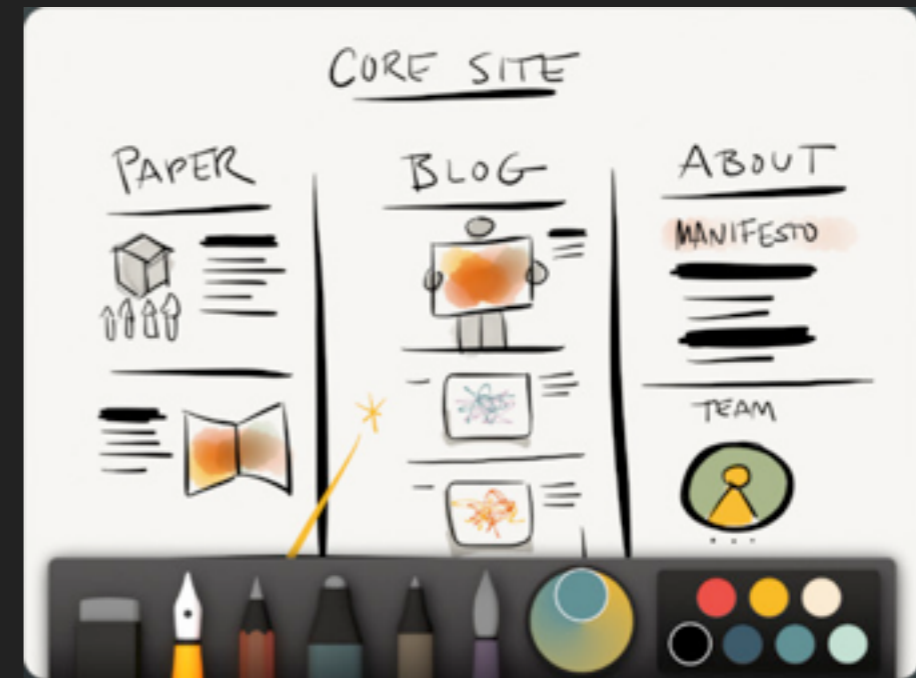


# INFORMATION SUBSTRATES

## INSTRUMENTAL INTERFACES

- ▶ To create and edit content



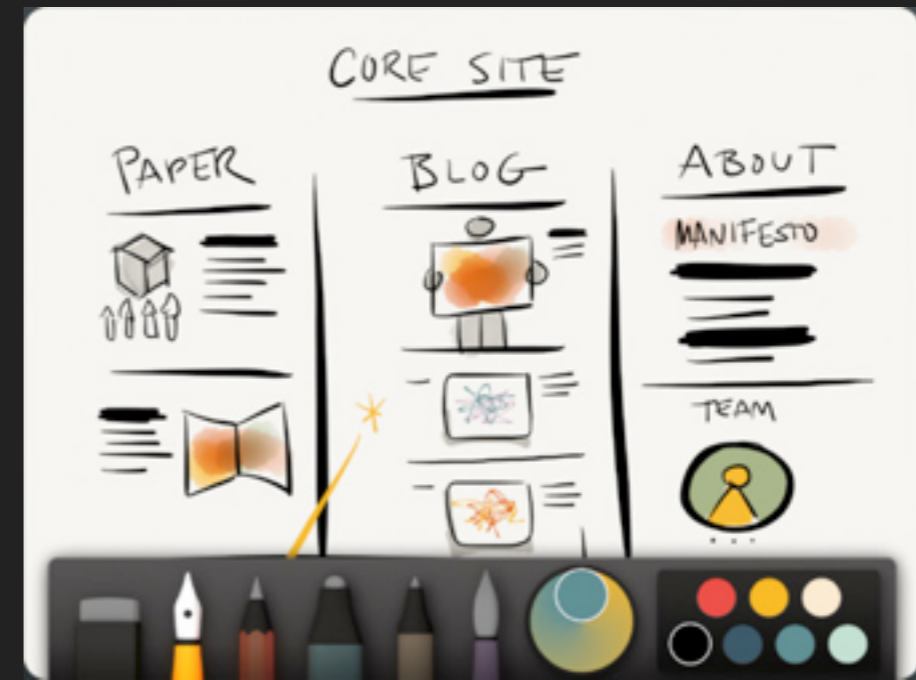
Paper



iPhoto

## INSTRUMENTAL INTERFACES

- ▶ BUT limited:
- ▶ How to use the pen from the "Paper" app to write on a photo in the "iPhoto" app?



Paper



iPhoto

## INFORMATION SUBSTRATES

- ▶ Data does not exist in a vacuum



## INFORMATION SUBSTRATES

- ▶ Data does not exist in a vacuum
- ▶ It is part of a substrate that provides context for interpreting data and constraints for presenting and interacting with it
- ▶ Examples: musical score, spreadsheet, page layout, graph...



# PHYSICAL SUBSTRATES



# INFORMATION SUBSTRATES



24 Diciembre XXIV.

28 noviembre 1935  
5 diciembre 1935  
6 Diciembre XXIV.

lengua que hace su cama cuando ya no se le importa un pito que el rocío que le pegó la jaca

