Accessible Computing

CSCI 497T/597T

Pre-Class Survey

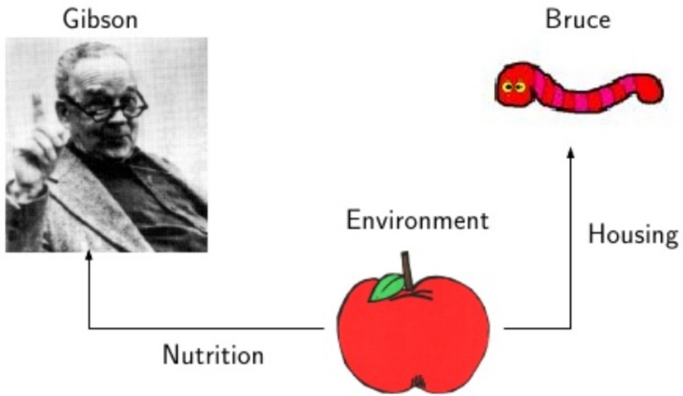
- Interest in technologies that help people with disabilities
- Challenging design and engineering constraints
- Personal experience with disability
- Get out of your comfort zone

Course Overview

• Discussion	25%
• Class participation	10%
• Activities	25%
• Project	40%

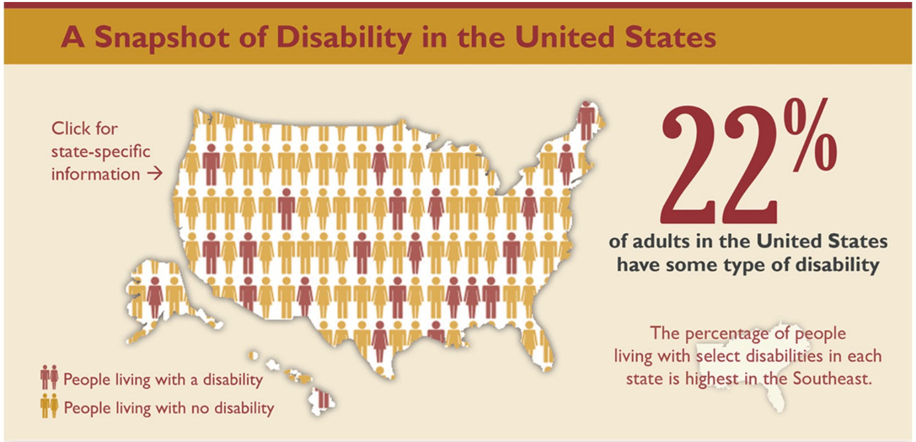
Intro to Accessible Computing

- Accessibility
- Usability
- Assistive technology



Why is Accessibility Important?

- According to the 2011 World Report on Disability produced by the World Health Organization (WHO) and the World Bank [20], more than one billion people around the world live with disabilities.
- http://whqlibdoc.who.int/publications/2011/9789240685215_eng.pdf
- In the United States, approximately 20% of individuals above the age of 18 have some disability.
- http://www.cdc.gov/ncbddd/documents/Disability%20tip%20sheet%20_PHPa_1.pdf



A Snapshot of Disability in the United States

Click for state-specific information →

22%

of adults in the United States have some type of disability

The percentage of people living with select disabilities in each state is highest in the Southeast.

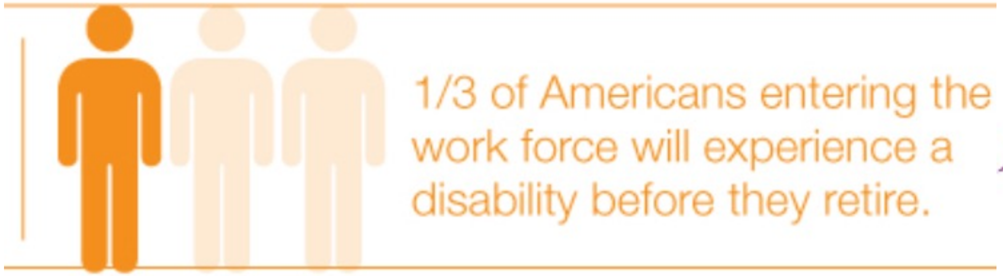
People living with a disability
People living with no disability

http://www.cdc.gov/ncbddd/disabilityandhealth/infographic-disability-impacts-all.html

