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USER NEEDS SUMMARY – Working Document V 1.8

This is a draft summary of user needs as they relate to Information and Communication Technologies. The goal is to create a model for listing user needs independent of particular standards and regulation – but that can be used to capture existing user needs in a fashion that leads to better understanding of the needs by product developers and importance of them to product operation.

This summary is based on the fact that all users (with or without disabilities) need to:

- 1. be able to PERCEIVE all information presented by the product:**
- 2. be able to OPERATE the Product**
- 3. be able to UNDERSTAND operation and output from Product**
- 4. be able to USE THEIR ASSISTIVE TECHNOLOGIES with the product** (personal / workstation)

More specifically

- **be able to PERCEIVE all**
 - static displayed info (including labels, signs, text, manuals, etc)
 - info presented via dynamic displays, (including screens, alerts, alarms, and other output)
 - existence and location of actionable components including buttons, controls, latches, etc)
 - status of controls and indicators (including progress indicators)
 - feedback from operation
- **be able to OPERATE Product**
 - be able to invoke and carry out all functions (using at least one method)
 - be able to complete actions and tasks within the time allowed (by life, competition, productivity requirements, etc.)
 - won't accidentally activate functions
 - be able to recover from errors (physical or cognitive errors)
 - have equivalent, security and privacy
 - not cause health risk (e.g. seizure etc.)
 - be able to efficiently navigate product
- **be able to UNDERSTAND**
 - understand how to use (including discovery and activation of any access features needed)
 - be able to orient themselves to products
 - understand the output or displayed material
- **be able to USE THEIR ASSISTIVE TECHNOLOGIES with the product**
 - (particularly personal and workstation)

Each of these is expanded providing specific problems faced by people with disabilities in accomplishing these essentials and the user needs for overcoming these problems and having access to the information and communication technology products.

This Summary of Needs is restricted to Information and Communication products and does not cover architectural and other aspects of accessibility.

This is a work in progress. Notification of any errors or omissions is appreciated.

Basic	Problems using products	User Needs
<p>Users need to be able to PERCEIVE the information presented by the product including:</p>		
<p>Static displayed info</p> <ul style="list-style-type: none"> - labels - signs - manuals - text - etc. 	<p>People who are blind</p> <ul style="list-style-type: none"> • Can't see (to read) <ul style="list-style-type: none"> ○ printed labels on keys, controls, slots, etc ○ printed signs near device, or instructions printed on device. ○ manuals or other printed material provided with product. • In electronic documents - can't access information presented (only) via graphics • Can't find public devices (can't see where device is or see signs giving location) <p>People with Low Vision</p> <ul style="list-style-type: none"> • Can't see (to read) signs and labels: <ul style="list-style-type: none"> ○ if text is too small for them ○ if contrast with background is too low ○ if text is presented as small raised letters (same color as background) ○ if information is coded with color only (color deficiency). ○ if there is glare - if they have light sensitivity <p>(Many problems same as blindness)</p> <p>People with Physical Disabilities</p> <ul style="list-style-type: none"> • Often cannot re-position themselves to see information if not in easy sightline • May not be able to see due to glare/reflections (and cannot re-position enough) 	<p>Some users with disabilities:</p> <ul style="list-style-type: none"> • Need to have all static information required for use provided via speech output or large raised text. <ul style="list-style-type: none"> ○ NOTE 1: Braille is also very useful to people who know it where it is practical to put it on the product. But it would be in addition to speech not instead since most people who are blind do not know braille including those who acquire it late in life. ○ NOTE 2: Speech output also important for those with cognitive disabilities (see 'UNDERSTAND' below) ○ NOTE 3: Raised text would need to be approx 3/4 inch high • Need to sufficient contrast between all printed information and its background • Need to have text presented in large easy to read fonts • Need to avoid glare • Need to have information within viewable range of people in wheelchairs and those of short stature.
<p>info presented via dynamic displays,</p> <ul style="list-style-type: none"> - Screens - alerts, - alarms, and - other output 	<p>People who are blind</p> <ul style="list-style-type: none"> • Can't see what is displayed on visual display units. (all types) • Can't determine current function of Soft keys (where key function is dynamic with label shown on dynamic display like LCD.) <p>People with Low Vision</p> <ul style="list-style-type: none"> • Same problems as static text (size, contrast, color) – (see above) • glare – from environment or too bright a screen • miss information presented temporarily where they are not looking • sometimes cannot track moving/scrolling text <p>People who are Deaf</p> <ul style="list-style-type: none"> • Cannot hear information presented through <ul style="list-style-type: none"> ○ Speech ○ Tones ○ Natural machine sounds <p>People who are Hard of Hearing</p> <ul style="list-style-type: none"> • May miss any information presented auditorily because <ul style="list-style-type: none"> ○ At a frequency they can't hear ○ Background noise blocks it or interferes with it (incl echos) ○ Too soft ○ Poor quality speech ○ Speech too fast – and user can't slow it down <p>People with Physical Disabilities</p> <ul style="list-style-type: none"> • Can't maneuver to see display or avoid glare <p>People with Cognitive Disabilities</p> <ul style="list-style-type: none"> • Distracted by dynamic movements on screen 	<p>Some users with disabilities:</p> <ul style="list-style-type: none"> • Need to have all DYNAMIC visual information required for use also provided via speech output <ul style="list-style-type: none"> ○ NOTE 1: Dynamic braille displays are very expensive and impractical for inclusion in devices. ○ NOTE 2: Speech output also important for those with cognitive disabilities (see 'UNDERSTAND' below) ○ NOTE 3: Raised text won't work for dynamic information. • Need a means for identifying all keys and controls via speech • Need sufficient contrast between all display information and its background • Need to have text presented in large easy to read fonts • Need to avoid glare • Need to have information within viewable range of people in wheelchairs and those of short stature. • Need to have <u>all</u> auditory information required for use also available in visual or tactile form <ul style="list-style-type: none"> ○ NOTE 1: Tactile presentation only useful for products that will always be in contact with user's body. • Need to have auditory events, alerts etc, be multi-frequency so that they can hear it • Need to sufficient volume (preferably adjustable) for audio output. •

