



Improving the User Interface through Gestalt Design Principles

**The 26th Annual IEEE
Software Technology Conference**

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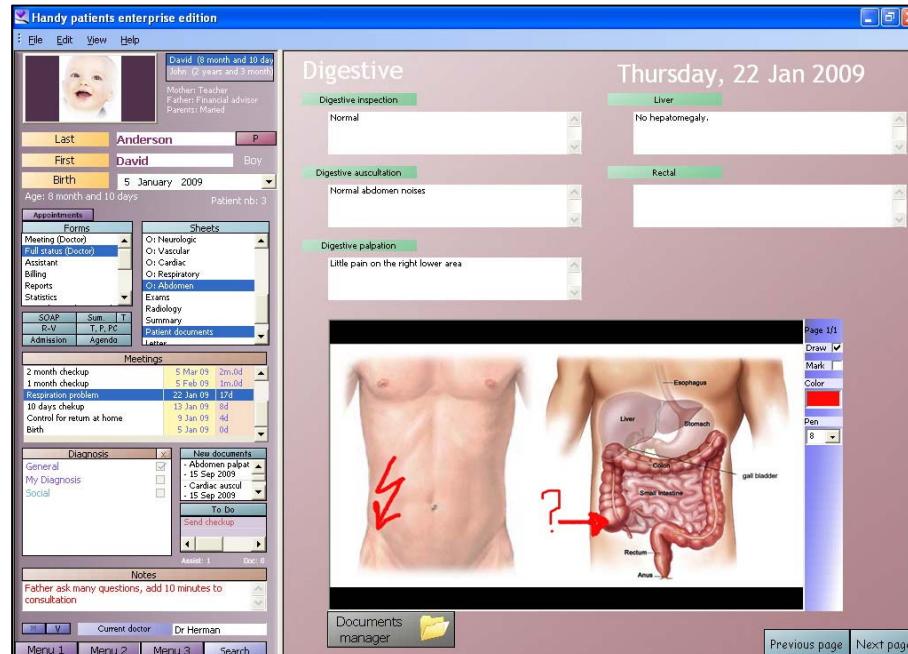
Neta Ezer, Ph.D.
Human Factors Engineer



Simple rules to improve your interface designs

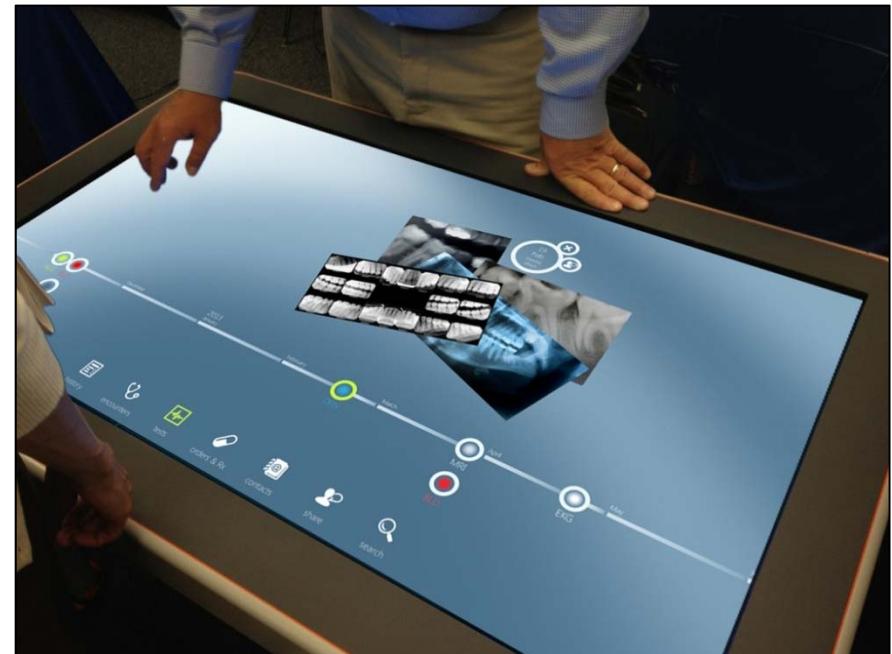


In this presentation you will learn how to take advantage of what the human mind naturally does to make huge improvements in display design.

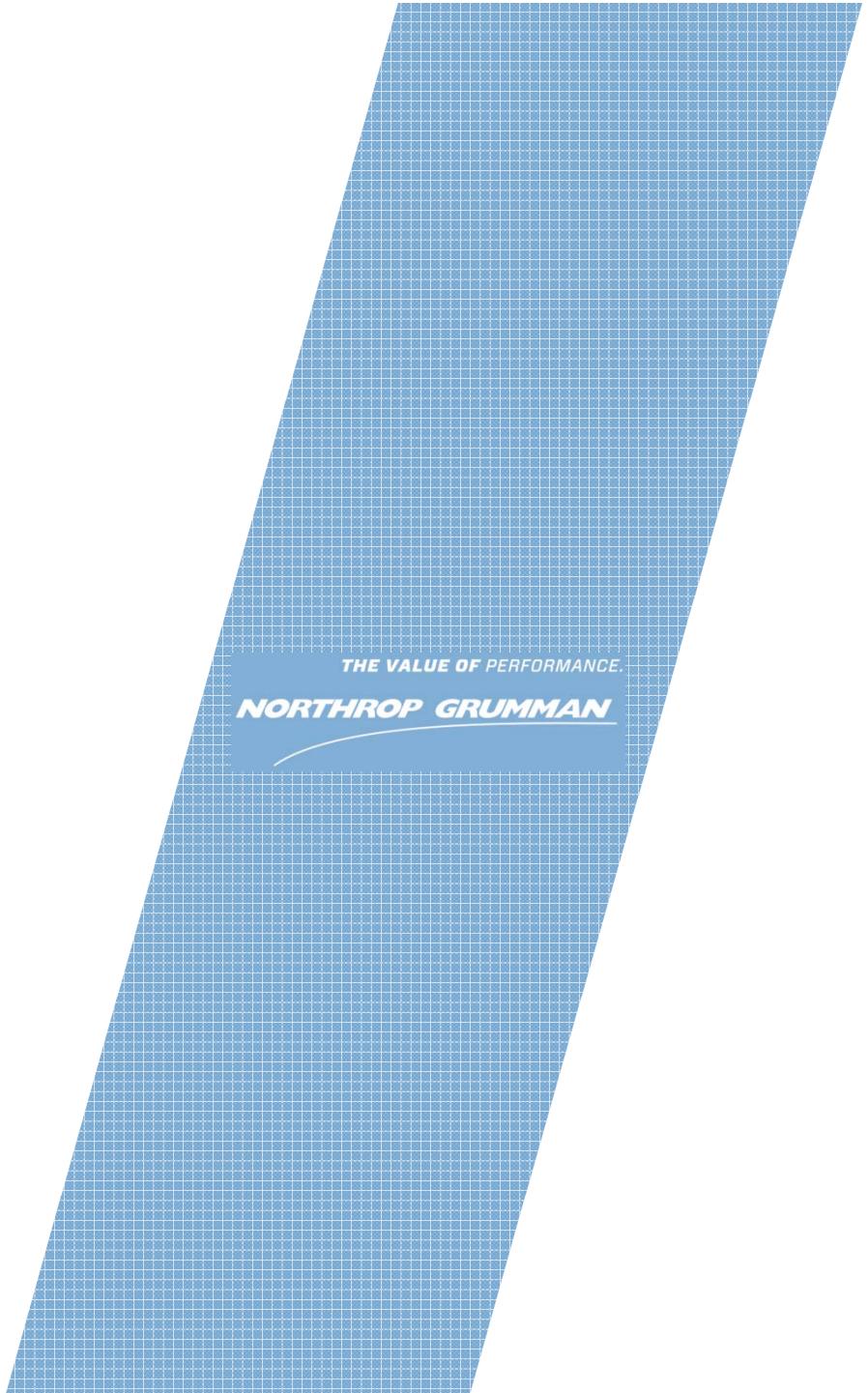


Handy Patients Electronic Medical Record
(free, open source version)

Wikipedia contributors. "Electronic health record." Wikipedia, The Free Encyclopedia. Wikipedia, The Free Encyclopedia, 29 Jan. 2014. Web. 30 Jan. 2014.



**Northrop Grumman
HealthIT Prototype UI (EMR)**
(Designed and developed by The User
Experience Team)



What is Gestalt?