haciendo su arroz con pollo en la sartén le diga la sartén y la sartén

y organiza en el amor la noche con sus cuantos de risas

pero si al rededor de la línea de fuego

de vapor como jamón no huele y queso se estreñece

el pájaro que canta retuerce la cortina no se para de pie ni gita

que abanica su cara y la corta

en la nieve

que cuece sus cintas de todos los colores

en la flauta la sopa

que cantándole

como si cantar pudiese la calavera

que le muerde la mano

y se la lleva suspendida por el anillo

envuelto en el ruido de las alas de las moscas llenas de caramelos

que la nota que sostiene el violín no deje respirar

apretándole el cuello con sus tenazas

roca la puñalada que toma al trío que sella el primero del pecho del cada día

que hincha en el globo atado con longanizas estremeñas

la razón perentoria del azul tan gracioso

que sentado en su silla curula

y arreglándose las faldas a cada momentito

cuando pasa la flecha tan veloz

le echa pimienta y sale saltando

y lee el porvenir en el ojo del toro

puchero roto cuchara hecha de boj y reloj de pulsera

orégano laurel y aljofaina de plata

el tomate

el clavado

el acorón

en el

partida de los saltos del jamón en la parrilla

de las alas de las moscas llenas de caramelos

que toma al trío que sella el primero del pecho del cada día

de las alas de las moscas llenas de caramelos

que el alijo se muerde

Caracoles

imposible

después

el queso

el queso

el queso

el queso

el queso

el queso

el queso

el queso

el queso

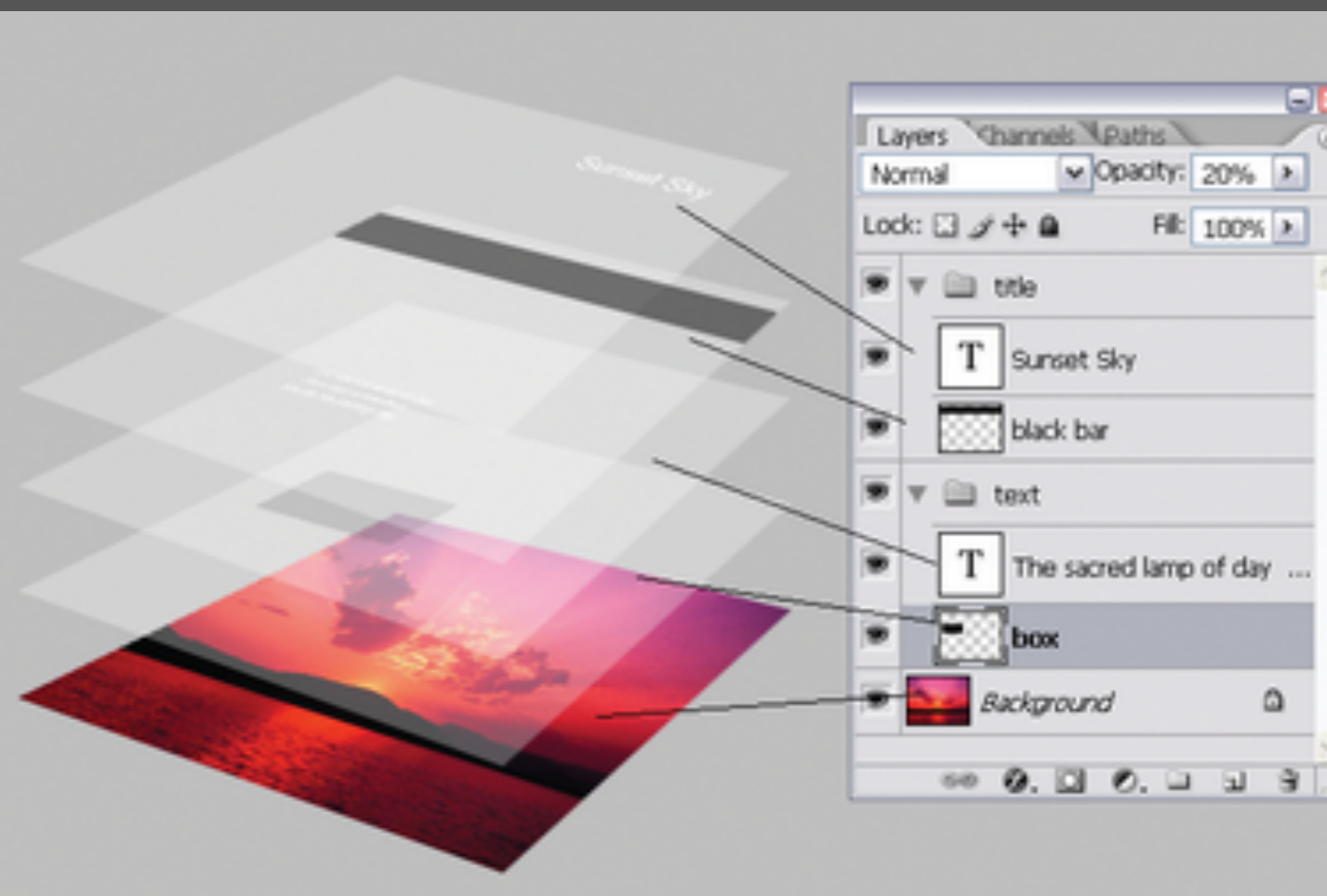
Piano

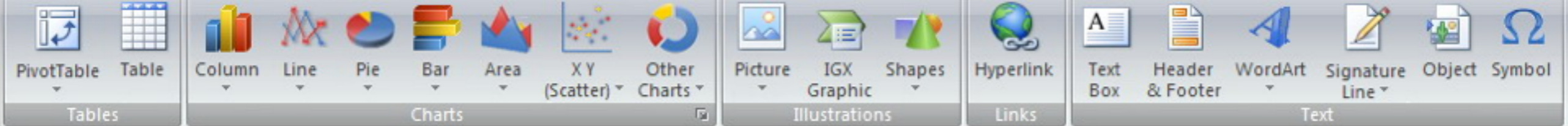




# INFORMATION SUBSTRATES

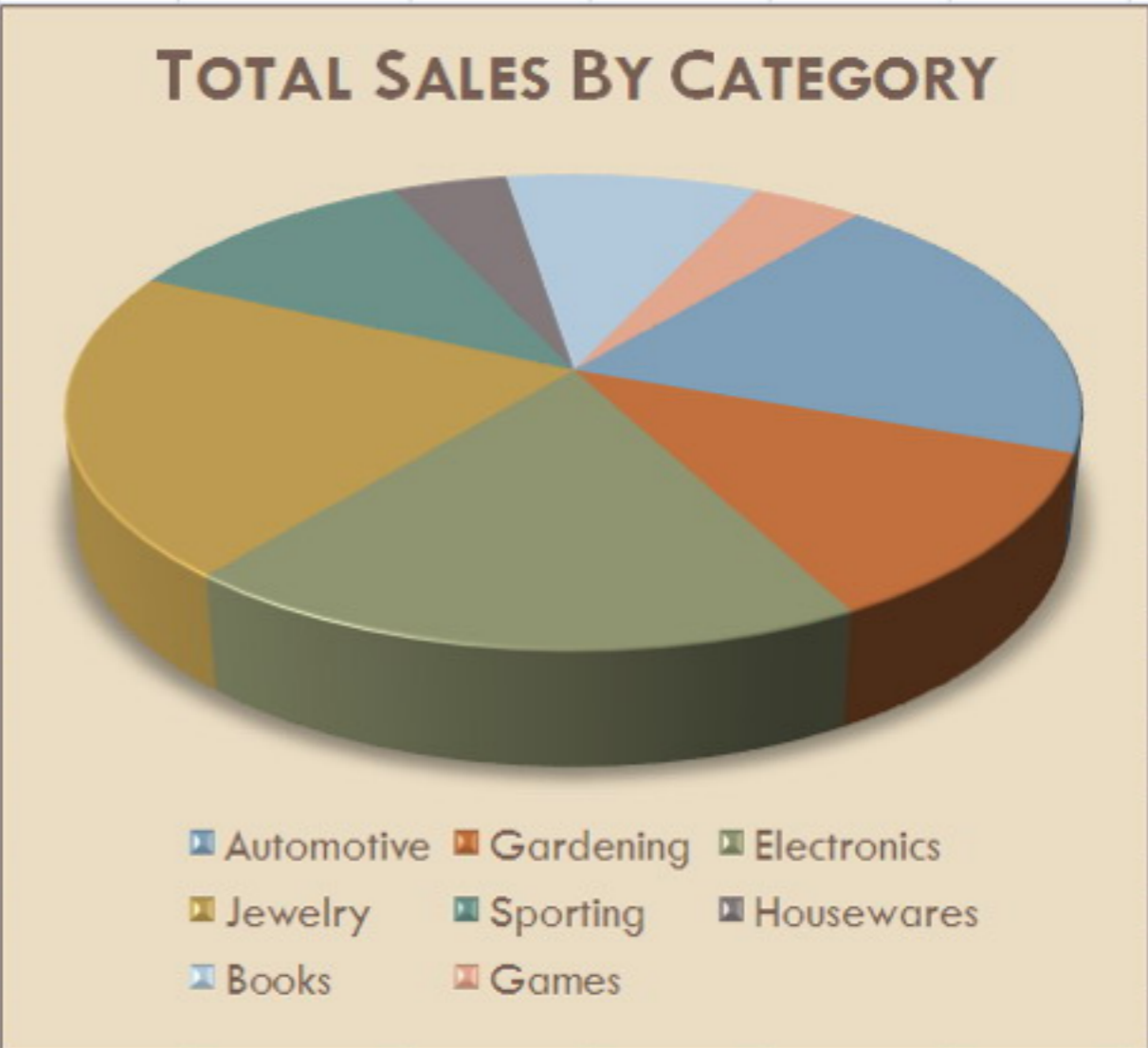
	B	C	D	E	F
2	OTBT Rzpsmr	OTBT N/B	Tsct OTBT NB		
3	11434	64037	200000		
4	ngd cslcmistm				
5	Tgtsl bssz yzrsz mntm Oz	BzTgrz 12 O	R/Onth -1	R/O	
