Natural User Interaction
Reaching Digital Inclusion in Healthcare and Education ICT services

SEIF 2013
- Experimental Research
- NUI Design

Edwin Duque
Ana Vasquez
Medellín, Colombia
Motivations

- The spread use of ICT in government, healthcare, education and basic citizen needs.

- Many software consider accessibility for disability users, but no low literacy accessibility.

- Above items, are bringing “technological discrimination”.

- Adult persons (> 40 years old), often have digital low literacy (developing countries is common), often called digital immigrants.

- Urban vs. Rural areas, literacy.
“I don’t want to make the most efficient use of the computer; I want to make the most efficient use of the human. How do you optimize the human user?”

Bill Buxton
Input Ecology

**Keyboard**
- Good for Accuracy
- Con Limited

**Mouse**
- Good for Moving across the screen efficiently
- Con Indirect

**Stylus**
- Good for Freeform input
- Con Low accuracy
  - Need large controls

**Single point**
- Good for Direct object selection
- Con Not for quick input
  - Low accuracy
  - Need of large controls
  - Mis-hits from fingernails of perceived hit area

**Multi point**
- Good for Manipulating objects
- Social
- Con Not for input
  - Low accuracy
  - Need large controls
  - Support of hands and screen
Essentially, what is "natural" depends on what is already familiar to the user and what is also appropriate at the moment the user is interacting with the system
Interface Iterations

CLI  GUI  NUI
Poll: Thick or Thin, what's your crust choice?
http://slice.thedailymeal.com/feeds/iBag/m=926

Thick and doughty like the grandma slice on the left or thin like this NY-style on the right?

[Photograph: Aaron Mattis]

It's been natural disaster week on the East Coast, and nothing makes you ask yourself the big questions like the threat of destruction. This week's question is, if you were limited to one kind of crust for the rest of your life, would you opt for only thick and doughty crusts like Sicilians, grandma, pan, deep dish, and Greek, or would life be unbearable without thin and crispy pies like NY-style, New Haven, bar pies and Neapolitan?

If you could only eat thick or thin crust for all eternity, which would you choose?
Poll: Thick or Thin, what's your crust choice?

http://slice.thedailymeal.com/feeds/8bag?m=926

Thick and doughy like the grandma slice on the left or thin like this NY-style on the right?

[Photograph: Aaron Mattia]

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If you could only eat thick or thin crust for all of eternity, which would you choose?
Headlines

The Pioneer Woman

- A Sandwich a Day: Egg and Chorizo Torta from Tortas
- Snapshot from Ecuador: Making Chicha at the Edge of the Amazon
- Would You Hire This Man?
- How to brew your own Munich Helles for Oktoberfest

Closet Cooking

- Pasta with Whiskey, Wine, and Mushrooms
- Chipotle Steak Salad
- Spicy Beans
- In the meantime

Just Bentel

- Caffe Press
  Higher Custom

Gilt City
3,300 American Packages

Gilt City deals on reserve
NUI-based technologies such as speech, touch, contextual and environmental awareness, immersive 3D experiences, Multi-Channel and anticipatory computing -- all with the goal of a computer that can see, listen, learn, talk and act smartly on our behalf.

Steve Ballmer.
Inside a Kinect Sensor

- The Kinect contains two cameras, an infra-red projector and four microphones.
- Software can use video, sound and gesture recognition driven interactions.
We should ignore THE PERIODIC TABLE... for a moment

And focus ON human being!
The Periodic Table of NUI Design

Design Symbol: \(N\)

Element Name: Natural

Metric: Multimodality

Fact: Learning Curve

Metric: Cognitive load
The Periodic Table of NUI Design

- User
  - Literacy
  - Skills acquired
  - Subjective Satisfaction

- Design Symbol
- Element Name
- Fact
- Metric
- Metric
The Periodic Table of NUI Design

- Interface
  - Common
  - Guided / Situated Interaction
  - Visual Cues / Feedback

- Design Symbol
- Element Name
- Fact
- Metric
- Metric
Data Streams (Eyes & Ears)

- **D** - Depth
  - DepthImagePixel[]
- **C** - Color
  - byte[]
- **A** - Audio
  - Waveform
- **IR** - Infrared
  - byte[]
- **T** - Touch and Traditional Inputs
  - Points and Chars
Recognition Streams (Brains)

- **ST**: Skeleton Tracking
  - Skeleton[
- **S**: Speech
  - Recognition Events
- **FT**: Face Tracking
  - FaceTrackFrame
- **MK**: Traditional Input
  - Mouse/Keyboard
- **IF**: Interactions
  - InteractionFrame (UserInfo[])