A brief history of Gestalt



- Gestalt is a collection of theories of the mind, developed by the Gestalt School of Psychology at the Berlin School in the late 1880s
- German: *Gestalt* – "essence or shape of an entity's complete form"
- Our visual system first sees an object(s) as a whole, rather than seeing it as its individual parts
- Our mind simplifies the complex visual world in an effort to clarify and to more easily understand
- We “fill in” missing visual information with the goal of closing the shape
- Verbal information can drastically change what we see



Published in Marr D. (1982) *Vision*. W.H. Freeman, New York, NY, p. 101, Figure 3-1

Visual Principles of Gestalt



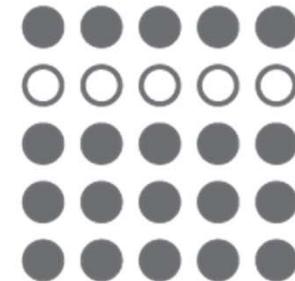
Proximity



Symmetry



Closure



Similarity



7

Common Fate



Continuity



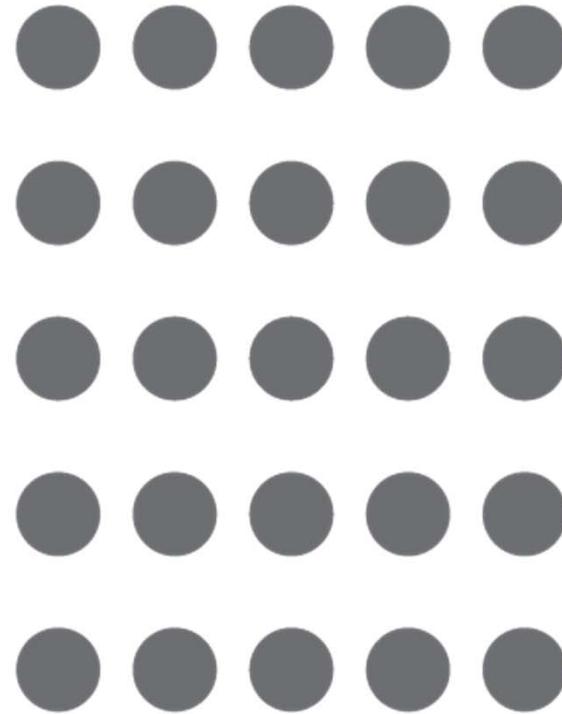
Figure/Ground

The Principle of Proximity



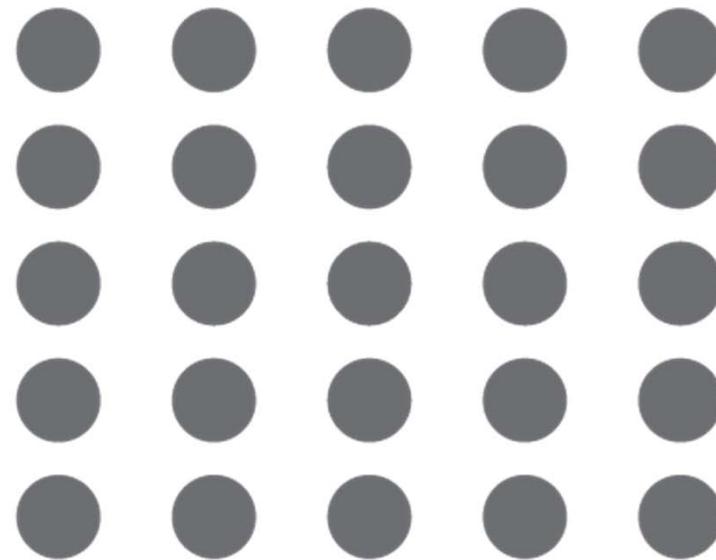
- The distance between objects effects our perception of the objects
- Are the objects grouped, or not
- Objects that are close together are perceived as being grouped
- If your intent is that items in a user interface are to be “read” by the user as being grouped, place them in close proximity
- If items in the user interface are not intended to be “read” as being grouped, be careful to allow enough space between them

The Principle of Proximity



Proximity

The Principle of Proximity



Proximity

UI Example: Proximity



Proximity Example

Example Location:

Example Field:

- Alpha
- Beta
- Charlie
- Delta
- Echo
- Foxtrot

NewDeleteCopy

Bad UI Example: Proximity



Proximity Example

Example Location:

Example Field:

- Alpha
- Beta
- Charlie
- Delta
- Echo
- Foxtrot

New

Delete

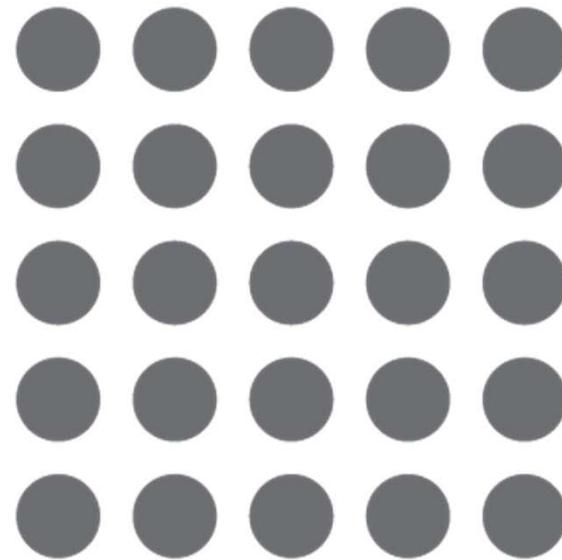
Copy

The Principle of Similarity



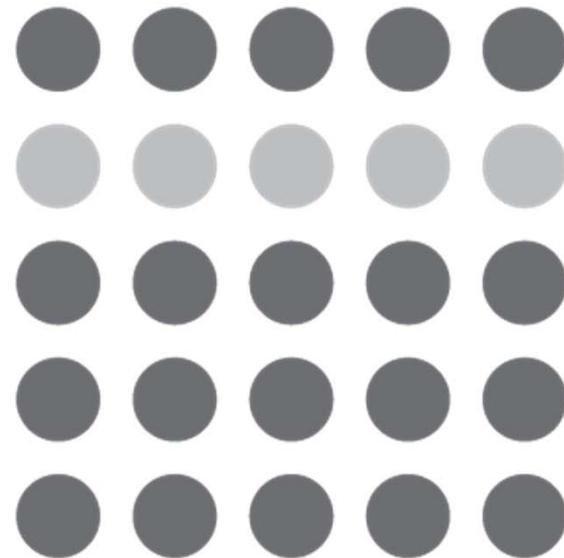
- Objects that look similar appear to be grouped
- This is a good thing, when it is done intentionally
- Often, objects in an interface are similar enough that they are misinterpreted as being related. This can be overcome by leveraging the principle of Proximity

The Principle of Similarity



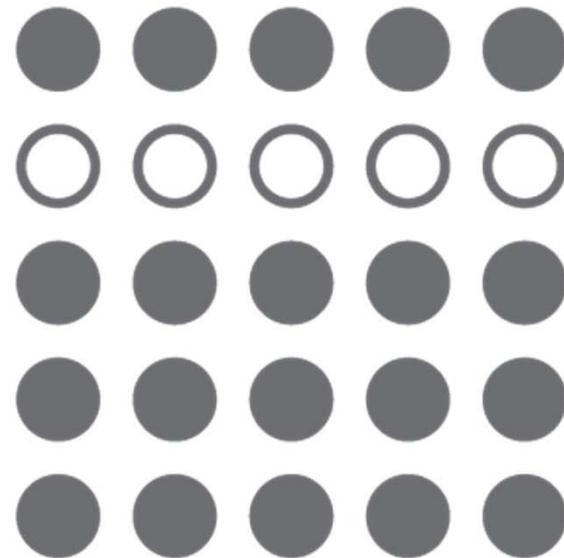
Similarity

The Principle of Similarity



Similarity

The Principle of Similarity



Similarity

UI Example: Similarity



Similarity - Example					
A	B	C	D	E	
321654	<input checked="" type="checkbox"/>	One	#####	Test 01	11:26:00 - 11-02-2013
487659	<input checked="" type="checkbox"/>	Two	#####	Test 02	11:26:00 - 11-02-2013
487516	<input checked="" type="checkbox"/>	Three	#####	Test 03	11:26:00 - 11-02-2013
285476	<input checked="" type="checkbox"/>	Four	#####	Test 04	11:26:00 - 11-02-2013
197658	<input checked="" type="checkbox"/>	Five	#####	Test 05	11:26:00 - 11-02-2013
325874	<input checked="" type="checkbox"/>	Six	#####	Test 06	11:26:00 - 11-02-2013
164975	<input checked="" type="checkbox"/>	Seven	#####	Test 07	11:26:00 - 11-02-2013
257485	<input checked="" type="checkbox"/>	Eight	#####	Test 08	11:26:00 - 11-02-2013
301695	<input checked="" type="checkbox"/>	Nine	#####	Test 09	11:26:00 - 11-02-2013

Bad UI Example: Similarity



Similarity Example

Example Location:

Example Field:

- Alpha
- Beta
- Charlie
- Delta
- Echo
- Foxtrot

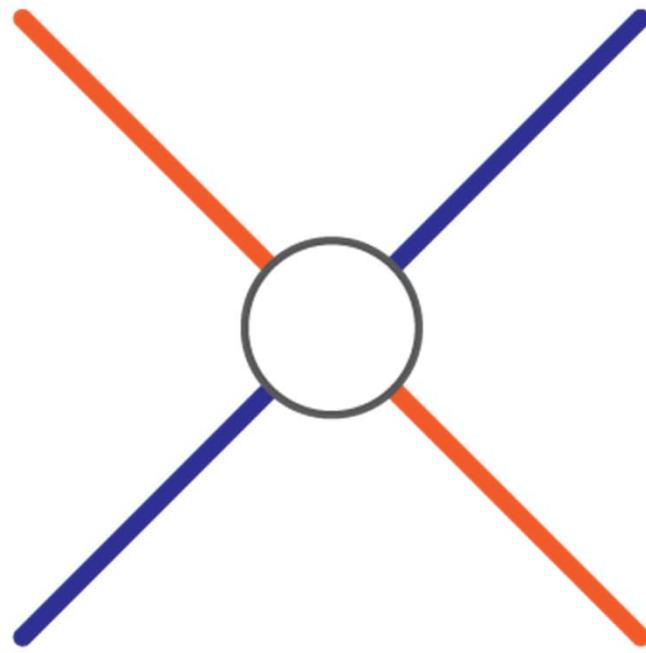
New
Delete
Copy

The Principle of Continuity



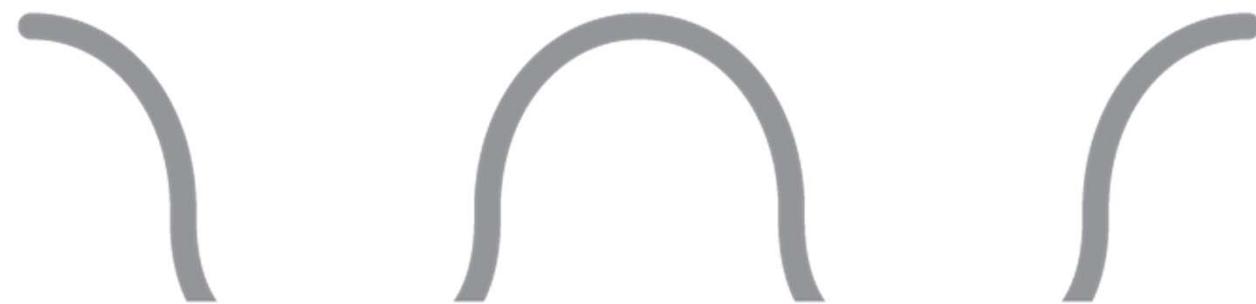
-
- Visual perception is based on continuous forms, not disconnected segments
 - Our mind fills in missing segments automatically, completing an incomplete form

The Principle of Continuity



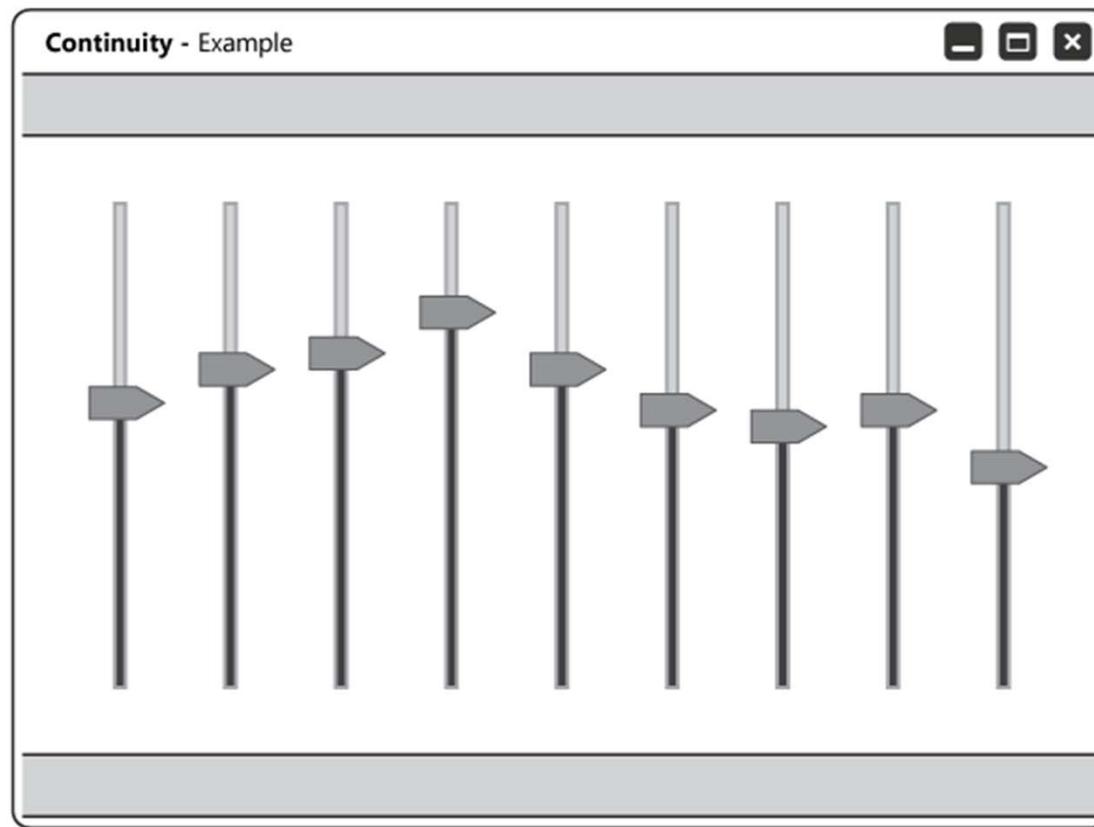
Continuity

The Principle of Continuity

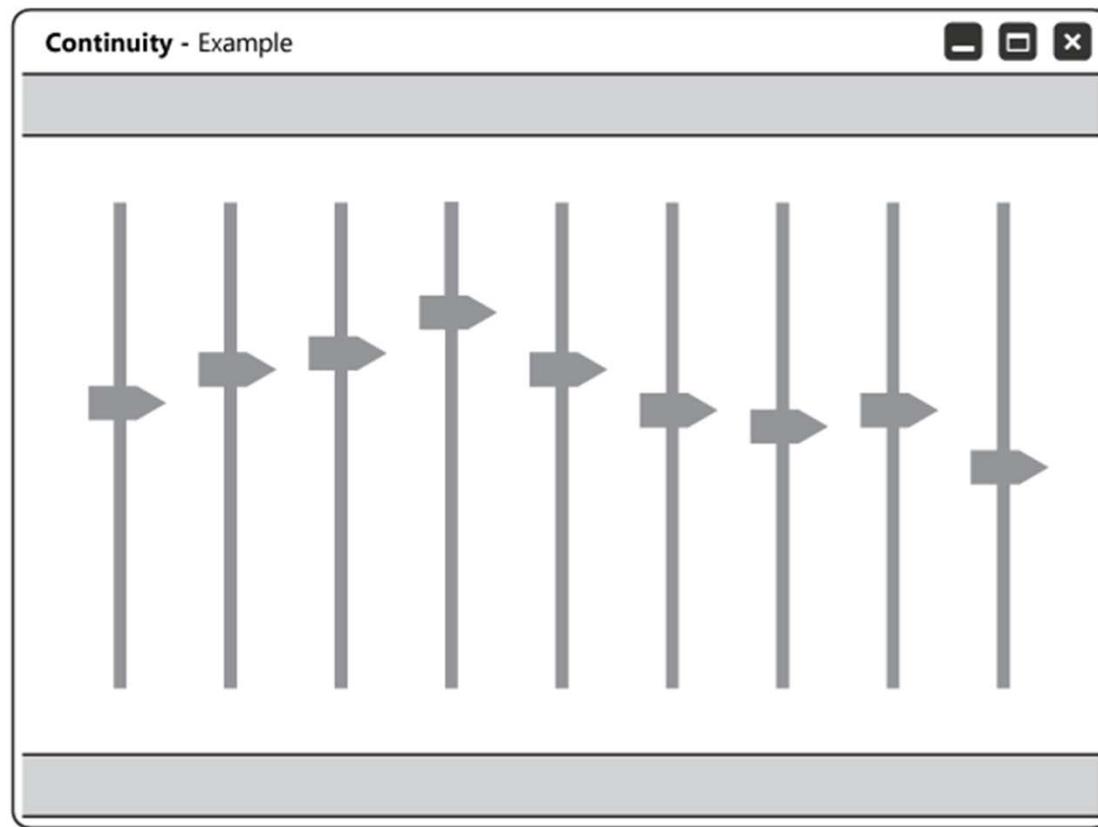


Continuity

UI Example: Continuity



Bad UI Example: Continuity

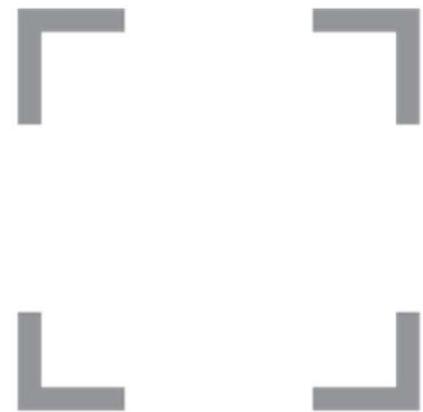


The Principle of Closure



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- We automatically attempt to complete “open” objects so that we perceive them as whole
 - Our visual system can interpret totally blank areas as objects
 - This is what graphic designers refer to as “white space”