6	1412	11.97	1400	0	
7	306	4.36	0	2	
8	272	4.01	0	1	
9	8	#DIV/0!	0	0	
10	34	7.10	0	1	
11					
12					
13	Rzpsmr mssgz	Rzpsmr pgpmlstm			
14	Tgtsl Rzpsmr Rzpsmrzd DOs	Rzpsmrzd Wsrr	NgrOsl Rzpsmr	LgcsL-Rz	
15	306	2	40	264	
16	% cmrrznt mnstllzd bssz s	r Tmtmrz sslz	nd dztgrmstmgn		
17	Argdmct NsOz	ytlyz NsOz	Rzvmzw_Dstz	Ognth-sctmvz	mtmrz rmt
18	zhmOmdmTmzr	sB6065903CT	25/06/98	76.8	
19			Ognth/dey/yzsr		
20	Dy Asrt NmObzr	yzt-mp_Dstz	ytndesrd_cgst	Ognthly mssgz	Ognth's-m
21	43588136-002	1/02/92	675.92	9.7	





H18 fx

	A	B	C	D	E	F	G	H	I	J	K	L	M
1													
2													
3		<b>Total Sales by Store</b>			<b>Total Sales by Region</b>								
4		<b>Store</b>	<b>Sales</b>		<b>Region</b>	<b>Sales</b>							
5		Store 1	\$ 313,765		West	✓ \$ 1,718,258							
6		Store 2	\$ 107,160		South	✗ \$ 534,389							
7		Store 3	\$ 351,751		Midwest	⚠ \$ 1,009,268							
8		Store 4	\$ 131,047		East	✗ \$ 900,431							
9		Store 5	\$ 252,136		<b>Total</b>	<b>\$ 4,162,346</b>							
10		Store 6	\$ 167,462										
11		Store 7	\$ 210,073										
12		Store 8	\$ 308,092		<b>Total Sales by Category</b>								
13		Store 9	\$ 97,492		<b>Category</b>	<b>Sales</b>							
14		Store 10	\$ 393,484		Automotive	\$ 86,285							
15		Store 11	\$ 396,891		Gardening	\$ 52,048							
16		Store 12	\$ 151,168		Electronics	\$ 83,026							
17		Store 13	\$ 251,390		Jewelry	\$ 93,035							
18		Store 14	\$ 392,776		Sporting	\$ 50,016							
19		Store 15	\$ 259,654		Houseware	\$ 19,149							
20		Store 16	\$ 225,184		Books	\$ 42,247							
21		Store 17	\$ 335,785		Games	\$ 18,420							
22													
23													



# BREATHING CITY

Manhattan's at Work and Home population by hour

12  
am



Joey Cherdarchuk | @cherdarchuk | www.darkhorseanalytics.com/blog  
Data: US Census Bureau, New York City, US Bureau of Labour Statistics