The reasons for making software accessible to people with disabilities are multifold:

- *Ethical Reasons*
- *Legal Reasons*
- *Technical Reasons*

Benefits and Cost of Accessibility



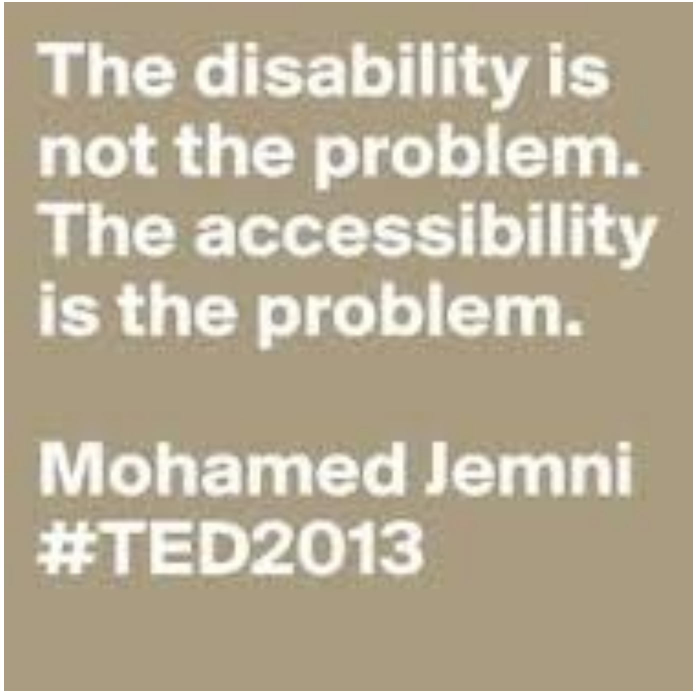
1/3 of Americans entering the work force will experience a disability before they retire.

https://www.usablelife.com/Individuals/Products-Services/Short-Term-Disability.aspx

NFB
National Federation of the Blind

How to Engineer Accessible Software?

- Planning & Requirements
- Design & Implementation
- Testing & Maintenance

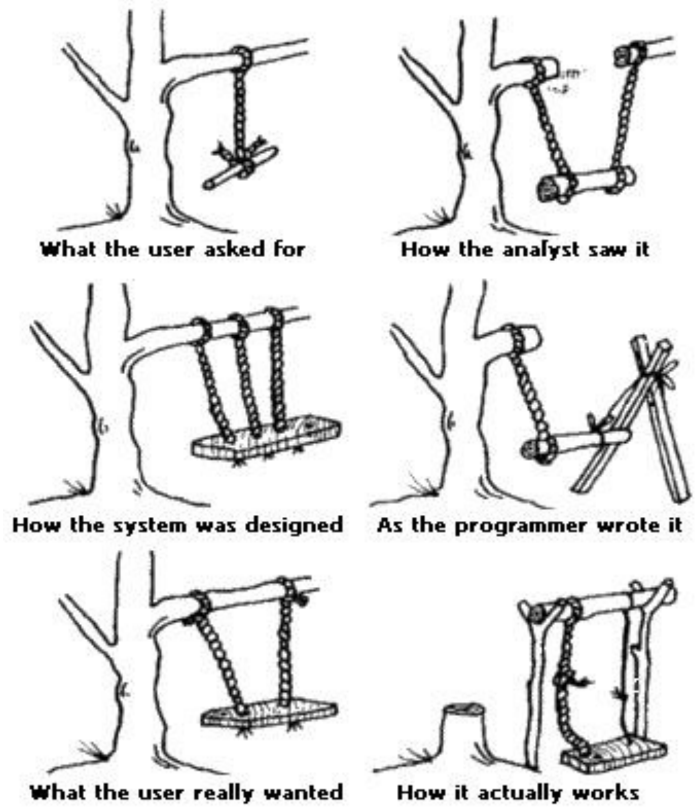


The disability is not the problem. The accessibility is the problem.