The Principle of Closure



Closure

UI Example: Closure



stack of documents



folder



database

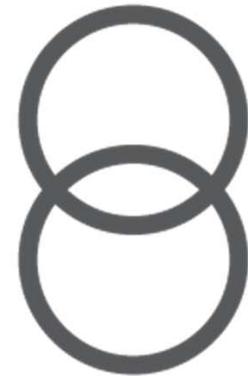
Icons

The Principle of Symmetry



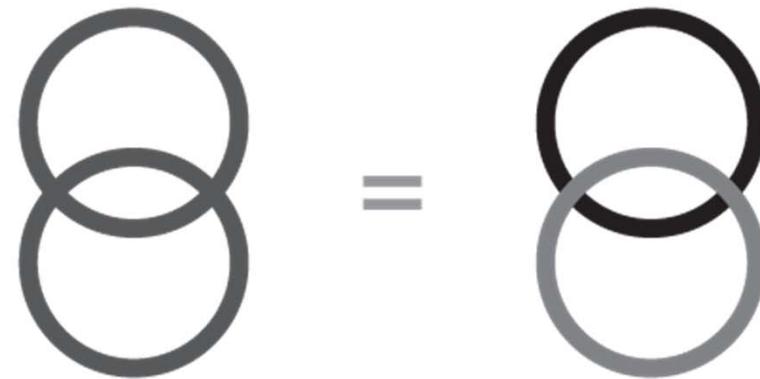
- The goal of our visual system: *reduce complexity*
- We interpreted data in our visual field in more than one way, but always with the goal of simplification
- Organizing objects into symmetrical shapes allows for easier understanding
- It's automatic
- Symmetry is the primary principle used to interpret three dimensional renderings on a two dimensional display

The Principle of Symmetry



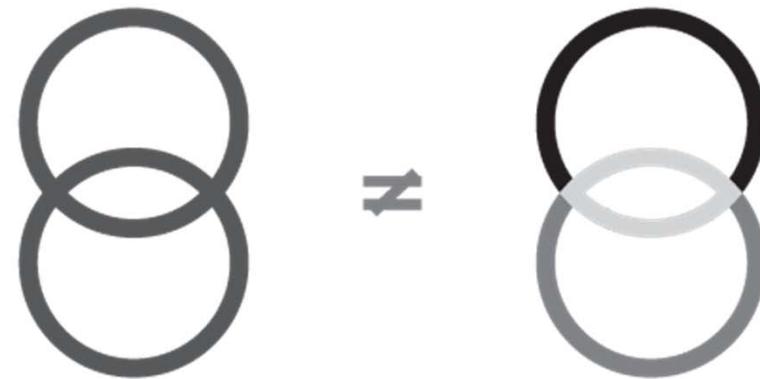
Symmetry

The Principle of Symmetry



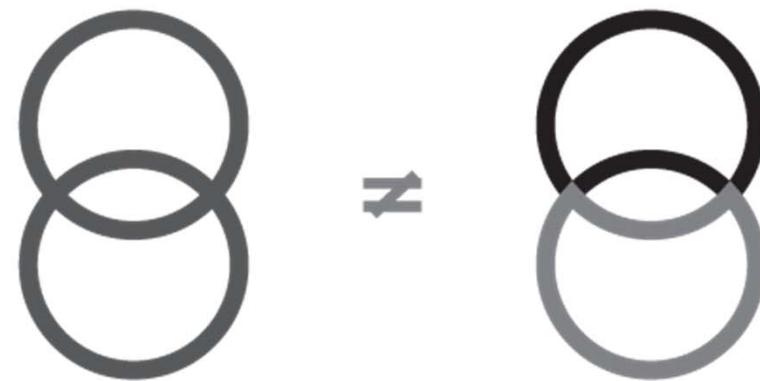
Symmetry

The Principle of Symmetry



Symmetry

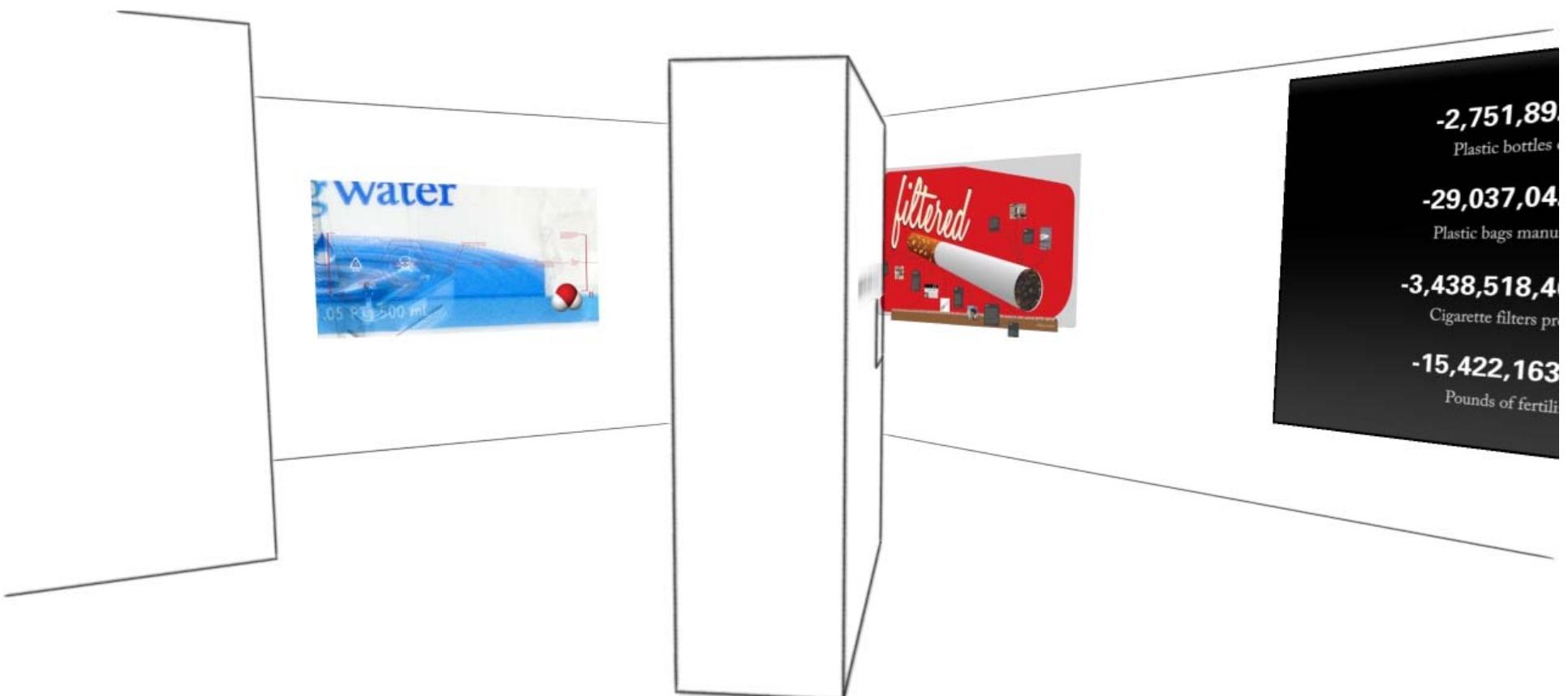
The Principle of Symmetry



Symmetry

UI Example: Symmetry

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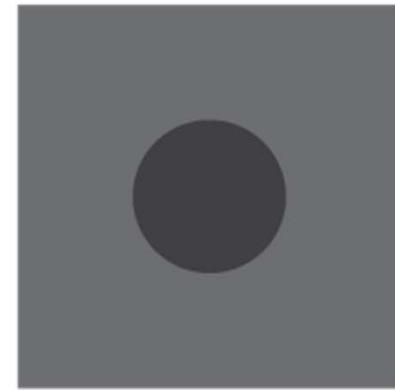


The Principle of Figure/Ground



- Our mind separates the visual field into figure (the foreground) and ground (the background)
- When objects overlap, we tend to see the smaller object as existing in the foreground and the larger object as in the background
- Objects in our primary attention seem to be in the foreground, while everything else seems to fade into the background

The Principle of Figure/Ground



Figure/Ground

The Principle of Figure/Ground



Figure/Ground

UI Example: Figure/Ground



Figure/Ground > Example

View: Lunch

Type: Pad Thai

Flavor: Strong

Size: X-Large

Spice: Native Thai

Dish: Takeout

Comments: Enter a remark here.

Close Save

A tooltip window is displayed over the "Spice" field, containing the text "Examples: One Star, Nose Clearing, Native Thai". The tooltip has a dark gray background, white text, and a small exclamation mark icon.

Bad UI Example: Figure/Ground



Figure/Ground > Example

View: Lunch

Type: Pad Thai

Flavor: Strong

Size: X-Large

Spice: Native Thai

Dish: Takeout

Comments: Enter a remark here.

Close Save

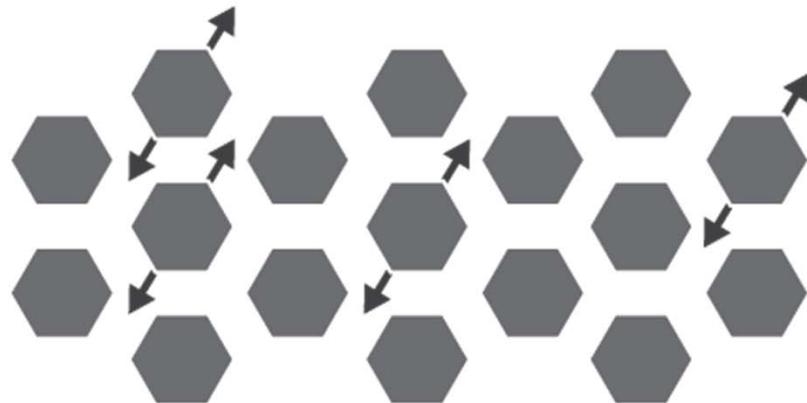
A screenshot of a user interface titled "Figure/Ground > Example". The interface includes a "View" dropdown set to "Lunch". Below it are several input fields: "Type" (Pad Thai), "Flavor" (Strong), "Size" (X-Large), "Spice" (Native Thai), "Dish" (Takeout), and a "Comments" text area with placeholder text "Enter a remark here.". A tooltip or callout box is overlaid on the "Spice" field, containing the text "Examples: One Star, Nose Clearing, Native Thai" and an exclamation mark icon. The entire window has a standard OS X-style appearance with a title bar, window controls, and scroll bars.