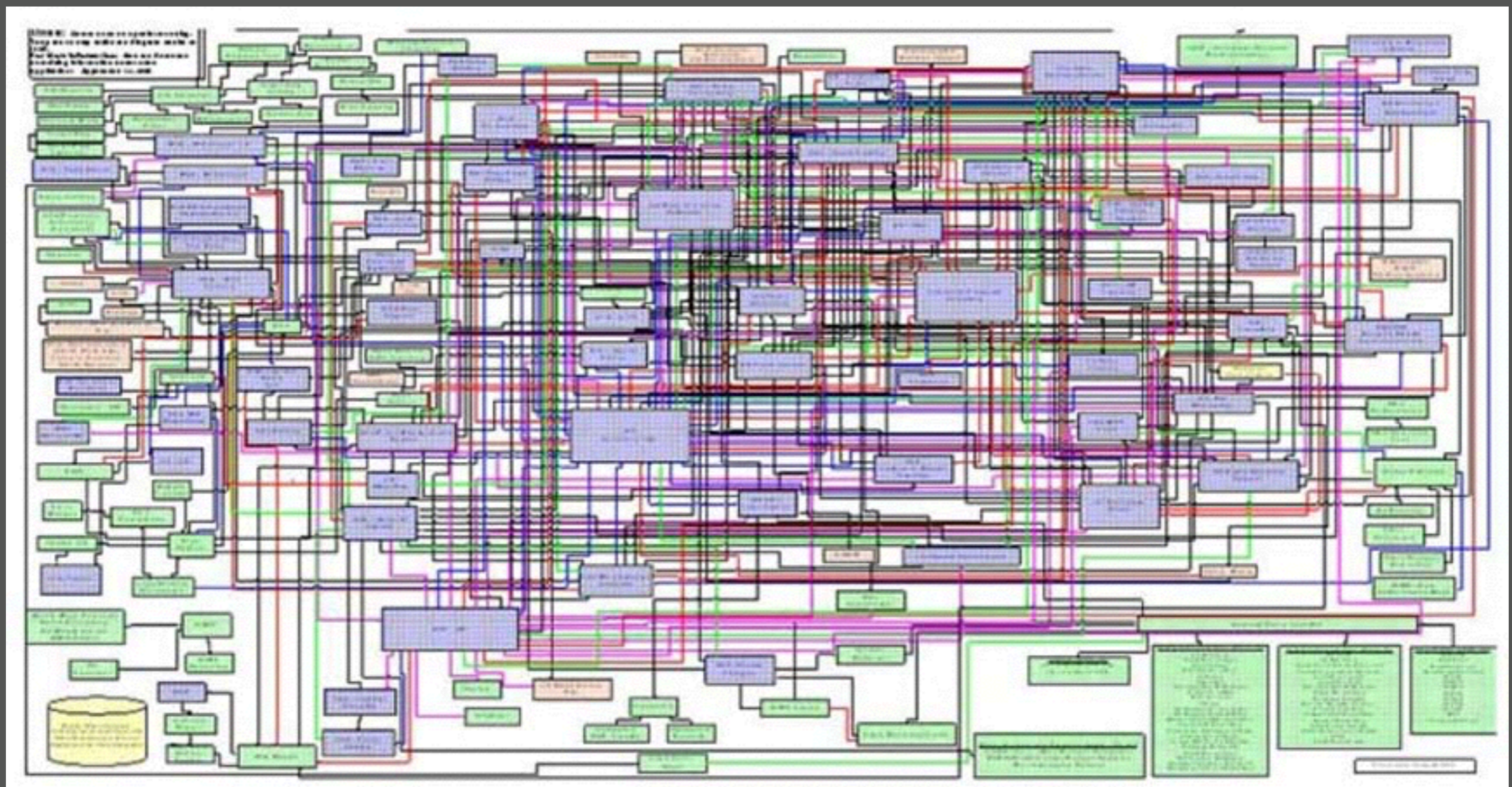
Microsoft Excel interface showing a game interface. The spreadsheet contains a grid-based game area with various symbols and numbers. To the right of the grid is a character status panel with fields for Name, Level, Health, Energy, Attack, Defense, Accuracy, Luck, and Abilities. The character is named 'Cary' and is a 'Vampire'.

New Game		Controls		About		Close Game	
Letters		Collections		Help			
Hall of Fame		Achievements List		Statistics		Import Data	
Title:	Duelist			Name:	Vampire		
Name:	Cary			Level:	13		
Level:	12			Health:	407 / 407		
Health:	370 / 370			Energy:	49 / 49		
Fame:	17230 / 18910			Abilities:	Life Leech		
Attack:	21	+		Flaming Corpse	None		
Defense:	28	+		Melee:	Bite		
Accuracy:	21	+		Ranged:	None		
Luck:	34	+		Condition:	None		
Available Points:	2						
Melee:	Shovel of Experience						
Ranged:	Pistol for Dentistry						
Condition:	None						