<p>- existence and location of actionable components</p> <ul style="list-style-type: none"> - buttons, - controls, - latches, - etc) <p>(find them and re-find them)</p>	<p>People who are blind</p> <ul style="list-style-type: none"> • Can't determine number, size, location or function of controls on <ul style="list-style-type: none"> 1) touchscreens 2) flat membrane keypads. • Controls in a large featureless group cannot be relocated easily even if known to be there • Switch or control in an obscure location may not be discoverable even if visible. • Can be fooled by Phantom buttons (tactile) – (Things that feel like buttons but are not. E.g. a Logo, a round flat raised bolt head, a styling feature) • Can't type on a non-touchtypeable keyboard <p>People with Low Vision</p> <ul style="list-style-type: none"> • Can't find buttons that don't contrast with background. (won't feel where nothing is visible or expected) • Phantom buttons (visual) (Logos, styling that looks like button when blurred) • Can't locate where the cursor is on the screen <p>People with Cognitive Disabilities</p> <ul style="list-style-type: none"> • Don't recognize stylized control as a control. 	<p>Some users with disabilities:</p> <ul style="list-style-type: none"> • Need a means to access all product functionality via tactilely discernable controls. • Need sufficient landmarks (nibs, groupings, spacing) to be able to locate controls easily tactilely once they have identified them (per above) • Need to have controls visually contrast with their surroundings so they can be located with low vision. • Need to have any keyboard be operable without site. • Need to have controls be in places where they can be easily found with poor and with no sight. • Need to have pointing cursors (on screen) be large enough to be visible with low vision. • Need to have logos, and other details not look like or feel like buttons or controls.
<p>status of controls and indicators</p> <ul style="list-style-type: none"> - includes PROGRESS indicators 	<p>People who are blind</p> <ul style="list-style-type: none"> • Cannot tell status of visual indicators (LEDs, on screen indicators etc.) • Cannot tell the status of switches or controls that are not tactilely different in different states. (or where tactile difference is too small) <p>People with Low Vision</p> <ul style="list-style-type: none"> • Cannot read visual indicators with low vision if indicator is not bold • Cannot distinguish between some colors used to indicate status. • Can't see or read small icons for status. • Can't see cursors unless large, high contrast. Static harder than dynamic to spot. <p>People who are Deaf</p> <ul style="list-style-type: none"> • Cannot hear audio indicators of status • Cannot hear natural sounds (e.g. machine running, stalled, busy etc). <p>People who are Hard of Hearing</p> <ul style="list-style-type: none"> • May not hear status sounds due to volume, frequency used, background noise, etc. <p>People with Physical Disabilities</p> <ul style="list-style-type: none"> • May not have good line of sight to indicators • May not have tactile sensitivity to detect tactile status indications. <p>People with Cognitive Disabilities</p> <ul style="list-style-type: none"> • May not recognize or understand different indicators 	<p>Some users with disabilities:</p> <ul style="list-style-type: none"> • Need an auditory or tactile equivalent to <u>any</u> visual indicators or operational cues, man-made or natural. • Need a visual or tactile indicator for <u>any</u> auditory indicators or operational cues, man-made or natural. • Need visual or auditory alternative to any <u>subtle</u> tactile feedback. • Need visual indicators to be visible with low vision. • Need all indications that are encoded (or presented) with color to be encoded (marked) in some none color way as well. • Need large high contrast pointer cursors. • Need to sufficient volume for audio cues. • Need indicators and cues to be obvious or explained.
<p>feedback from operation</p>	<p>People who are blind</p> <ul style="list-style-type: none"> • Cannot see visual feedback of operation <p>People with Low Vision</p> <ul style="list-style-type: none"> • Cannot see visual feedback of operation unless large, bold. <p>People who are Deaf</p> <ul style="list-style-type: none"> • Cannot hear auditory feedback of operation <p>People who are Hard of Hearing</p> <ul style="list-style-type: none"> • Often cannot hear auditory feedback of operation due to <ul style="list-style-type: none"> o Volume o Frequency used o Background noise o Speech feedback not clear or repeatable. <p>People with Physical Disabilities</p> <ul style="list-style-type: none"> • May not be able to feel tactile feedback due to insensitivity or impact of hand or use of artificial hand, stick, splint etc to operate the control. <p>People with Cognitive Disabilities</p> <ul style="list-style-type: none"> • Feedback to subtle or not directly tied to action. 	<p>Some users with disabilities:</p> <ul style="list-style-type: none"> • Need visual feedback that is dramatic (Visual from 10 ft) • while others need it to be audio or tactile feedback <p>[much the same as above] [Combine status and operational feedback???)</p>