The Principle of Common Fate



-
- This principle deals with motion and animated objects
 - All things being equal, if a group of objects moves in a similar way, they are perceived to be a related group
 - *Common motion* = Common Fate

The Principle of Common Fate

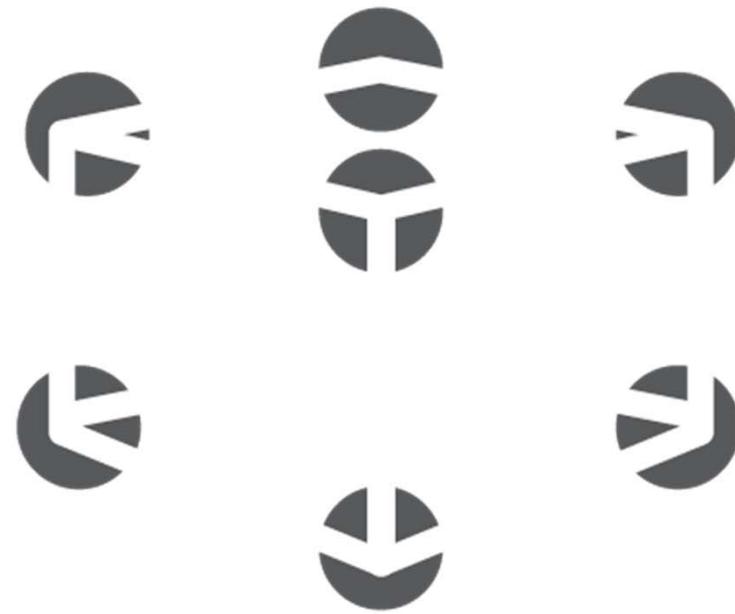


Common Fate

UI Example: Common Fate

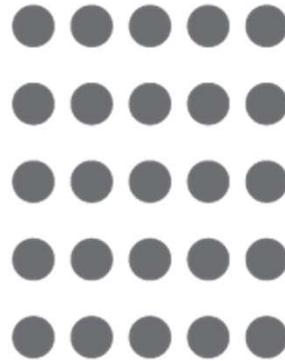


Combining Gestalt Visual Principles



Symmetry, Closure & Continuity

Visual Principles of Gestalt



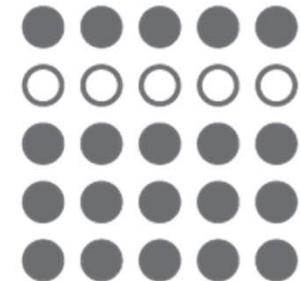
Proximity



Symmetry



Closure



Similarity



42

Common Fate



Continuity



Figure/Ground

Its all about visual hierarchy

Know Your Buisness Jargon
Collaboratively administrate empowered markets via plug-and-play networks.
Dynamically procrastinate B2C users after installed base benefits. Dramatically visualize customer directed convergence without revolutionary ROI.
Impress Your Boss Efficiently unleash cross-media information without cross-media value.
Quickly maximize timely deliverables for real-time schemas. Dramatically maintain clicks-and-mortar solutions without functional solutions.
Fun at Office Parties Completely synergize resource sucking relationships via premier niche markets. Professionally cultivate one-to-one customer service with robust ideas.
Dynamically innovate resource-leveling customer service for state of the art customer service.

Know Your Buisness Jargon

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Fun at Office Parties

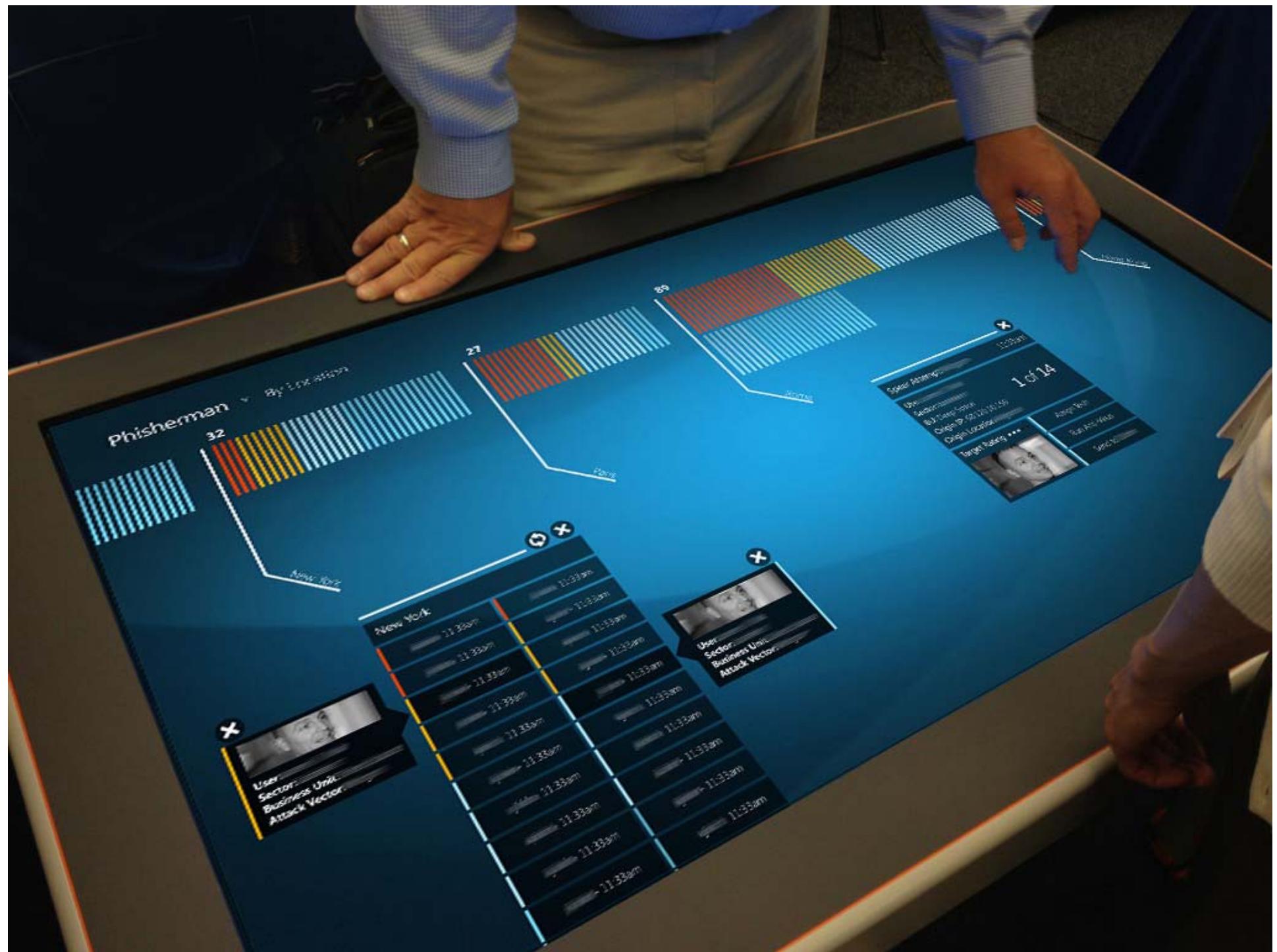
Completely synergize resource sucking relationships via premier niche markets.
Professionally cultivate one-to-one customer service with robust ideas. Dynamically innovate resource-leveling customer service for state of the art customer service.