Mohamed Jemni
#TED2013

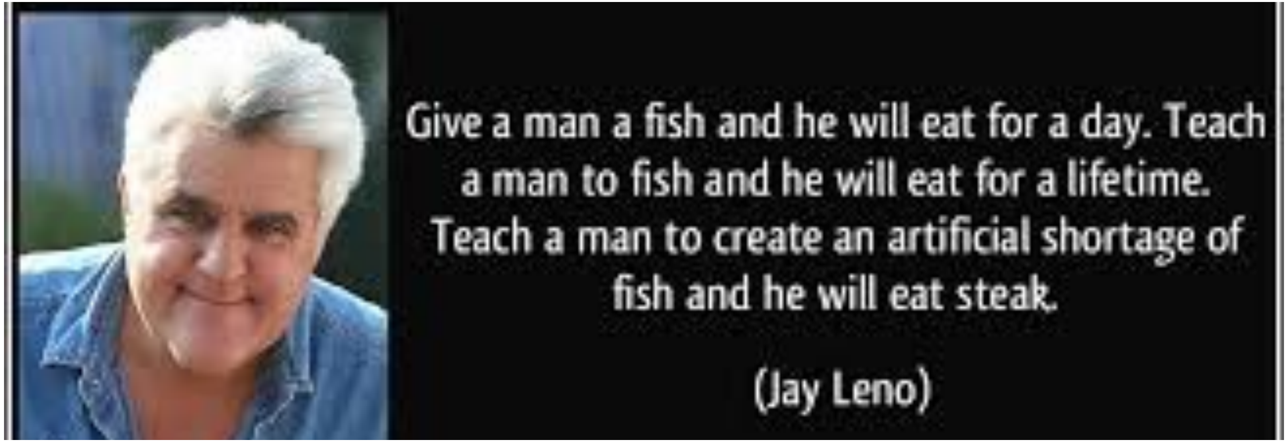
Requirements Engineering

- Requirements elicitation
  - Focus groups, pilot studies
- Requirements analysis
  - Task analysis
- Requirements specification
  - Usability specification
- Requirements validation
  - Walkthroughs


What the user asked for
How the analyst saw it
How the system was designed
As the programmer wrote it
What the user really wanted
How it actually works