be able to OPERATE the Product		
<p>be able to invoke and carry out all functions</p> <p>(using at least one method)</p>	<p>People who are blind</p> <ul style="list-style-type: none"> • Can't use controls that require eye-hand coordination <ul style="list-style-type: none"> ◦ Pointing devices including mice, trackballs, etc. ◦ Touchscreens of any type • Can't use devices with touch activated controls (can't explore tactilely) • Can't use products that require presence of iris or eyes. (e.g. for identification) <p>People with Low Vision</p> <ul style="list-style-type: none"> • Difficult to use device with eye-hand coordination. <p>People who are Deaf</p> <ul style="list-style-type: none"> • Many cannot use if speech input is only way to do some functions. • Cannot operate devices where actions are in response to speech (only). <p>People with Physical Disabilities</p> <ul style="list-style-type: none"> • Can't operate devices if operation <u>requires</u> (i.e. no other way to do function) <ul style="list-style-type: none"> ◦ Too much force ◦ Too much reach ◦ Too much stamina (including long operation of controls with arm extended or holding handset to head for long period unless able to prop or rest arm) ◦ Contact with body (so that artificial hands, mouthsticks etc cannot be used) ◦ Simultaneous operation of two parts (modifier keys, two latches, etc) ◦ Tight grasping ◦ Pinching ◦ Twisting of the wrist ◦ Fine motor control or manipulations (i.e. can't operate with closed fist). • Can't use products that require presence of fingerprints or other specific body parts or organs.(e.g. for identification) 	<p>Some users with disabilities:</p> <ul style="list-style-type: none"> • Need to be able to operate all functionality using only tactilely discernable controls coupled with audio or tactile feedback/display (no vision required). • Need to not have touch sensitive or very light touch controls where they would be touched while tactilely finding keys they must use to operate device. • Need alternate identification means if biometrics are used for identification. • Need alternate method to operate any speech controlled functions. • Need to be able to access all computer software functionality from the keyboard (or keyboard emulator). • Need method to operate product that does not require <ul style="list-style-type: none"> ◦ simultaneous actions, ◦ much force, ◦ much reach, ◦ much stamina, ◦ tight grasping, ◦ pinching, ◦ twisting of the wrist or ◦ direct body contact.
<p>be able to complete actions and tasks within the time allowed</p> <p>(by life, competition, productivity requirements, etc.)</p>	<p>People who are blind</p> <ul style="list-style-type: none"> • must use non-visual techniques that are often slower requiring more time than usual to read/listen to output, explore and locate controls etc. <p>People with Low Vision</p> <ul style="list-style-type: none"> • often take longer to read text and locate controls <p>People who are Deaf</p> <ul style="list-style-type: none"> • may be reading information in a second language (sign language being first) • may be communicating (or operating phone system) through a relay/interpreter which introduces delays. <p>People who are Hard of Hearing</p> <ul style="list-style-type: none"> • may have to listen more than once to get audio information. <p>People with Physical Disabilities</p> <ul style="list-style-type: none"> • may take longer to read (due to head movement), to position themselves, to reach or to operate controls <p>People with Cognitive Disabilities</p> <ul style="list-style-type: none"> • may take longer to remember, to look things up, to figure out information and to operate the controls. <p>All of these can cause problems if</p> <ul style="list-style-type: none"> ◦ Information or messages are displayed for fixed period and then disappear. ◦ Users are only given a limited amount of time to operate device before it resets or moves on. ◦ Text moves on them while they are trying to read it. 	<p>Some users with disabilities:</p> <ul style="list-style-type: none"> • Need to have all messages either stay until dismissed or have a mechanism to keep message on screen or easily recall it. • Need to have ability to either <ul style="list-style-type: none"> ◦ Have not timeouts or ◦ Have ability to urn off timeouts or ◦ Be able to set timeouts to 10 times default value or ◦ Be warned when timeout is coming and be provided with ability to extend timeou except where it is impossible to do so. • Need to have a way to turn off or freeze any moving text.