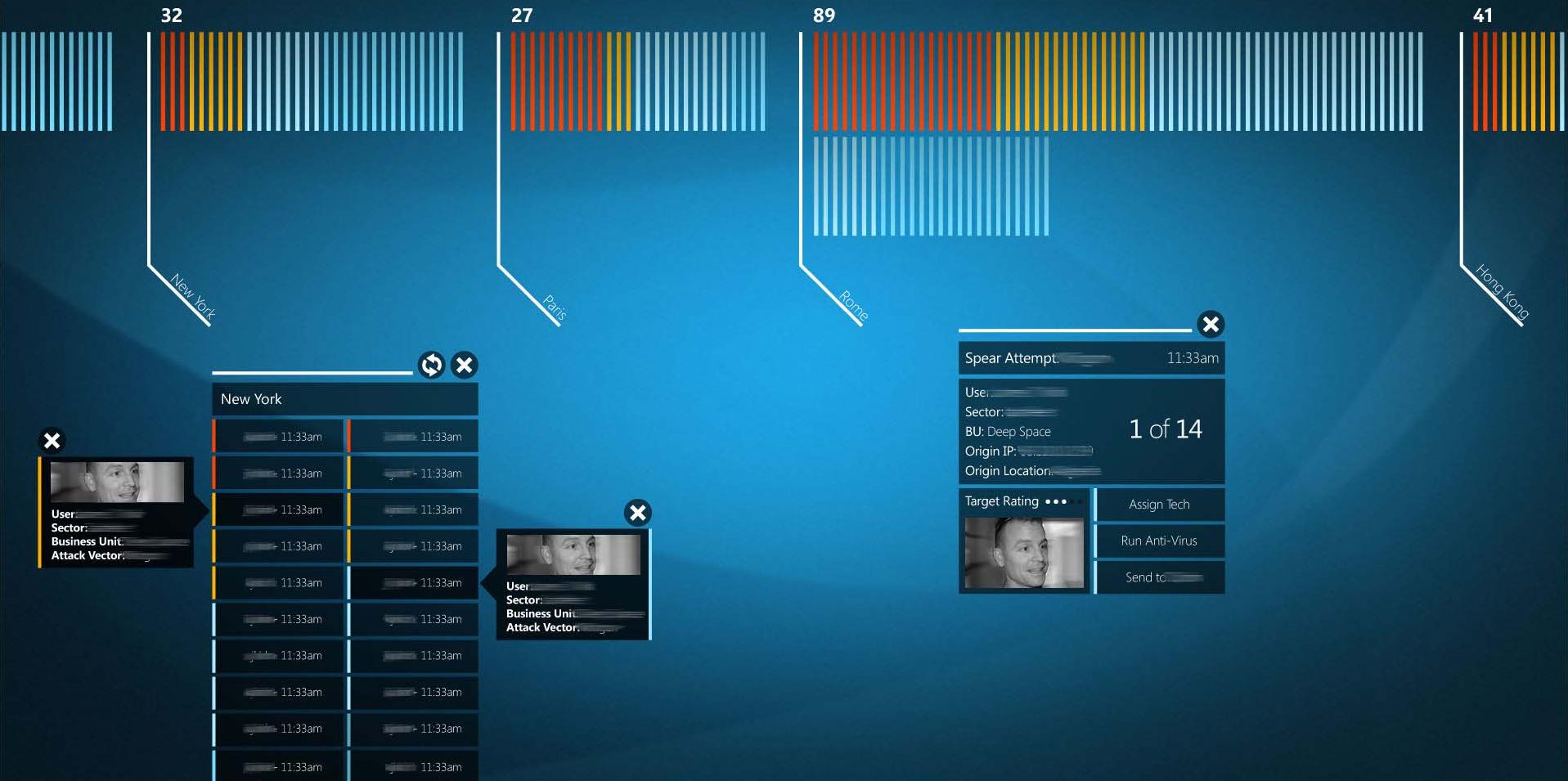
Prototype UI Example: **Phisherman**

Microsoft PixelSense©

Domain: Cyber



Phisher By Location



Phisherman ▾ By Location



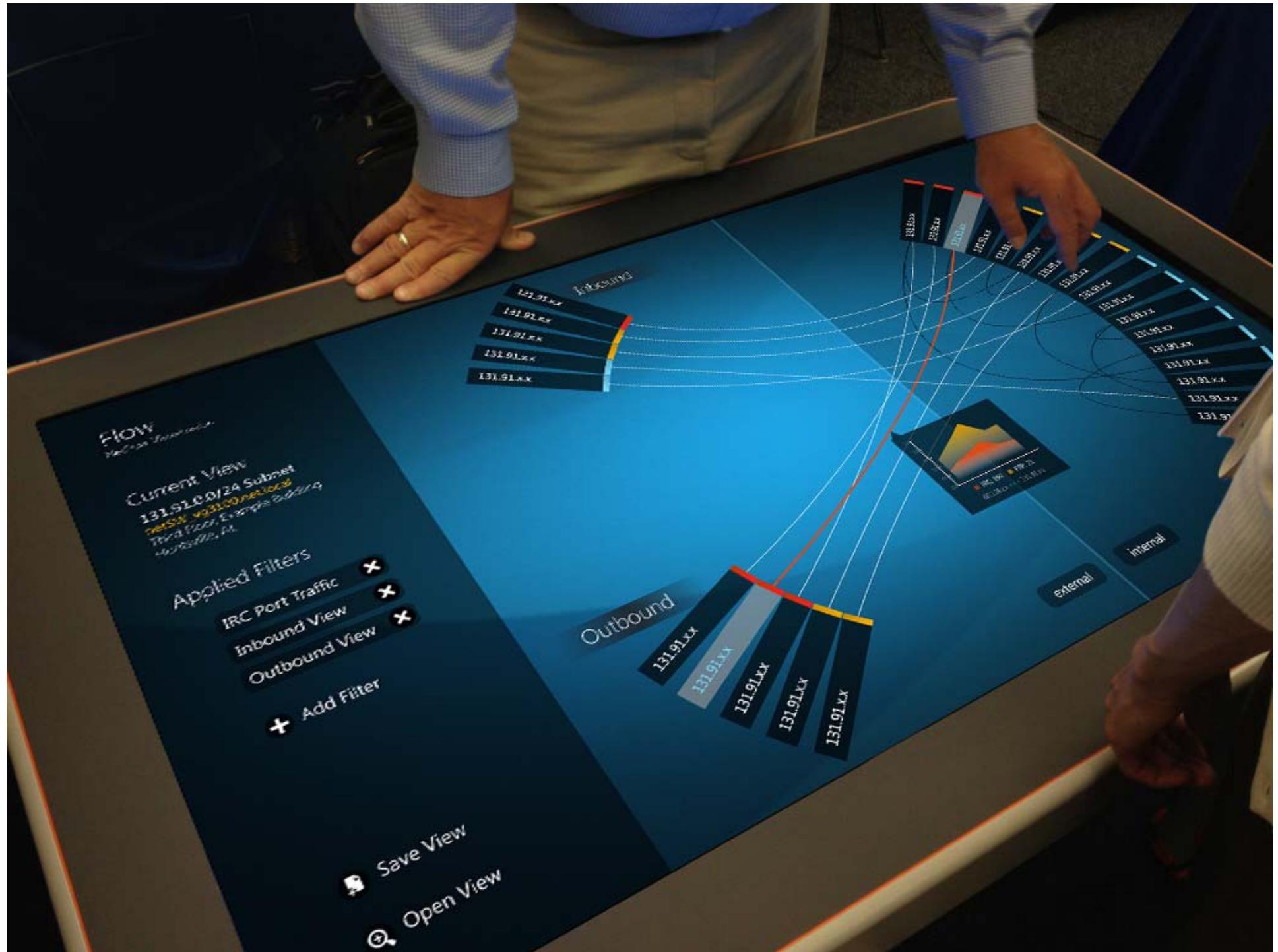


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Prototype UI Example: **NetFlow**

Microsoft PixelSense©

Domain: Cyber



Flow

NetFlow Visualization

Current View

131.91.0.0/24 Subnet
netSW_vg3100.net.local
Third Floor, Example Building
Huntsville, AL