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ARENA  
XLSMS

# HOW TO DEFINE INFORMATION SUBSTRATES?



**THIS IS NOT A PENCIL**



---

ATOMS  
MOLECULES  
MATERIAL  
OBJECT  
TOOL  
USE  
CULTURE

**THIS IS NOT  
(JUST) A PENCIL**



## LAYERING SUBSTRATES

- ▶ A substrate can represent data in another substrate



Pixels



Shapes



Graph

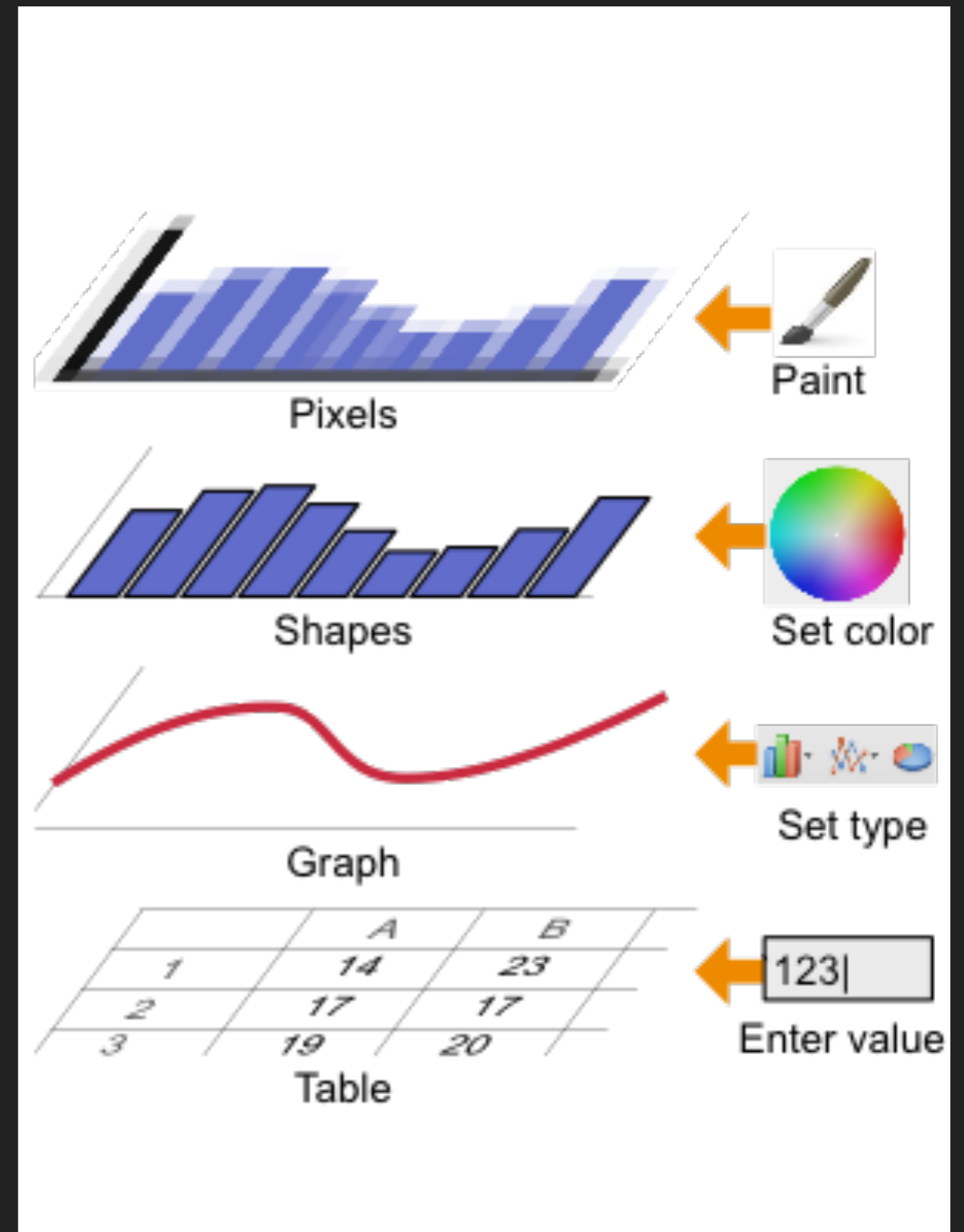
	A	B
1	14	23
2	17	17
3	19	20

Table



## LAYERING SUBSTRATES

- ▶ A substrate can represent data in another substrate
- ▶ Instruments can modify the different substrates in the stack
- ▶ Example:
  - A table substrate - edit a value
  - A graph substrate - set its type
  - A histogram - set its color
  - An image - paint on it





Constraint Options

name: constraint 4

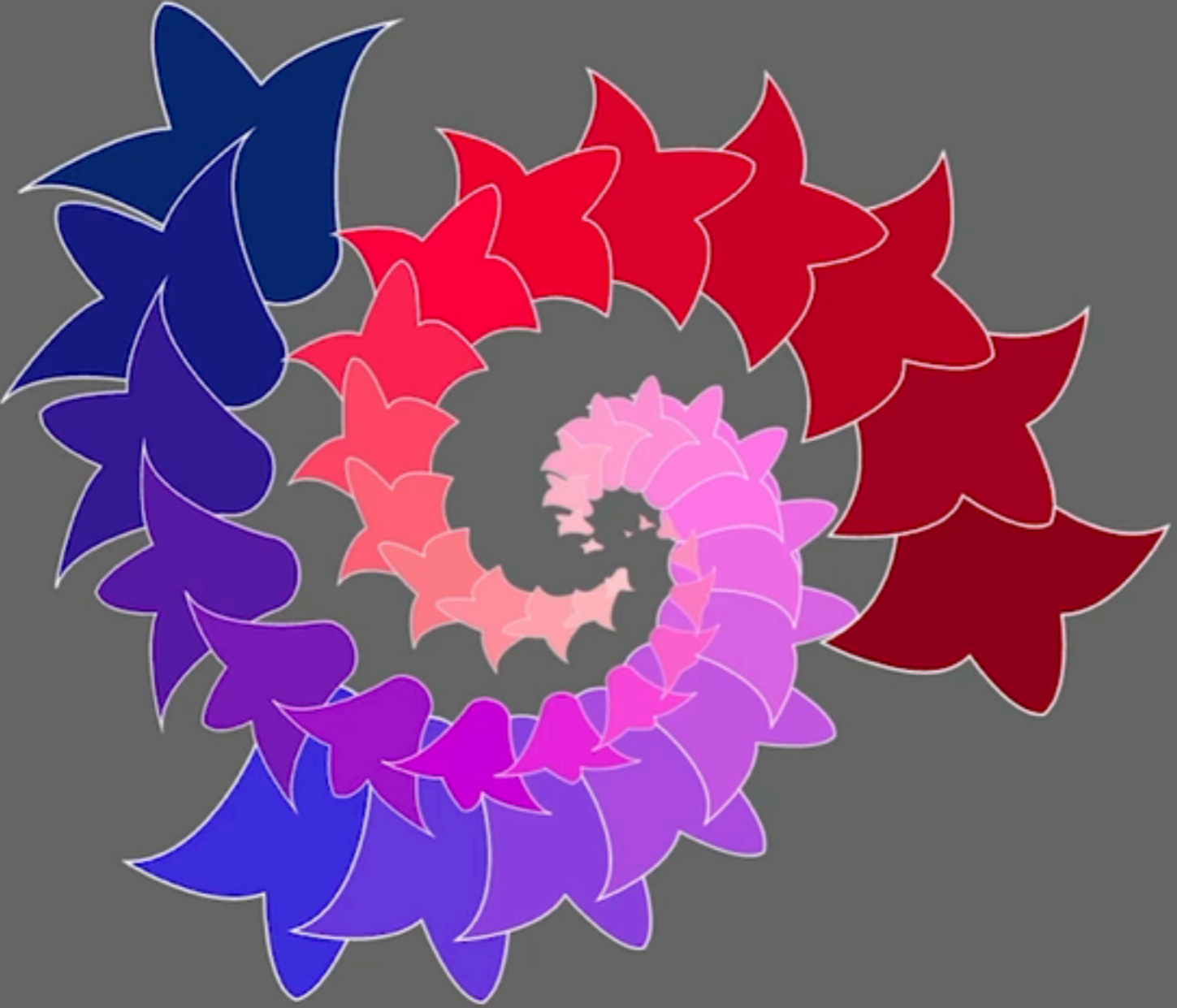
+ - [ ] [ ] [ ] [ ]