<p>won't accidentally activate functions</p>	<p>People who are blind</p> <ul style="list-style-type: none"> • Might touch “touch sensitive” controls or screen buttons while tactily exploring • Might miss warning signs or icons that are presented visually • Might bump low activation force switch(es) while tactily exploring. <p>People with Low Vision</p> <ul style="list-style-type: none"> • Might bump low contrast switches/controls that they do not see. <p>People who are Deaf or Hard of Hearing</p> <ul style="list-style-type: none"> • May not detect alert tone and operate device when unsafe. <p>People with Physical Disabilities</p> <ul style="list-style-type: none"> • Might activate functions due to extra body movements (tremor, chorea) • Might activate functions when resting arm while reaching. <p>People with Cognitive Disabilities</p> <ul style="list-style-type: none"> • Might not understand purpose of control (or control changes due to softkey). 	<p>Some users with disabilities:</p> <ul style="list-style-type: none"> • Need to have products designed so they can be tactily explored without activation. • Need to have products that don't rely on users seeing hazards or warnings in order to use products safely. • Need to have products that don't rely on users hearing hazards or warnings in order to use products safely. • Need to have products where hazards are obvious and easy to avoid, hard to trigger.
<p>be able to recover from errors (physical or cognitive errors)</p>	<p>People who are blind or have low vision.</p> <ul style="list-style-type: none"> • May not detect error if indication is visual • May not be able to perceive contextual cues (if visual only) to know they did something wrong or unintended (when not an ‘error’ to the device). <p>People who are Deaf</p> <ul style="list-style-type: none"> • Will not hear auditory ‘error’ sounds. <p>People who are Hard of Hearing</p> <ul style="list-style-type: none"> • May not hear auditory ‘error’ sounds or be able to distinguish between them. <p>ALL Disabilities</p> <ul style="list-style-type: none"> • User may not be able to figure out how to go back and undo the error. 	<p>Some users with disabilities:</p> <ul style="list-style-type: none"> • Need a mechanism to go back and undo the last thing(s) they did – unless impossible. • Need good auditory and visual indications when things happen so that they can detect errors. • Need to be notified if the product detects errors made by the user.
<p>have equivalent, security and privacy</p>	<p>People who are blind</p> <ul style="list-style-type: none"> • Have more difficulty detecting people looking over shoulder • If no headphone or handset – information is broadcast to others via speaker. <p>People with Low Vision</p> <ul style="list-style-type: none"> • Larger print makes it easier for others to look over shoulder <p>People who are Deaf</p> <ul style="list-style-type: none"> • May not detect sensitive information being said aloud <p>People who are Hard of Hearing</p> <ul style="list-style-type: none"> • Louder volume may allow eavesdropping – even with headphones. <ul style="list-style-type: none"> ◦ Use may not realize volume of audio <p>People with Physical Disabilities</p> <ul style="list-style-type: none"> • In wheelchair, body doesn't block view of sensitive information like someone standing. <p>People with Cognitive Disabilities</p> <ul style="list-style-type: none"> • Less able to determine when information should be kept private. 	<p>Some users with disabilities:</p> <ul style="list-style-type: none"> • Need to have product designed to help protect privacy and security of their information even if they are not able to do the “expected things to protect it themselves.
<p>not cause health risk (e.g. seizure etc.)</p>	<p>People who are blind</p> <ul style="list-style-type: none"> • Can't see to avoid hazards that are visual • Can't see warning signs, colors, markers etc. • If using headphones – they are less aware of surroundings (and not used to it). <p>People who are Deaf or Hard of Hearing</p> <ul style="list-style-type: none"> • May miss auditory warnings or sounds that indicate device failure. <p>People with Physical Disabilities</p> <ul style="list-style-type: none"> • May hit objects harder than usual and cause injury. • May not sense when they are injuring themselves. <p>People with Photosensitive Epilepsy</p> <ul style="list-style-type: none"> • May have seizure triggered by provocative visual stimuli. <p>People with Allergies and other sensitivities.</p> <ul style="list-style-type: none"> • May have adverse reactions to materials, electro-magnetic emissions, fumes and other adverse aspects of products they touch or are near. 	<p>Some users with disabilities:</p> <ul style="list-style-type: none"> • Need products that don't assume body parts will never stray into openings or that only gentle body movements will occur around the products (unless required by task). <p>Need to have products that take into account their special visual, physical, chemical, etc. sensitivities so that they are not prevented from using products except when the nature of the product or task would prevent them. (e.g. not by product design).</p>
<p>be able to efficiently navigate product</p>	<p>People who are blind</p> <ul style="list-style-type: none"> • Often have to wait for unnecessary audio before getting to desired information <p>People with Physical Disabilities</p> <ul style="list-style-type: none"> • Have trouble with navigation requiring many repeated actions to navigate. <p>People with Cognitive Disabilities</p> <ul style="list-style-type: none"> • Have trouble with hierarchical structures 	<p>Some users with disabilities:</p> <p>Need to have alternate modes of operation that are efficient enough to allow them to be able to compete in education and employment settings.</p>

