UNIFIED DESIGN PRINCIPLES
TO SUPPORT DIVERSITY

WE NEED UNIFICATION
ONE: ONE IS NOT ENOUGH
UNIFIED PRINCIPLES OF INTERACTION
HOW TO IDENTIFY UNIFYING PRINCIPLES?
HOW DO WE INTERACT IN THE PHYSICAL WORLD?
HOW DO WE INTERACT IN THE PHYSICAL WORLD?
PHYSICAL ACTION IS OFTEN MEDIATED BY TOOLS
THE PHYSICAL WORLD IS FLEXIBLE

A PENCIL

A MUG
THE PHYSICAL WORLD IS FLEXIBLE

A RULER!

A PAPER WEIGHT!
KSB 0.5-6.5: Providing fly ash sand mortar of mix 1:1.5:3 (cement: fly ash: sand) including cost of all materials, labor charges, HOM, OM of machinery complete as per specifications. KSB 4.26: Providing and laying in position reinforced cement concrete of design mix N225 with OPC cement @ 225gps, with 40mm and down size graded granite metal coarse aggregate @ 0.6432 cum and fine aggregate @ 0.0622 cum, machine mixed concrete laid in layers not exceeding 15 cm thick vibrated for all works in foundation, plinth and ground floor level for retaining walls return walls, walls (any thickness) including attached plinth, columns, piers, abutments, pillars, posts, struts, buttresses, string or facing courses, piers, abutments, coping, bed blocks, anchor blocks, plain window sills, etc including cost of all materials, labor, HOM of machinery, curing, complete as per specifications.

Specifications (i) KBS 4.16 KSB 0.5-6.5: Providing fly ash sand mortar of mix 1:1.5:3 (cement: fly ash: sand) including cost of all materials, labor charges, HOM, OM of machinery complete as per specifications. KSB 4.26: Providing and laying in position reinforced cement concrete of design mix N225 with OPC cement @ 225gps, with 40mm and down size graded granite metal coarse aggregate @ 0.6432 cum and fine aggregate @ 0.0622 cum, machine mixed concrete laid in layers not exceeding 15 cm thick vibrated for all works in foundation, plinth and ground floor level for retaining walls return walls, walls (any thickness) including attached plinth, columns, piers, abutments, pillars, posts, struts, buttresses, string or facing courses, piers, abutments, coping, bed blocks, anchor blocks, plain window sills, etc including cost of all materials, labor, HOM of machinery, curing, complete as per specifications.

Specifications (ii) KBS 4.16 KSB 0.5-6.5: Providing fly ash sand mortar of mix 1:1.5:3 (cement: fly ash: sand) including cost of all materials, labor charges, HOM, OM of machinery complete as per specifications. KSB 4.26: Providing and laying in position reinforced cement concrete of design mix N225 with OPC cement @ 225gps, with 40mm and down size graded granite metal coarse aggregate @ 0.6432 cum and fine aggregate @ 0.0622 cum, machine mixed concrete laid in layers not exceeding 15 cm thick vibrated for all works in foundation, plinth and ground floor level for retaining walls return walls, walls (any thickness) including attached plinth, columns, piers, abutments, pillars, posts, struts, buttresses, string or facing courses, piers, abutments, coping, bed blocks, anchor blocks, plain window sills, etc including cost of all materials, labor, HOM of machinery, curing, complete as per specifications.

Specifications (iii) KBS 4.16 KSB 0.5-6.5: Providing fly ash sand mortar of mix 1:1.5:3 (cement: fly ash: sand) including cost of all materials, labor charges, HOM, OM of machinery complete as per specifications. KSB 4.26: Providing and laying in position reinforced cement concrete of design mix N225 with OPC cement @ 225gps, with 40mm and down size graded granite metal coarse aggregate @ 0.6432 cum and fine aggregate @ 0.0622 cum, machine mixed concrete laid in layers not exceeding 15 cm thick vibrated for all works in foundation, plinth and ground floor level for retaining walls return walls, walls (any thickness) including attached plinth, columns, piers, abutments, pillars, posts, struts, buttresses, string or facing courses, piers, abutments, coping, bed blocks, anchor blocks, plain window sills, etc including cost of all materials, labor, HOM of machinery, curing, complete as per specifications.

Specifications (iv) KBS 4.16 KSB 0.5-6.5: Providing fly ash sand mortar of mix 1:1.5:3 (cement: fly ash: sand) including cost of all materials, labor charges, HOM, OM of machinery complete as per specifications. KSB 4.26: Providing and laying in position reinforced cement concrete of design mix N225 with OPC cement @ 225gps, with 40mm and down size graded granite metal coarse aggregate @ 0.6432 cum and fine aggregate @ 0.0622 cum, machine mixed concrete laid in layers not exceeding 15 cm thick vibrated for all works in foundation, plinth and ground floor level for retaining walls return walls, walls (any thickness) including attached plinth, columns, piers, abutments, pillars, posts, struts, buttresses, string or facing courses, piers, abutments, coping, bed blocks, anchor blocks, plain window sills, etc including cost of all materials, labor, HOM of machinery, curing, complete as per specifications.
24 Riciembre XXAV.