x y

relative index: 1

relative offset: -530

interpolate



Layers

Constraints

- constraint
- constraint
- constraint
- constraint

Lists

Shapes

- duplicator
- group
- group
- group
- group
- group
- group
- group
- group
- group

Style

Fill: #1e0506

Stroke: #ff0000

Stroke Weight

Parameters

Save or Load a file

save save as

download file to desktop

upload file from desktop

upload a file No file chosen

Import or Export an SVG

export svg

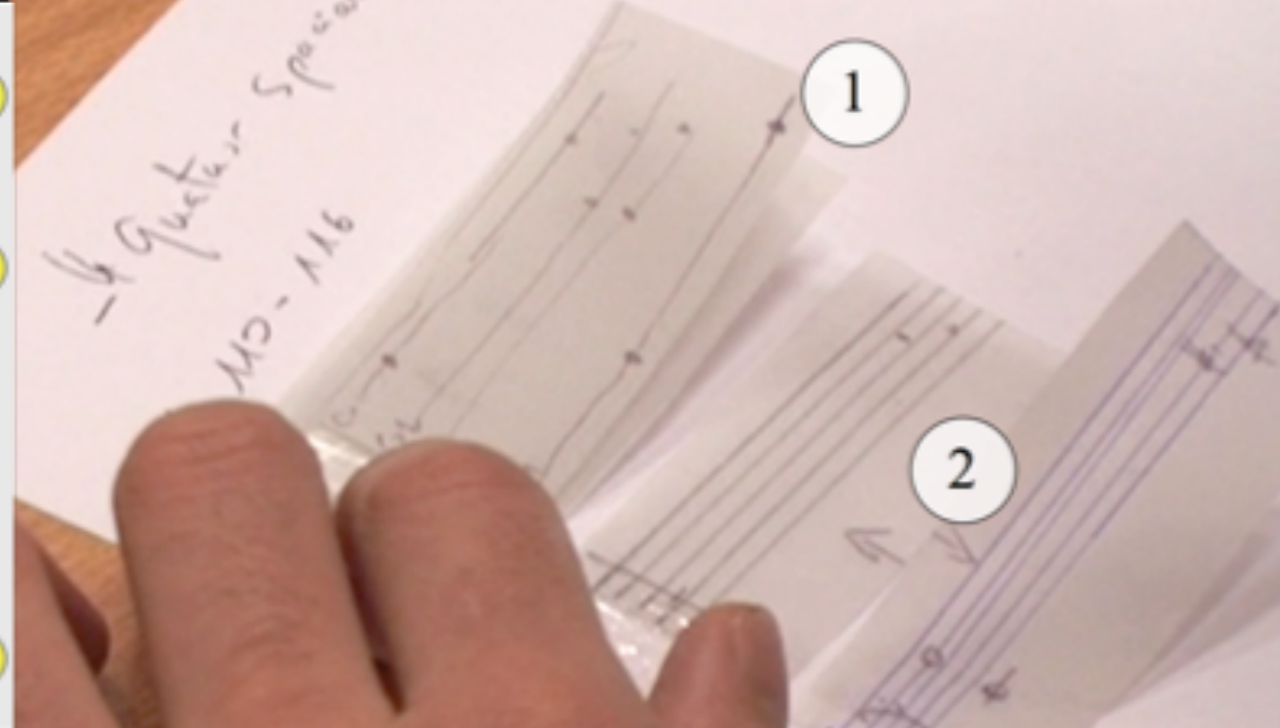
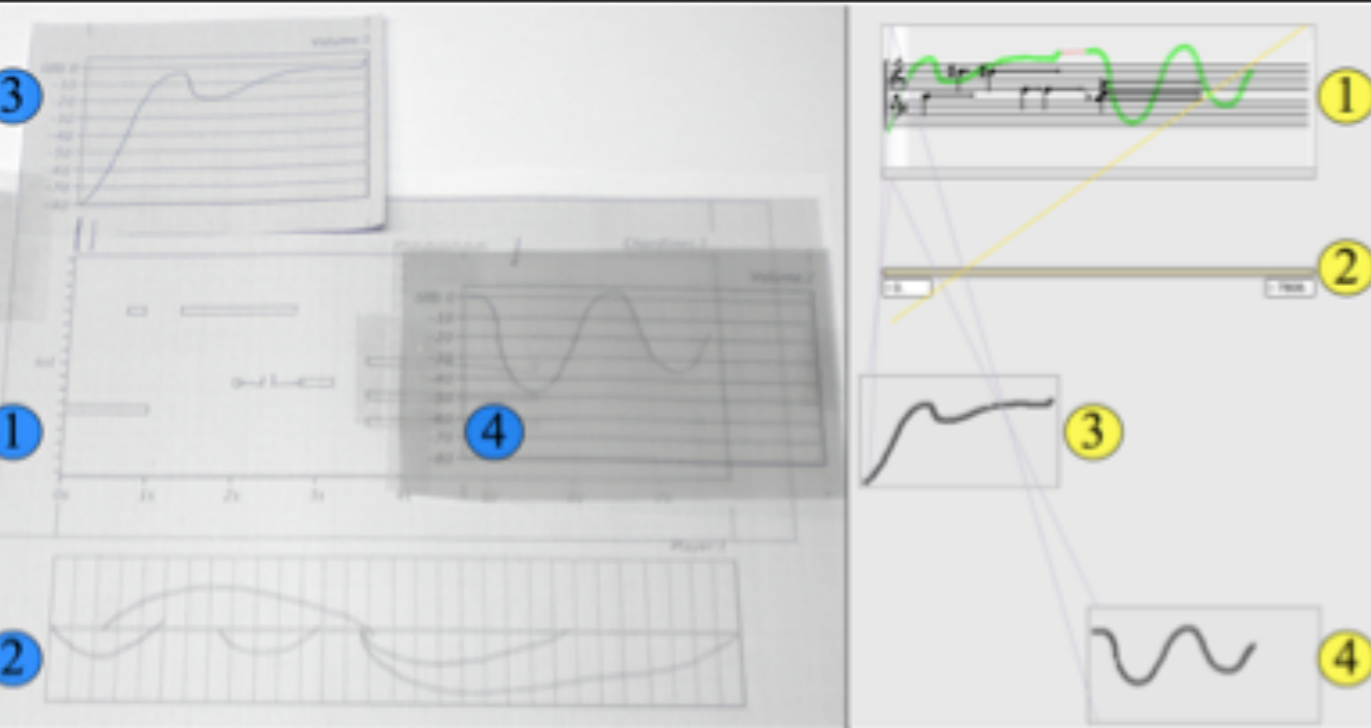
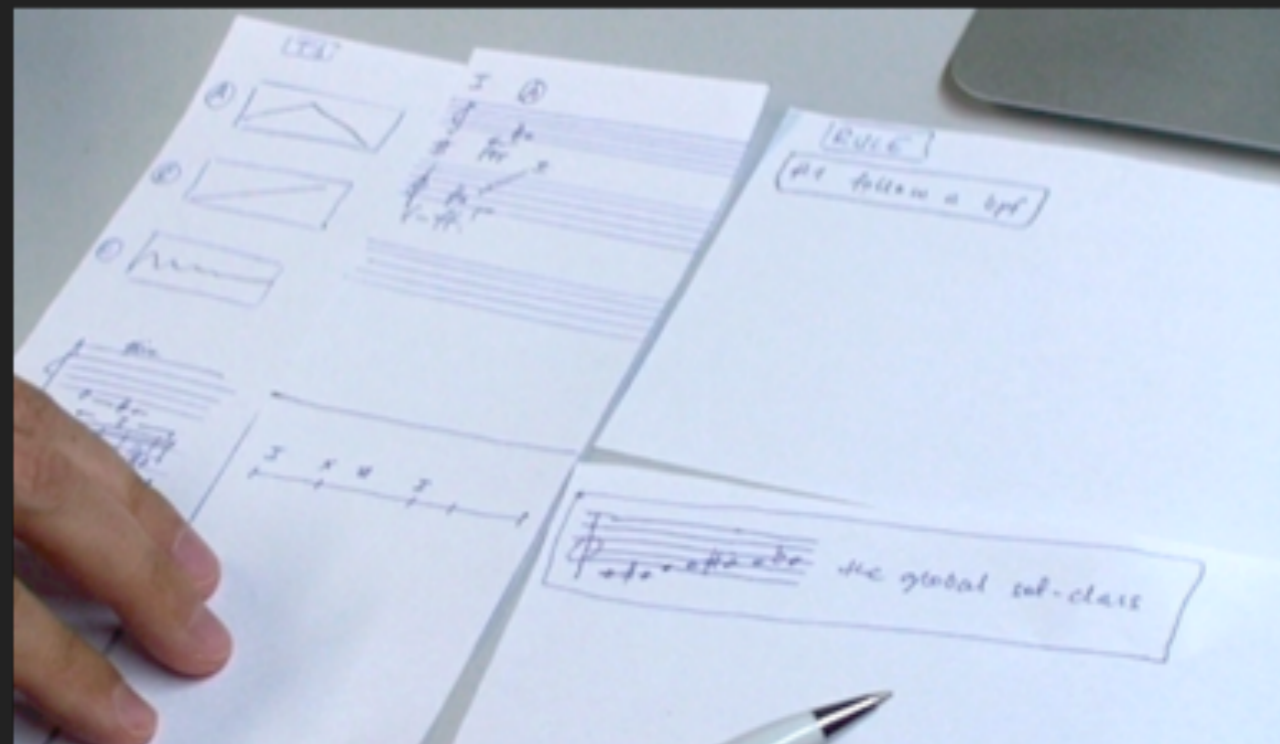
import SVG desktop

upload a file group\_design.svg

## PAPER SUBSTRATES

Garcia, Tsandilas, Agon & Mackay, 2012

- ▶ Support the music composition process by combining and interpreting notations in various ways



A handwritten musical score on a white background, featuring three staves. The top staff has a blue arrow pointing to the first measure and a blue zigzag line under the second measure. The middle staff has a blue heart-shaped outline around the first measure and a blue box around the second measure. The bottom staff has a blue box around the first measure and a blue circle around the second measure. A red dashed line encloses a section of the bottom staff, containing a blue box with the number '2' and the handwritten text '(viol...)' in blue. The score includes dynamic markings 'mp' and 'mf', and the word 'Solo' written in blue. There are also blue diagonal lines crossing out parts of the top staff.

textual & numerical elements

TSANDILAS, LETONDAL, MACH

Prototype demonstrating a simple scenario:  
Working on a piece for piano and electronics