<p>be able to UNDERSTAND</p>		
<p>understand how to use (including discovery and activation of any access features needed)</p>	<p>ALL Disabilities</p> <ul style="list-style-type: none"> • May have trouble understanding how to turn on special access features they need. • May have trouble understanding who to operate it if different than standard users. <p>People who are Deaf</p> <ul style="list-style-type: none"> • English (or the spoken/written language used on the product) may be different than their natural (first) language (e.g. if it is sign language). <p>People with Cognitive Disabilities</p> <ul style="list-style-type: none"> • Cannot read labels, signs, manuals etc due to reading limitations • May have trouble understanding directions – especially if printed. • May have trouble remembering steps for use. • May have trouble getting it turned on – and therefore active. • May be confused by options, buttons, controls, that they don't need or use. • Icons and symbols may not make sense to them – and they don't remember. • Product may differ from real life experience enough to leave them at a loss. 	<p>Some users with disabilities:</p> <ul style="list-style-type: none"> • Need to have clear and easy activation mechanisms for any access features • Need to have language used on products to be as easy to understand as possible given the device and task. • Need to have printed text read aloud to them. • Need to have steps for operation minimized and clearly described. • Need cues to assist them in multistep operations. • Need to have simple interfaces that only require them to deal with the controls they need. (advanced or optional controls removed in some fashion).
<p>be able to orient themselves to products</p>	<p>People who are blind (or have low vision)</p> <ul style="list-style-type: none"> • Have a more difficult time getting a gestalt since they cannot see the overall visual layout or organization. • Complex layouts can behave like a maze for someone navigating with arrowkeys. <p>People with Cognitive Disabilities (mild and moderate)</p> <ul style="list-style-type: none"> • Have trouble remembering the organization of a product, its menus etc. • Have a harder time with any hierarchical structures 	<p>Some users with disabilities:</p> <ul style="list-style-type: none"> • Need way to get overview and orient themselves to product and functions/parts without relying on visual presentation or markings on product. • Need way to understand product if they don't think hierarchically very well.
<p>understand the output or displayed material (even after they perceive it accurately) see also “perceive” above</p>	<p>People who are blind</p> <ul style="list-style-type: none"> • Output often only makes sense visually. Reading it is confusing (e.g. “select item from list at the right” when they get to it by pressing down arrow). • Have difficulty with any simultaneous presentation of audio output and audio description of visual information (e.g. reading of screen information while playing audio). <p>People who are Deaf</p> <ul style="list-style-type: none"> • Reading skills – English may not be primary language (ASL) • Can have difficulty with simultaneous presentation of visual information and (visual) captions of auditory information. <p>People with Cognitive Disabilities</p> <ul style="list-style-type: none"> • Language may be too complex for them • Long or complex messages may tax their memory abilities. • Use of idiom or jargon may make it hard to understand. • Structures, tabular or hierarchical information may be difficult. 	<p>Some users with disabilities:</p> <ul style="list-style-type: none"> • Need descriptions, instructions and cues to match audio operation – not just visual operation • Need to have any printed material be worded as clearly and simply as possible. • Need to have any printed material read to them. • Need to have audio generated by access features not interfere with any other audio generated by device. • Need to have visual information generated by access features (such as captions) not occur simultaneously with other visual information they must view (and then disappear before they can read the captions).