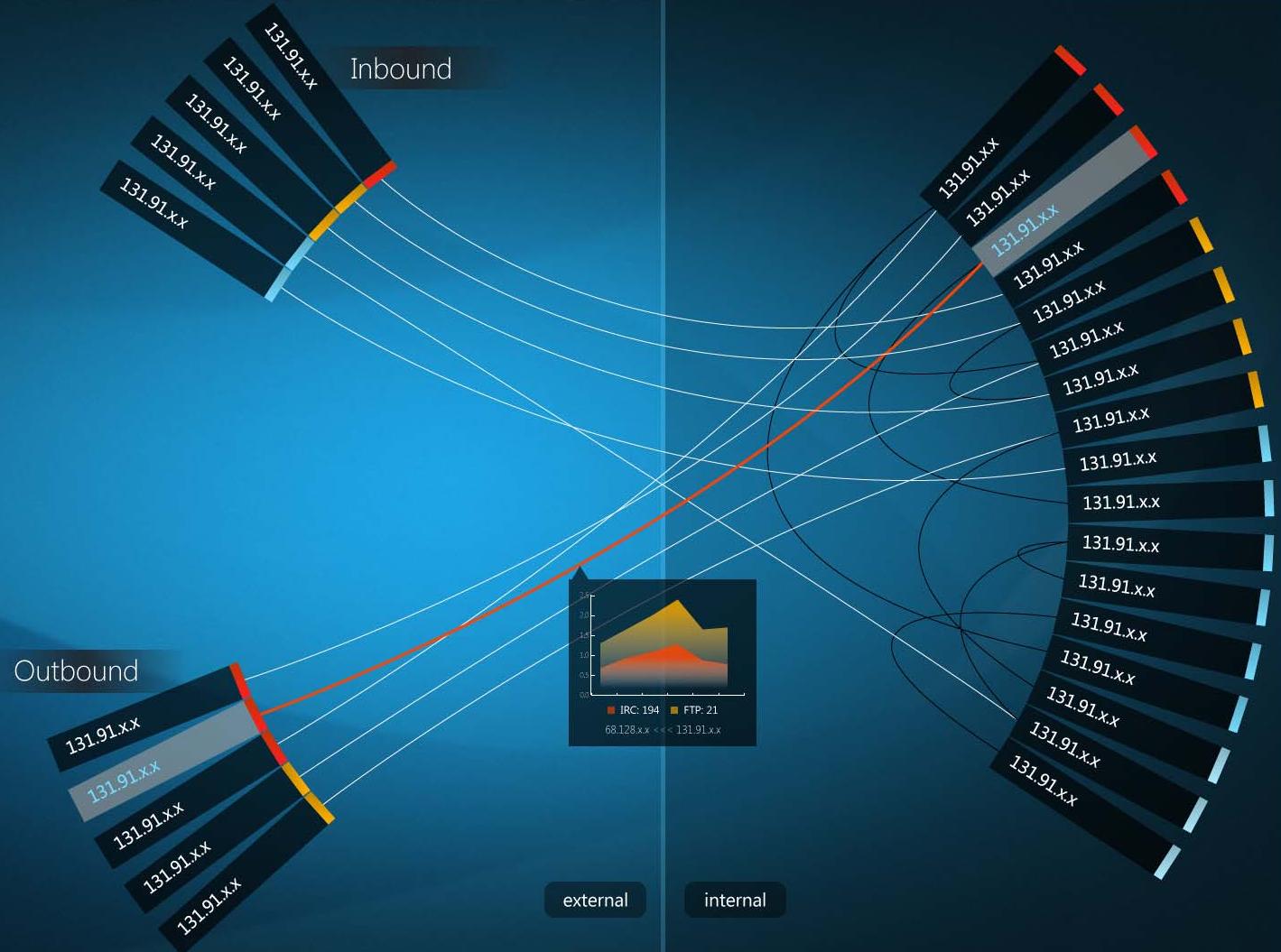
Applied Filters

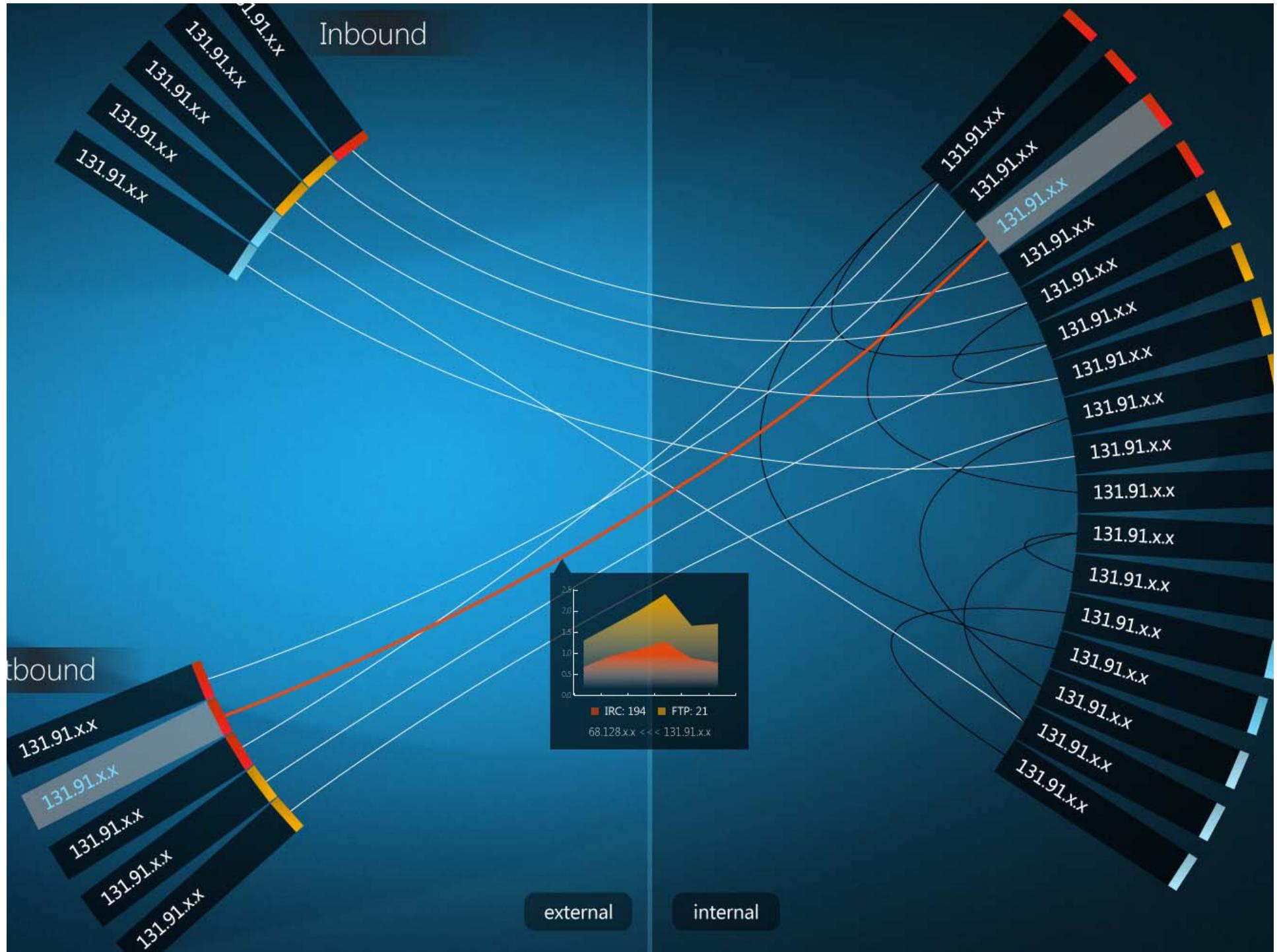
- IRC Port Traffic X
- Inbound View X
- Outbound View X