Design Accessible Software

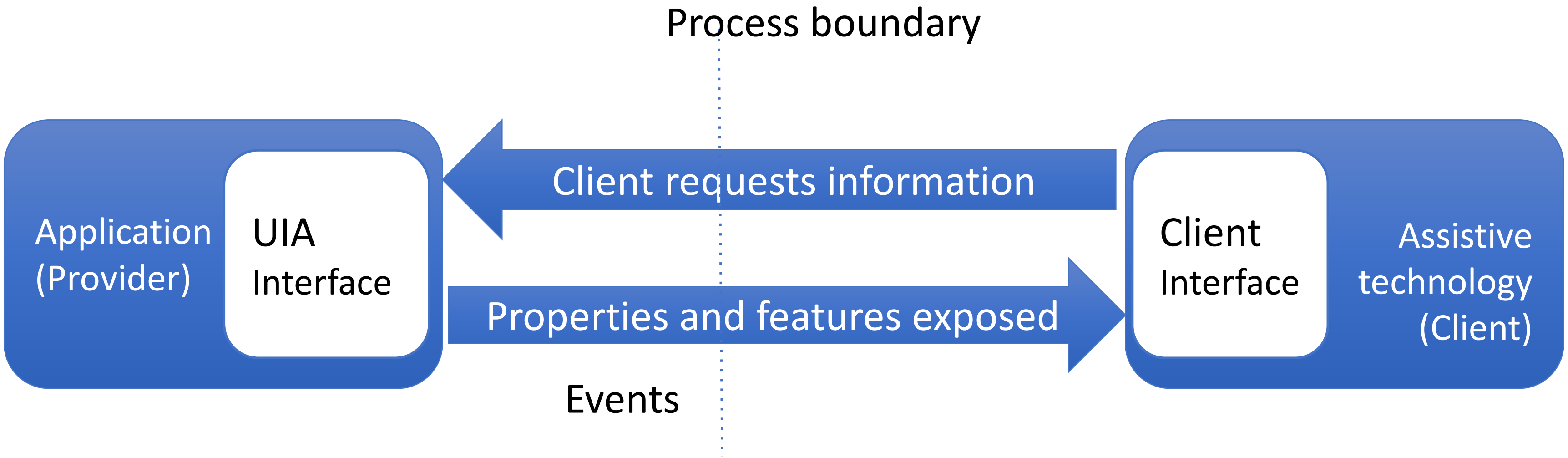
- Desktop applications (e.g., Microsoft UIA)
- Mobile apps (e.g., iOS Accessibility API)
- Websites (e.g., WAI-ARIA)



Give a man a fish and he will eat for a day. Teach a man to fish and he will eat for a lifetime. Teach a man to create an artificial shortage of fish and he will eat steak.

(Jay Leno)

Accessible Desktop Apps



Process boundary

Application (Provider)

UIA Interface

Client requests information

Properties and features exposed

Events

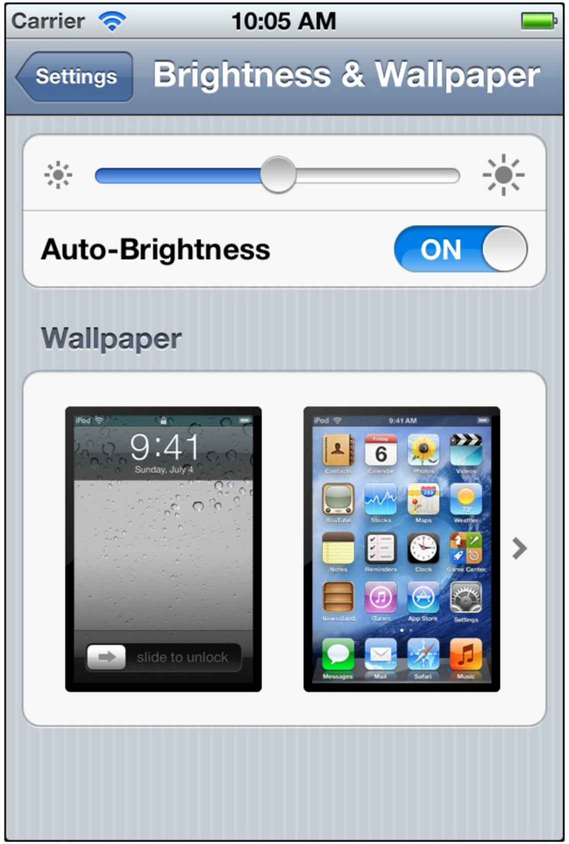
Client Interface

Assistive technology (Client)

Simplified illustration of a UIA (UI Automation) architecture

Accessible iOS Apps (1/2)

- iOS 3.0 and later includes the UI Accessibility programming interface, which is a lightweight API that helps an application provide all the information VoiceOver needs to describe the UI.



