability to recognize written language
    - 36. Use with limited ability to comprehend written language
    - 37. Use without ability to write
    - 38. Use with limited ability to correctly write (or type) words and use punctuation
    - 39. Use without understanding symbols
    - 40. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
      - **The user needs the animation to avoid relying on subtle facial expressions, culture-specific gestures and pop culture references, so they can understand the issue regardless of their background and prior exposure to animations \*\*NRN\*\***
  - Learning
    - 41. Use with limited ability of math and numeric concepts
    - 42. Use with limited compositional skill (simultaneous thinking and input)
    - 43. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)
  - Memory
    - 44. Use with limited short-term or working memory
    - 45. Use with limited medium or long-term memory
    - 46. Use with limited sensory memory
  - Executive
    - 47. Use with limited planning, organization, sequencing, and execution ability
    - 48. Use with limited emotional control and self monitoring
    - 49. Use with limited judgement
  - Mental Health
    - 50. Use with debilitating fear or anxiety
  - Cognitive & Sensory Intersections
    - 51. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
    - 52. Use with limited phonological or phonemic awareness

- Functional Needs: Independence
  - Independence
    - 53. Use without autonomy or agency
    - 54. Use without privacy

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## **25. TO BE COMPLETED Error on form input/System does not visually indicate required input, Submit button enabled, error message**

- User action: User skips inputs that are not marked as required and submits form
- System Response/Unintended Result: System displays an error message at the
- User Response:
  - User
- Severity:
- **Scope: Correct Errors**
  - **Error Message**
- Common User Needs:
  - TBC
- Functional Needs: Essential
  - Essential
    - 55. Use without physical harm or risk (to self or others within a physical environment)
- Functional Needs: Sensory
  - Vision & Visual
    - 56. Use without vision
    - 57. Use with limited vision
    - 58. Use without color perception
    - 59. Use with limited color perception
    - 60. Use with limited depth perception
    - 61. Use with limited orientation or spatial tracking
    - 62. Use with photosensitivity (too much or too little)
  - Hearing & Auditory
    - 63. Use without hearing
    - 64. Use with limited hearing
    - 65. Use with limited auditory processing (speech)
    - 66. Use with sensorineural hearing loss (limited frequency range) related to age or Presbycusis (gradual loss over time)
  - Sensory Intersections
    - 67. Use without vision and hearing
    - 68. Use with vestibular issues
    - 69. Use without spatial auditory awareness or perception (needs diegetic sound)
- Functional Needs: Physical

- Mobility
  - 70. Use without mobility
  - 71. Use with limited mobility
  - 72. Use with limited reach or range
- Motor
  - 73. Use without hands
  - 74. Use without multiple touchpoint gesture
  - 75. Use with limited strength
  - 76. Use without fine point control
  - 77. Use without physical tracking speed
  - 78. Use with tremors
- Physical & Sensory Intersections
  - 79. Use with limited kinesthetic perception (orientation, position, weight distribution, movement)
  - 80. Use with limited tactile perception, sensory processing, or touch pressure sensitivity
  - 81. Use with chronic pain impacting input or interaction modality
- Speech
  - 82. Use without vocalization
  - 83. Use with limited vocalization or volume
- Functional Needs: Cognitive
  - Attention
    - 84. Use with limited ability to focus attention
    - 85. Use with limited ability to direct attention
    - 86. Use with limited ability to shift attention
  - Language & Communication
    - 87. Use with limited ability to comprehend spoken language
    - 88. Use without ability to read
    - 89. Use with limited ability to recognize written language
    - 90. Use with limited ability to comprehend written language
    - 91. Use without ability to write
    - 92. Use with limited ability to correctly write (or type) words and use punctuation
    - 93. Use without understanding symbols
    - 94. Use without understanding metaphors, idioms, euphemisms, or specific dialect of culture or location
  - Learning
    - 95. Use with limited ability of math and numeric concepts
    - 96. Use with limited compositional skill (simultaneous thinking and input)
    - 97. Use with limited coordinational skill (motoric skills, visual-spatial organizational memory, and social)
  - Memory
    - 98. Use with limited short-term or working memory
    - 99. Use with limited medium or long-term memory

- 100. Use with limited sensory memory
- Executive
  - 101. Use with limited planning, organization, sequencing, and execution ability
  - 102. Use with limited emotional control and self monitoring
  - 103. Use with limited judgement
- Mental Health
  - 104. Use with debilitating fear or anxiety
- Cognitive & Sensory Intersections
  - 105. Use with interocular transfer of visual memory (retrieval based on limited acuity in a single eye)
  - 106. Use with limited phonological or phonemic awareness
- Functional Needs: Independence
  - Independence
    - 107. Use without autonomy or agency
    - 108. Use without privacy