20 noviembre 1935
5 diciembre 1935

Algunas frases escritas en la página son:
- "Algunas veces, cuando ya no se le importa un pito, el roce suave de la pluma en el papel es un deleite para el escritor."
- "El clavelito, regalado con el arroz en la serenata."
- "Y organiza en el soplo de la noche con sus cuentas de plata, el canto de la serpiente en el rededor de las liras de fuego.
- "Además de lo que parece olvidado y tan pálido, es un melodía en el aire.
- "El pájaro que construyó la cortina no se puede llegar al nido."
<table>
<thead>
<tr>
<th>Store</th>
<th>Sales</th>
<th>Store</th>
<th>Sales</th>
<th>Store</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Store 1</td>
<td>$313,765</td>
<td>Store 2</td>
<td>$107,160</td>
<td>Store 3</td>
<td>$351,751</td>
</tr>
<tr>
<td>Store 4</td>
<td>$131,047</td>
<td>Store 5</td>
<td>$252,136</td>
<td>Store 6</td>
<td>$167,462</td>
</tr>
<tr>
<td>Store 7</td>
<td>$210,073</td>
<td>Store 8</td>
<td>$308,092</td>
<td>Store 9</td>
<td>$97,492</td>
</tr>
<tr>
<td>Store 10</td>
<td>$393,484</td>
<td>Store 11</td>
<td>$396,891</td>
<td>Store 12</td>
<td>$151,168</td>
</tr>
<tr>
<td>Store 13</td>
<td>$291,390</td>
<td>Store 14</td>
<td>$392,776</td>
<td>Store 15</td>
<td>$97,492</td>
</tr>
</tbody>
</table>

**Total Sales by Region**

<table>
<thead>
<tr>
<th>Region</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>West</td>
<td>$1,718,258</td>
</tr>
<tr>
<td>South</td>
<td>$534,389</td>
</tr>
<tr>
<td>Midwest</td>
<td>$1,099,268</td>
</tr>
<tr>
<td>East</td>
<td>$900,431</td>
</tr>
<tr>
<td>Total</td>
<td>$4,162,346</td>
</tr>
</tbody>
</table>

**Total Sales by Category**

<table>
<thead>
<tr>
<th>Category</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automotive</td>
<td>$86,285</td>
</tr>
<tr>
<td>Gardening</td>
<td>$52,048</td>
</tr>
<tr>
<td>Electronics</td>
<td>$83,026</td>
</tr>
<tr>
<td>Jewelry</td>
<td>$93,035</td>
</tr>
<tr>
<td>Sporting</td>
<td>$50,016</td>
</tr>
</tbody>
</table>

**TOTAL SALES BY CATEGORY**
BREATHING CITY
Manhattan's at Work and Home population by hour

12 am
THIS IS NOT A PENCIL
THIS IS NOT (JUST) A PENCIL

ATOMS
MOLECULES
MATERIAL
OBJECT
TOOL
USE
CULTURE
INSTRUMENTAL INTERACTION
TOOLS MEDIATE INTERACTION
INSTRUMENTAL INTERACTION
INSTRUMENTAL INTERFACES
DESIGN PRINCIPLE: REIFICATION

TURN ABSTRACT COMMANDS INTO CONCRETE OBJECTS (INSTRUMENTS)
MAGNETIC GUIDELINES
aligning an object to more than one StickyLine
DESIGN PRINCIPLE: POLYMORPHISM

MAKE INSTRUMENTS WORK WITH DIVERSE CONTENT (SUBSTRATES)
POLYMORPHISM
Color Portraits
From Color Picking to Interacting with Color

Ghita Jalal  Nolwenn Maudet  Wendy Mackay
INRIA, Université Paris-Sud, CNRS
Orsay, France
DESIGN PRINCIPLE: REUSE

CAPTURE AND REUSE INTERACTION PATTERNS
INFORMATION SUBSTRATES
INFORMATION SUBSTRATES
WHAT'S A SUBSTRATE?

- STRUCTURE + CONTENT
- INTERNAL RULES (CONSTRAINTS)
- MAPPING RULES (TO OTHER SUBSTRATES)
- EXTERNAL RULES (RELATIONSHIPS)
LEVELS OF INTERPRETATION

Table

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14</td>
<td>23</td>
</tr>
<tr>
<td>2</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>3</td>
<td>19</td>
<td>20</td>
</tr>
</tbody>
</table>
LEVELS OF INTERPRETATION

- **Pixels**
- **Shapes**
- **Graph**
- **Table**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14</td>
<td>23</td>
</tr>
<tr>
<td>2</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>3</td>
<td>19</td>
<td>20</td>
</tr>
</tbody>
</table>

**Buttons:**
- Paint
- Set color
- Set type
- Enter values
DESIGN PRINCIPLES

MAUDET, JALAL, TCHERNAVSKIJ, BEAUDOUIN-LAFON, MACKAY
NEW DESIGN PRINCIPLE: SHAREABILITY

MAKE CONTENT AND INSTRUMENTS SHAREABLE
INTERACTIVE ENVIRONMENTS
ONE

- Understanding Interaction
- Conceptual modeling
- Environments
- Instruments
- Substrates
- System exploration
CONCLUSION

AUGMENTING HUMAN INTELLECT
DOUGLAS ENGELBART
THANKS!

MICHEL BEAUDOUIN-LAFON
UNIVERSITÉ PARIS-SUD
mbl@lri.fr