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Universal-Design Requirements for Cross-Platform Electronic Services

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Outline



- Constraints
 - Service provider, user, context, market, channel, device, technical
- Recommendations
- Dos vs. don'ts

Service provider constraints

- Same “corporate” identity on all platforms
- Positive customer experience across channels
- Honoring legal frameworks
- Good legibility
- Consistent look & feel
- ...



User constraints

- Ability diversity
 - Cognition, motor, sensor
 - Age, illness, severity
 - Lingual, memory, learning, problem solving, orientation, focus, attention span
- Background diversity
 - Language
 - Culture
 - Skills/literacy



User constraints, cont'd



- Preference diversity
 - Design (e.g., font, font size, color scheme, user style)
 - Content (e.g., image, audio, ads)
 - Technology (e.g., JavaScript, plugins)
 - Interaction (e.g., scrolling)
- Expectation diversity
 - Useful, efficient, ubiquitous, mature, usable, accessible, ...





Context constraints

- Context diversity
 - Short-time impairments (e.g., sun on screen, car driving)
 - Distance from screen
 - Overhearing surrounding
 - ...
- Task diversity (e.g., ATM; withdrawing cash vs. printout of available amount)

Market constraints



- Device diversity
 - Desktop & tablet PC, smartphone, phone, media reader/player, TV, middleware, ...



Channel constraints

- Channel diversity
 - Offline vs. online
 - 2G (GSM/GPRS), 3G, 4G, WLAN, WiMax, Bluetooth, ...





Device constraints

- Input hardware diversity
 - Mouse, keyboard, T9 keypad, game controller, touch, ...
- Output hardware diversity
 - Screen dimensions, screen colors, audio, tactile, ...



Device constraints, cont'd

- Software, assistive technology, operating system, user agent, and service diversity
 - Varying equipment, installation, configuration, versions



- Different fonts, screen colors, screen resolutions, screen dimensions, ..

Technical constraints

- Lack/confusion of standards
 - e.g., definition of “pixel”
- Standards limitations
 - E.g., WCAG does not cover all accessibility issues
- OS limitations
 - iOS reportedly more accessible than Android
- Software flaws
- SW and HW incompatibilities/conflicts





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- [Abstract submission](#)

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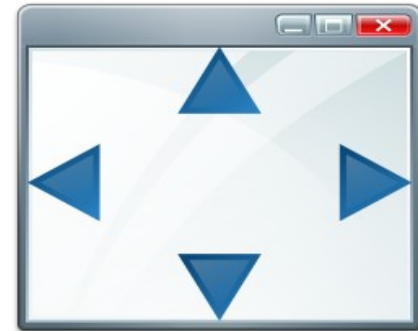


Technical constraints, cont'd

- Different technology strategies
 - Native mobile apps
 - Better control of system resources, Apple/Google/Microsoft/... accessibility guidelines
 - Web apps
 - HW limitations, W3C recommendations
 - Hybrid apps
 - HW limitations, W3C recommendations

Technical constraints, cont'd

- Screen space and colors not costly
- User interaction cumbersome and error-prone





Recommendations from related research

- Open and universally designed solutions with accessible, flexible/adaptive, and personalized multimodal user interfaces
- Minimally exposed profiling with reasonable defaults and opt-ins, combined with privacy-enhancing technology
- (Repeated) education on demand

The don'ts



- No design for all
- No unified user experience
- No device specificity
- No pixel identical rendering
- No fixed grids
- No dedicated stylesheets (e.g., mobile)

The dos, overview

- User first!
- Individual UX
- Content over navigation
- Natural user interfaces
- Intuitive interactivity
- Bottom-up approach (mobile first)
- Web technology for efficient cross-platform accessibility
- Fluid/liquid grid (responsive design)
- Progressive enhancement through feature detection
- Similarity of mobile and accessibility requirements
- WCAG, ARIA, additional requirements (e.g., font family, screen dimensions)
- W3C validators, additional checkers (e.g., Webaim)
- Test with zooming
- Testing stress points
- Testing on as many devices and user agents as possible
- Testing only latest versions
- Simple smartphones rather than phones
- Testing with Rent a Device or emulators
- Relative units WRT container
- Content dimensions relative to text size
- Floating content
 - Content relationships
- Min-width, max-width, min-height, max-height
- Maximum line length
- HTML5, CSS3
- Scripting (JavaScript) for additional logic
- Cross-platform JavaScript libraries
 - hyphenator, css3-mediaqueries, ...
- Style sheets for specification of style
- Media queries
 - (Max-)device-width, device-pixel-ratio, orientation, ...



The dos

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- Individual UX
- Content over navigation
- Natural user interfaces
- Intuitive interactivity





The dos, cont'd

- Bottom-up approach (mobile first)
- Web technology for efficient cross-platform accessibility
- Fluid/liquid grid (responsive design)
- Progressive enhancement through feature detection



The dos, cont'd

- Similarity of mobile and accessibility requirements (MWBP)
- WCAG, ARIA, additional requirements (e.g., font family, screen dimensions)
- W3C validators, additional checkers (e.g., Webaim)



The dos, cont'd



- Test with zooming
- Testing stress points
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The dos, cont'd

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Key take-aways



User first!



Fluid grids



Progressive enhancement & feature detection
= true

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