be able to USE THEIR ASSISTIVE TECHNOLOGIES (in addition)		
<p>Ability to use their AT to control the product</p> <p>(not always possible with public devices but common with personal or office workstation technologies).</p> <p>NOTE: to replace built-in access, AT must allow all of the above basics to be met.</p>	<p>All Disabilities</p> <ul style="list-style-type: none"> • Cannot use their AT to access products if <ul style="list-style-type: none"> ○ Product is in public and they will not have their technology with them, ○ They do not have permission to use their AT with the product <ul style="list-style-type: none"> ▪ E.g. cannot install AT software on Library systems ○ They are not able to connect their AT to it • Cannot use their AT if the device interferes with it • Cannot use their AT if they are not easily able to find the connection mechanism given their disability • Need to have full functionality of the product available to them via their AT. <p>People who are blind</p> <ul style="list-style-type: none"> • Would need all visual information to be available to their AT in machine readable form via a standard connection mechanism. • Would need to be able to activate all functionality from their AT (or from tactile controls on the product) <p>People with Low Vision</p> <ul style="list-style-type: none"> • Would need all visual information to be available in machine readable form to their AT via a standard connection mechanism so that the AT could enlarge it or read it. <p>People who are Deaf</p> <ul style="list-style-type: none"> • Would need all auditory information to be available to their AT in machine readable form via a standard connection mechanism. <p>People who are Hard of Hearing</p> <ul style="list-style-type: none"> • Would need all audio information to be available via a standard connection mechanism that is compatible with their assistive listening devices (ALDs). <ul style="list-style-type: none"> ○ Need a standard audio connector to plug their ALD ○ For something held up to the ear, it should be T-Coil compatible. <p>People with Physical Disabilities</p> <ul style="list-style-type: none"> • Can't use products that aren't fully operable with artificial hand, stick, stylus etc. • Need connection point that allow operation of all controls <p>People with Cognitive Disabilities</p> <ul style="list-style-type: none"> • Would need all information to be available in machine readable form to their AT via a standard connection mechanism 	<p>Some users with disabilities:</p> <ul style="list-style-type: none"> • Need to not have product interfere with their AT. • Need to be able to connect their AT • Need to have full functionality of product available through their AT if they have to use their AT to access the product. <ul style="list-style-type: none"> ○ Need to have software use standard system-provided input and output methods. ○ Need to have all displayed text made available to their AT ○ Need information about user interface elements including the identity, operation and state of the element to be available to assistive technology ○ All controls need to be operable from AT • Need to be able to access all computer software functionality from the keyboard (or keyboard emulator) <p>Need to have all controls work with their at manipulators, artificial hands, pointers, etc.</p>