"Settings, Back Button"

"Screen Brightness, 50% Adjustable"
Hint: "Swipe up or down with one finger to adjust the value"

"Wallpaper, Heading"

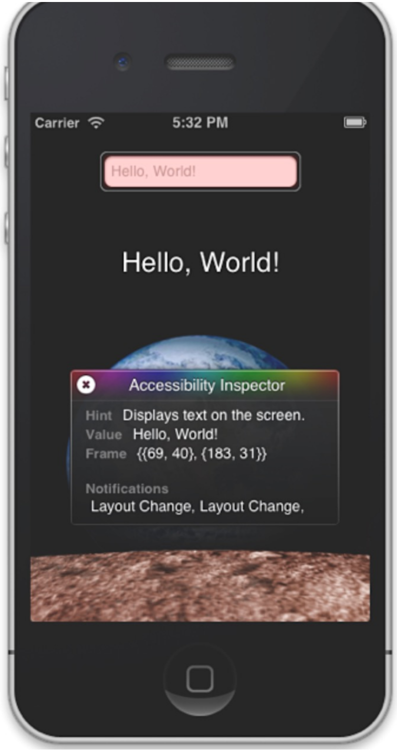
"Change Wallpaper, Button"

"Brightness & Wallpaper, Heading"

"Auto-Brightness, On"
Hint: "Double-tap to toggle setting"

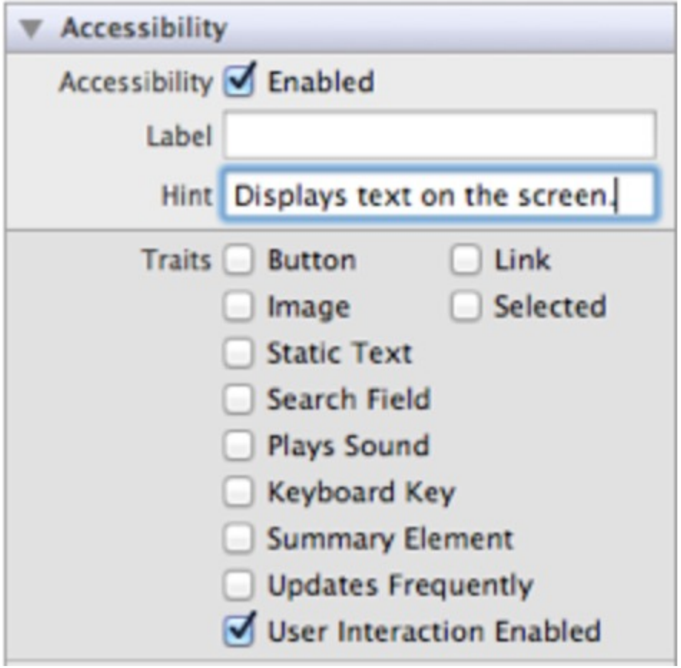
Accessible iOS Apps (2/2)

- iOS Accessibility Inspector displays the accessibility information embedded in your application’s UI and allows you to verify this information when you run your application in iOS Simulator.



Hint Displays text on the screen.
Value Hello, World!
Frame {{69, 40}, {183, 31}}