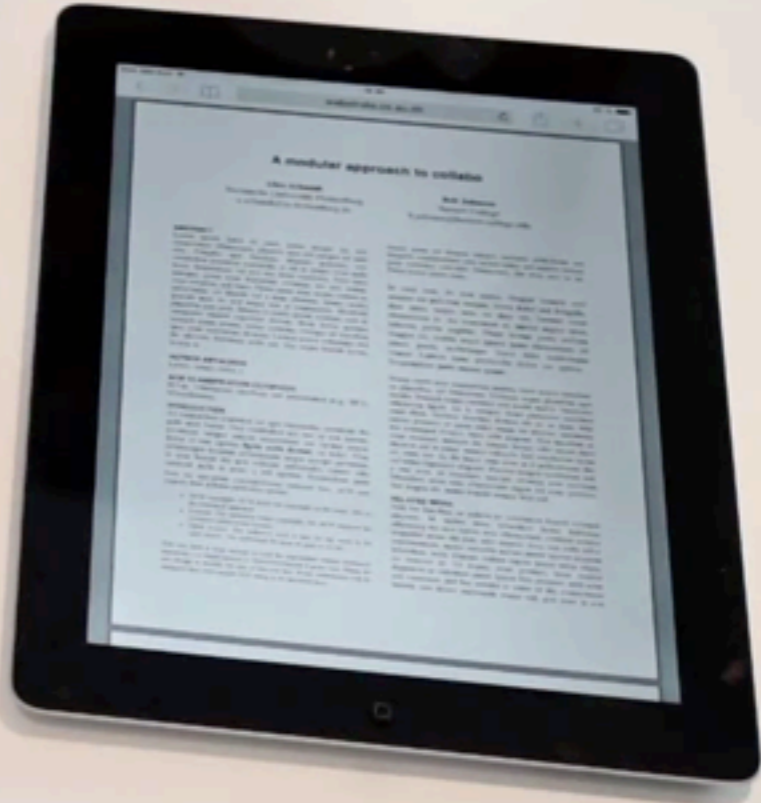
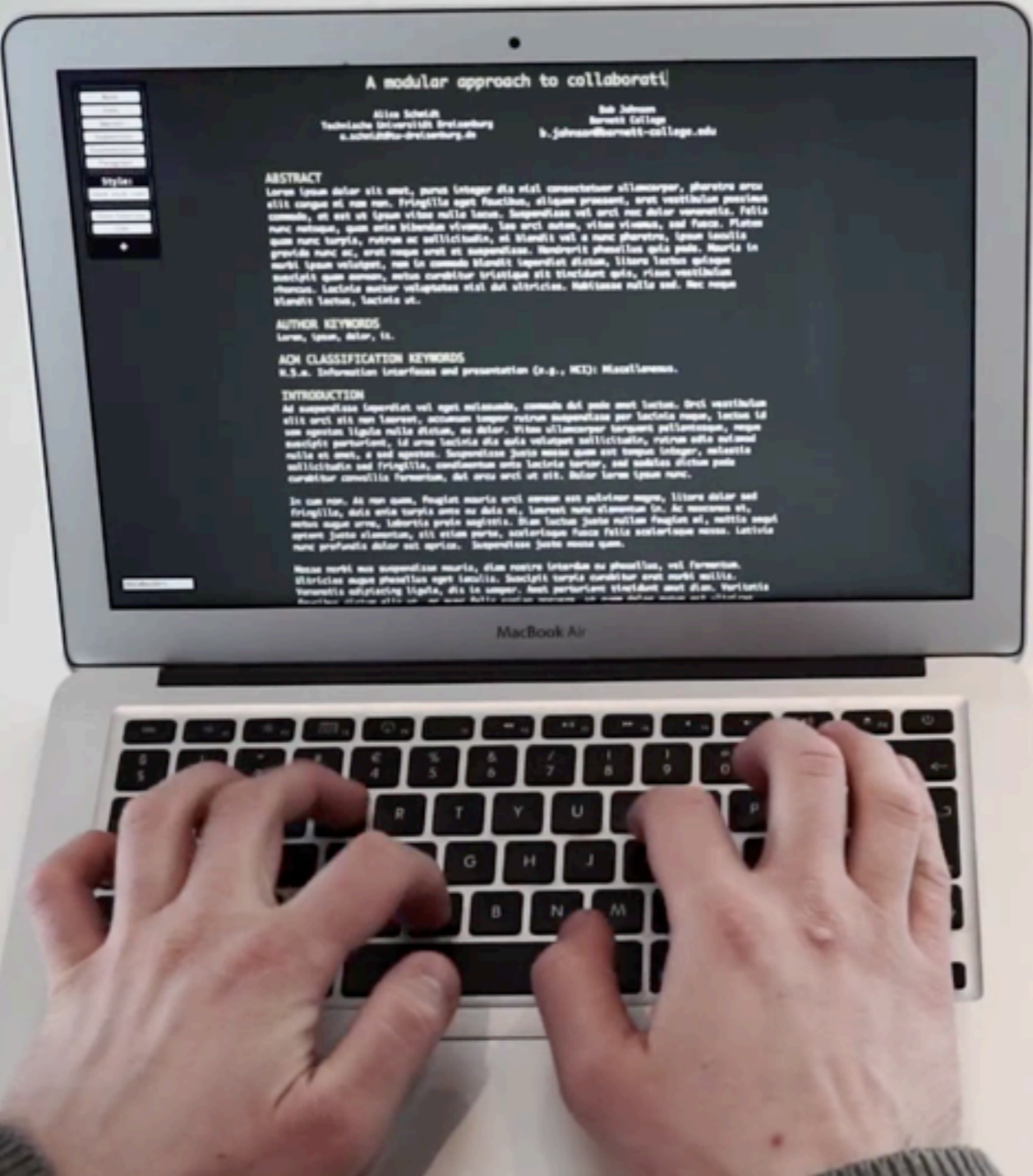
GARCIA, TSANDILAS, AGON, M

***QUID SIT MUSICUS?***  
**BY PHILIPPE LEROUX**

## INSTRUMENTS & SUBSTRATES

- ▶ Instruments can manipulate substrates
- ▶ Instruments probe the substrate for specific properties or protocols to decide if they can operate
- ▶ Instruments are themselves substrates
- ▶ Instruments can be embedded in substrates







# WHAT'S IN A SUBSTRATE?

- ▶ Content
  - ▶ Numbers, text, images, ... and other substrates
- ▶ Structure
  - ▶ Record, Sequence, Tree, DAG, Graph, Table, ...
- ▶ Relationships / Constraints / Rules
  - ▶ "spreadsheet formulas"...