+ Add Filter

Save View

Open View



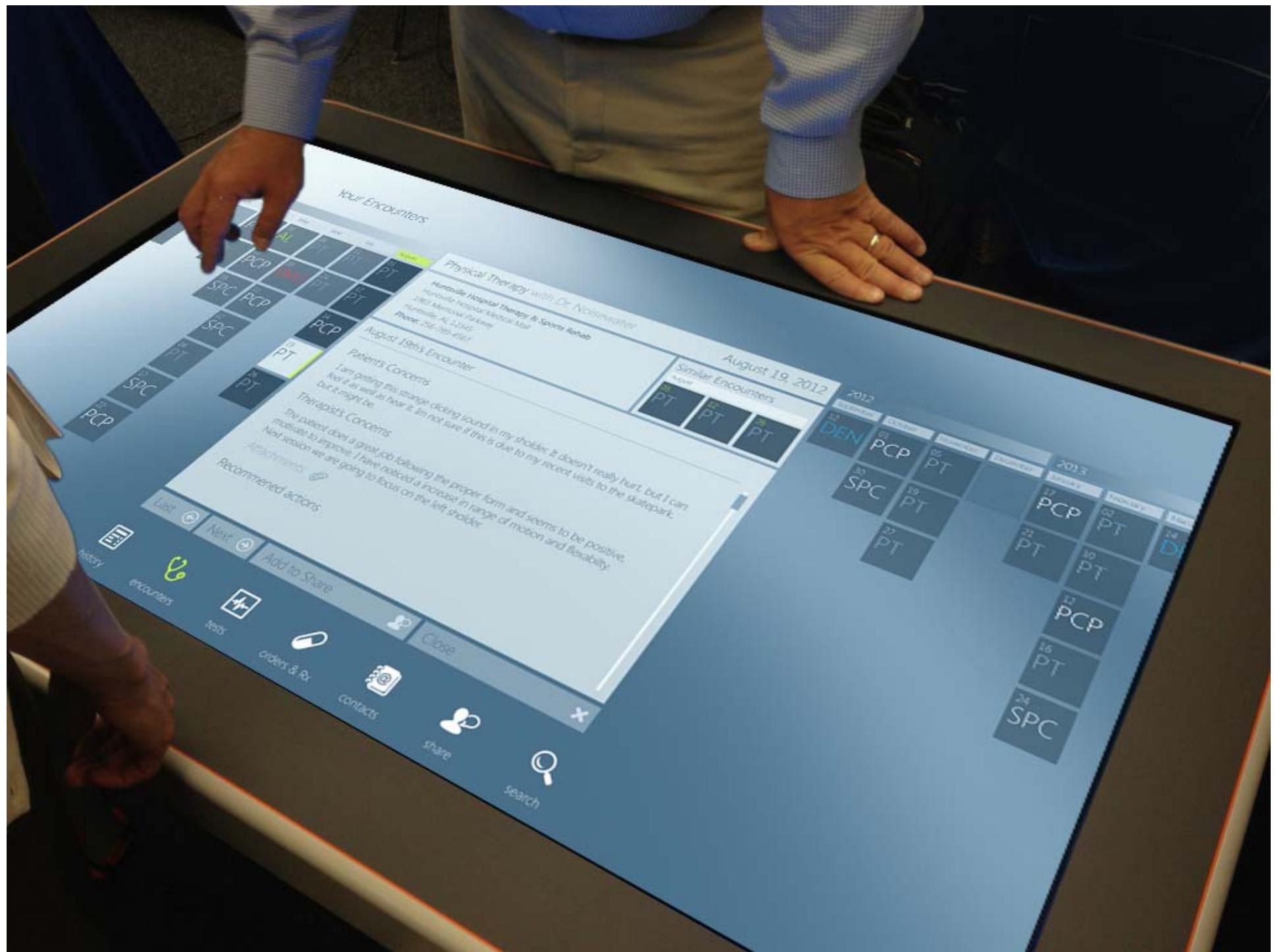


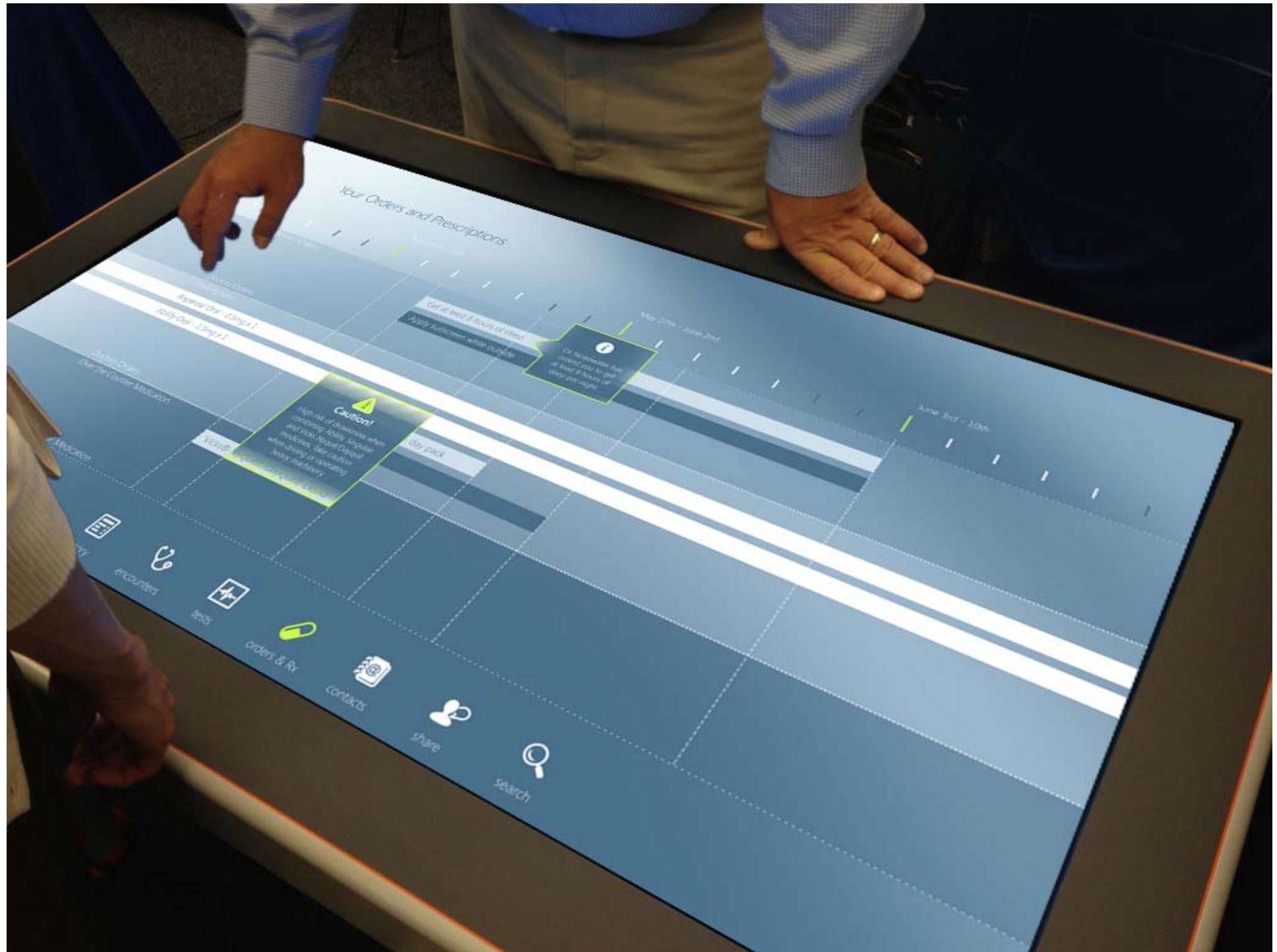


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Prototype UI Example: **HeathIT** Microsoft PixelSense©

Domain: Heath IT





Your Encounters

Your Encounters

	May	June	July	August
P	06 AL	08 PT	11 PT	05 PT
	08 PCP	09 EMG	24 PT	12 PT
	18 SPC	11 PCP		14 PCP
	12 SPC		19 PT	
	14 PT		26 PT	
	17 SPC			
	22 PCP			

Physical Therapy with Dr. John Doe August 19, 2012

Example Hospital Therapy & Sports Rehab
Example Hospital Medical Mall
1234 Example Parkway
Huntsville, AL 12345
Phone: 256-123-4567

Similar Encounters

August
05 PT
12 PT
26 PT

August 19th's Encounter

Patient's Concerns

I am getting this strange clicking sound in my sholder. It doesn't really hurt, but I can feel it as well as hear it. Im not sure if this is due to my recent visits to the skatepark, but it might be.

Therapist's Concerns

The patient does a great job following the proper form and seems to be positive, motivate to improve. I have noticed a increase in range of motion and flexabilty. Next session we are going to focus on the left sholder.

Attachments

Recommended actions

Last Next Add to Share Close

Your Orders and Prescriptions

May 20th - 26th

May 27th - June 2nd

Doctors Orders			
	Get at least 8 hours of sleep		
	Apply sunscreen while outside		
Doctors Orders			
Prescriptions			
Risperdal Oral - 0.5mg x 1			
Abilify Oral - 1.5mg x 1		Azithromycin 250mg x 1 - 5 day pack	
		Singulair 5mg x 1	
Doctors Orders			
Over the Counter Medication		Vicks® NyQuil®/DayQuil® Liquid	
Over the Counter Medication			

Your Orders and Prescriptions

May 20th - 26th

May 27th - June 2nd

Doctors Orders

Get at least 8 hours of sleep

Apply sunscreen while outside



Dr. John Doe has ordered you to get at least 8 hours of sleep per night.

Doctors Orders

Prescriptions

Risperdal Oral - 0.5mg x 1

Abilify Oral - 1.5mg x 1



Caution!

High risk of drowsiness when combining Abilify, Singulair and Vicks Nyquil/Dayquil medicines. Take caution when driving or operating heavy machinery.

6 day pack

Doctors Orders

Over the Counter Medication

Vicks® NyQuil®/DayQuil® Liquid

Over the Counter Medication

Why Gestalt should be part of every interface design



- Our visual system will try to resolve ambiguity, overly complex user interface designs are often misread by the user
- A strong understanding of Gestalt principles can help produce interface designs that are accurately read and understood by the user
- In most interface designs, multiple principles interact in concert. Understanding and screening designs for this will help avoid unintended visual relationships
- Applying Gestalt principles is a good method for ensuring a clear hierarchy in your interface layout and visual flow, resulting in a better experience for the user
- Users are goal driven, understanding and applying Gestalt visual principles can result in easier, more accurate and efficient task execution

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Abstract



One of the biggest challenges in user interface design is intentionally directing the user's attention to the functions and features that are most useful and the data which are mission critical. A foundation in basic design principles such as Gestalt can help developers produce a user interface that addresses this challenge. Gestalt, the German term for "Pattern", is the understanding of how we perceive pattern, form and organization in what we see. The collection of visual perception principles developed by the Gestalt School of Psychology can offer several insights which can be applied to user interface designs. In particular, developers can exploit the visual principles of connection, similarity, closure, proximity, continuity and enclosure to create visual hierarchy. These visual characteristics have been used for human interface design to increase human performance and enjoyment. Gestalt can aid critical, time sensitive missions by informing the application user interface design to intentionally direct the user to the most important and relevant information. This presentation will address the relationship between Gestalt principles and user interface design and provide examples of their influence in diverse domains including cyber and health information technology.

Author Biography

Peter Shimpeno is a User Experience Designer for Northrop Grumman based in Huntsville, Alabama. The team applies principles and best practices from the fields of interaction design, user experience, and usability engineering. Peter and the team work to solve challenging information visualization and navigation problems for complex systems. Peter is experienced in the visual and interaction design of complex application user interfaces for the Air & Missile Defense, Cyber, Heath IT and Intel domains. Peter has a Master of Fine Arts in Graphic Design from Florida Atlantic University and is an Apple Certified System Administrator.

Neta Ezer is a human factors engineer with six years of experience designing and evaluating interfaces for mission-critical applications. Dr. Ezer has conducted user research and designed interfaces for the Integrated Air and Missile Defense Battle Command System (IBCS) program and for intelligence programs, including Bierstadt and GCCS-J. She is the Principal Investigator for the User-Centered Design for Missile Defense IR&D project. Prior to working at Northrop Grumman, Dr. Ezer led human engineering of displays and controls for NASA's Orion Multi-Purpose Crew Vehicle, was an investigator for NASA projects on human-robot interaction, and supported flight crew integration for the International Space Station. She is knowledgeable in the areas of human performance testing, user-centered design, human-systems integration, display standards, human-robot/computer interaction, and usability analysis methods. Dr. Ezer has 20 peer-reviewed publications and has given over 30 conference presentations in these areas. Dr. Ezer holds a B.S. degree in Industrial Design and M.S. and Ph.D. degrees in Engineering Psychology (i.e., Human Factors), with a minor in Human-Computer Interaction, from the Georgia Institute of Technology. She is a member of the Human Factors and Ergonomics Society and serves as the newsletter editor for the Product Design Technical Group.

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