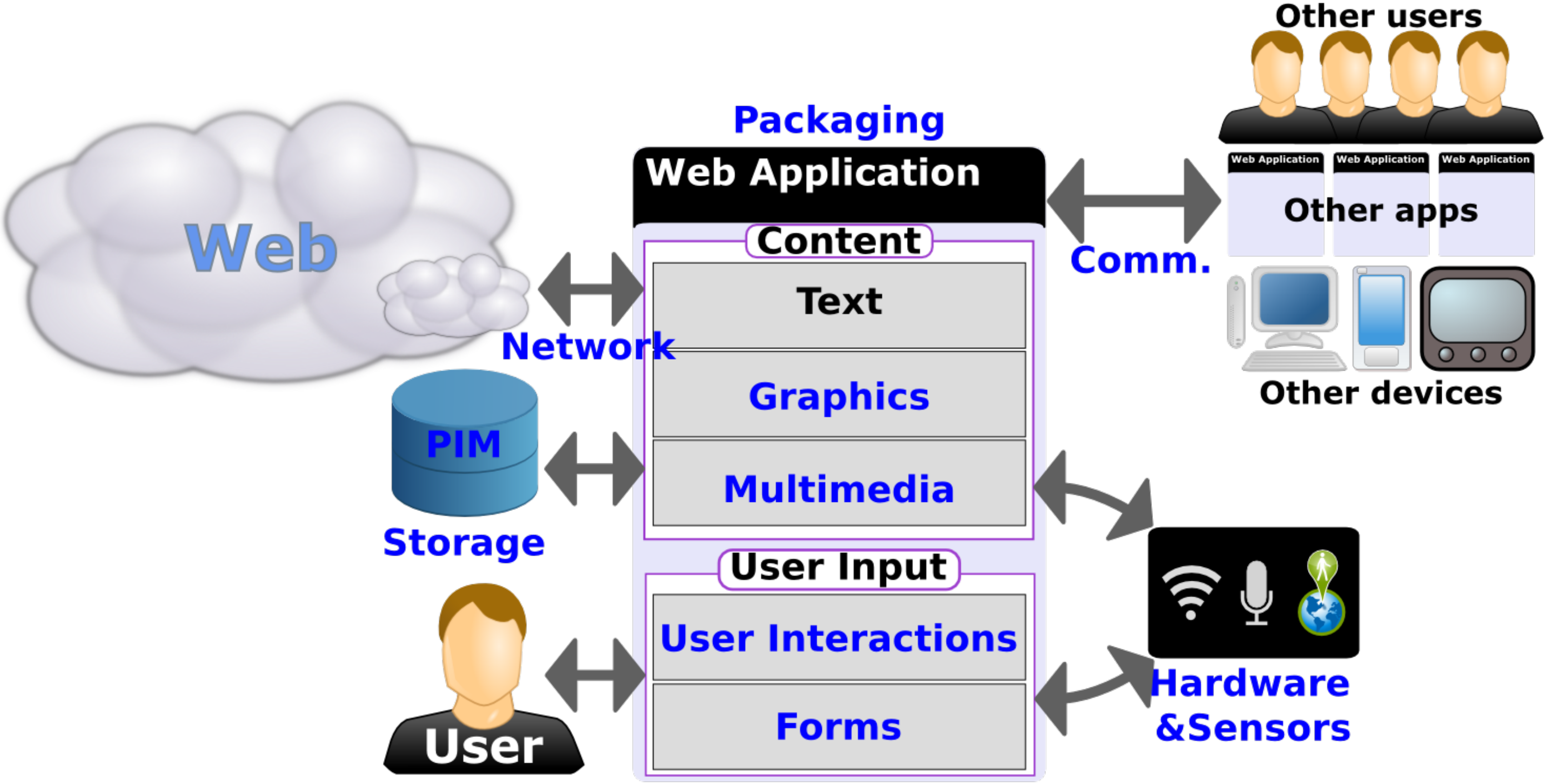
Notifications
Layout Change, Layout Change,



Accessibility ☑ Enabled
Label
Hint Displays text on the screen.

Traits
☐ Button ☐ Link
☐ Image ☐ Selected
☐ Static Text
☐ Search Field
☐ Plays Sound
☐ Keyboard Key
☐ Summary Element
☐ Updates Frequently
☑ User Interaction Enabled

Accessible Websites



Implementation

- Programmatic access

 - is achieved when an application or library of UI functionality exposes the content, interactions, context, and semantics of the UI via a discoverable and publicly documented API.

- Keyboard access

 - everything should be accessible using the keyboard

Accessibility Testing

- Code review
- Automated tools
- User testing

- http://wave.webaim.org

Hi, please could you guide me to the checkout?
Sure... It's just over there
I bet he's pointing

References

- Engineering software for accessibility, Microsoft Press, 2009.
- A Web For Everyone, Rosenfeld Media, 2014
- https://msdn.microsoft.com/en-us/windows/desktop/dd936223.aspx