D  A  D  C  T  D  ST
Hypothesis

NUI interface design helps users among different ages and diverse computer experience to ask a medical consultation reducing the learning curve.
## A first approach

### Users

<table>
<thead>
<tr>
<th>Aspect</th>
<th>User 1</th>
<th>User 2</th>
<th>User 3</th>
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<tbody>
<tr>
<td>Age</td>
<td>67</td>
<td>58</td>
<td>29</td>
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<tr>
<td>Literacy</td>
<td>Basic</td>
<td>High School</td>
<td>Accounting Professional</td>
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<tr>
<td>Times in front of the pc trough life time.</td>
<td>0</td>
<td>5</td>
<td>All most 7/24</td>
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<tr>
<td>Last time in front of the pc.</td>
<td>Never</td>
<td>Six months ago</td>
<td>Two hours ago</td>
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<tr>
<td>Living Area</td>
<td>Rural</td>
<td>Urban</td>
<td>Urban</td>
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</tbody>
</table>
GUI design
Citad Internet

Afiliado *
Fecha nacimiento
(dd/mm/yyyy) *

CÉDULA DE CIUDADANIA

ACEPTAR
# Asignación de Citas

### Información de Afiliado

<table>
<thead>
<tr>
<th>Afiliado</th>
<th>Nombre</th>
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<tbody>
<tr>
<td>CC 44002522</td>
<td>ANA MARIA VASQUEZ VELASQUEZ</td>
</tr>
</tbody>
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<table>
<thead>
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<th>IPS Basica</th>
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<tbody>
<tr>
<td>CIS CONFAMA SAN IGNACIO</td>
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### Información de Contacto

<table>
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<td>5277914</td>
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<table>
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<tbody>
<tr>
<td>ANTIOQUIA</td>
<td>MEDELLIN</td>
</tr>
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</table>

Correo Electrónico: amvasquez240@hotmail.com

AUTORIZO VOLUNTARIAMENTE QUE LA INFORMACIÓN PARA LA RECORDACIÓN DE MIS CITAS, INFORMACIÓN DE MIS PÓLIZAS Y/O INFORMACIÓN GENERAL DE SURAMERICANA ME SEA ENVIADA POR:

Correo electrónico: **✓** Celular: **✓**

### Información de la Cita

<table>
<thead>
<tr>
<th>Plan</th>
<th>Servicio</th>
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<tbody>
<tr>
<td>POS</td>
<td>CONSULTA MEDICINA GENERAL</td>
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</tbody>
</table>

CONSULTAR DISPONIBILIDAD DE CITAS
Asignación de Citas

Asignación Citas

Consulta y Cancelación

Información de Afiliado

Afiliado: CC 44002522 - ANA MARIA VASQUEZ VELASQUEZ
Lugar de la Cita: CIS COMFAMA SAN IGNACIO
Plan: POS
Servicio: CONSULTA MEDICINA GENERAL
Profesional de Familia: CC 43252894 - LIMA SALGADO SUHANY ANDREA

Información de Profesional

Profesional: LIMA SALGADO SUHANY ANDREA - 2013/11/26 (F)

Citas

<table>
<thead>
<tr>
<th>Horas</th>
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<th>Martes</th>
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<tbody>
<tr>
<td>19:40</td>
<td>CIS COMFAMA SAN IGNACIO</td>
<td>2013/11/26</td>
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<tr>
<td>20:00</td>
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<td>ASIGNAR CITA</td>
</tr>
<tr>
<td>20:20</td>
<td>CIS COMFAMA SAN IGNACIO</td>
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</tr>
<tr>
<td>20:40</td>
<td>CIS COMFAMA SAN IGNACIO</td>
<td>ASIGNAR CITA</td>
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</tbody>
</table>

Seleccionar fecha
NUI design
Multimodal interaction through dashboard. (a) User give voice commands to navigate through dashboard, as well as (b) touch the screen, (c) swipe his hands on the air or (d) use traditional mouse to do a task.
Application created for help patients to ask appointments in a natural way. (a) The login can be done using multimodal interaction as well as (b) review the bio signals graph, (c) and assign an appointment on a selected day considering (d) the care professional agenda.
Demo
Some findings
Learning how to use the interface.
Debating the future of NUI is useless
Creating the future is more interesting
The biggest change of technology is not software or hardware, they are becoming faster and cheaper, but the true change is about who is doing what, where, with whom, for how much and how.

Bill Buxton
What we build is about **People**, not about **technology**.
Contact Info

edwin.duque@outlook.com

anamariavasquez@outlook.com

@dea398