

A User Centric Interface for the Management of Past, Present and Future Events

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DISI, University of Trento

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- Modeling *life events* taking different perspectives of human experience.
- An extended data visualization reference model has been proposed.
- A content rich interrelated timeline.
- A novel User Interface development method has been introduced.
- Minimalist metadata visualization for entity recognition.

The Context

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I am more and more convinced that our happiness or our unhappiness depends far more on the way we meet the events of life than on the nature of those events themselves.

- Karl Wilhelm von Humboldt

What is *important* to us may not lie in the line of historical account, but there is a need for individual to keep record of and maintain them with affordable cost.

The Problem

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- The very challenging issues are to define what events are important to us.
- The correlations between events.
- How events of one life are related to the events of another life.
- Association of other entities .
- Finally, how the interface supports visualization and interaction.

The Solution

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- A formal definition has been proposed for the life events along with other relevant entities.
- A visualization framework has been developed.
- Visualization of complex historical data has been proposed.
- Intuitive user interface has been designed supporting the data visualization and operations.

Related Works

Temporal data

Visualization

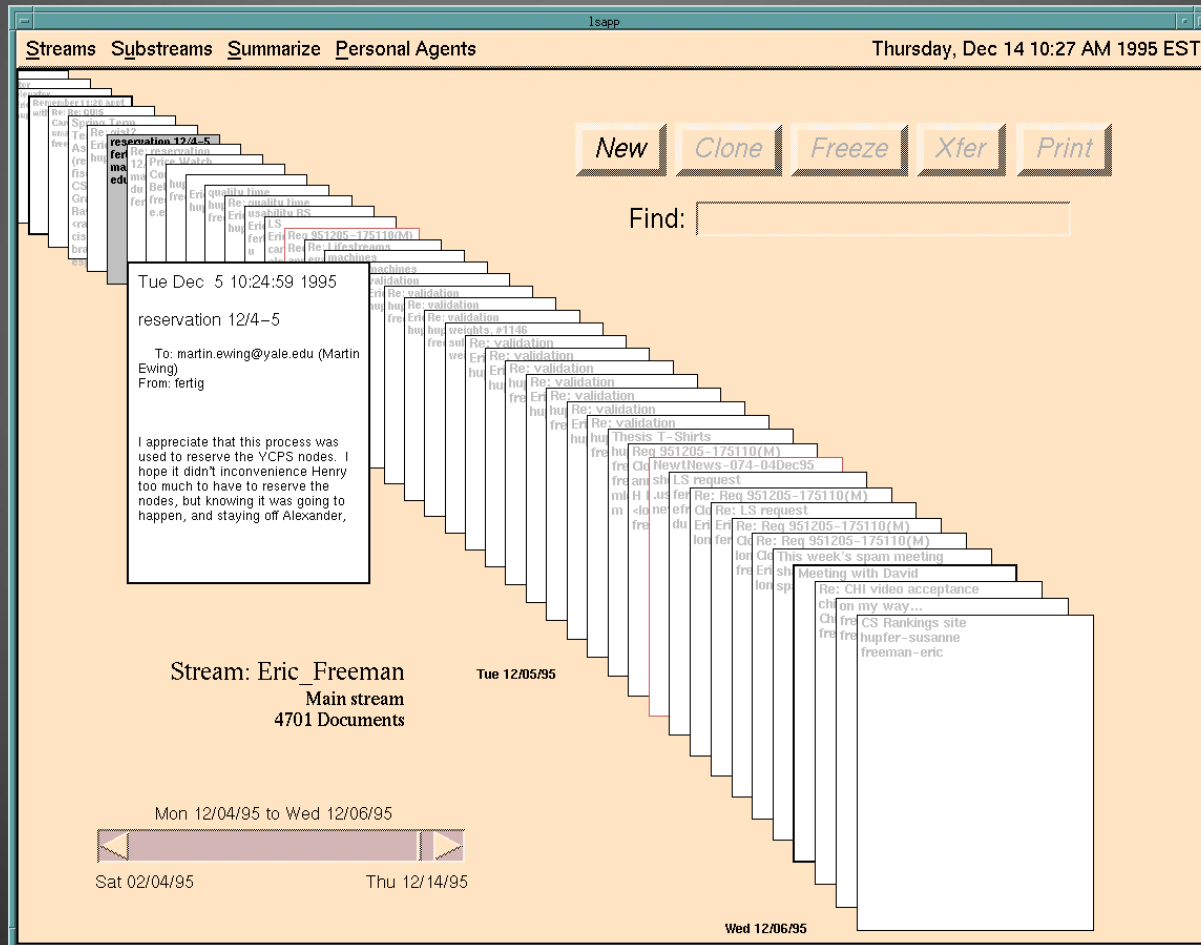


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Eric Freeman and David Gelernter's LifeStream interface [4]



Related Works

Timeline
visualization

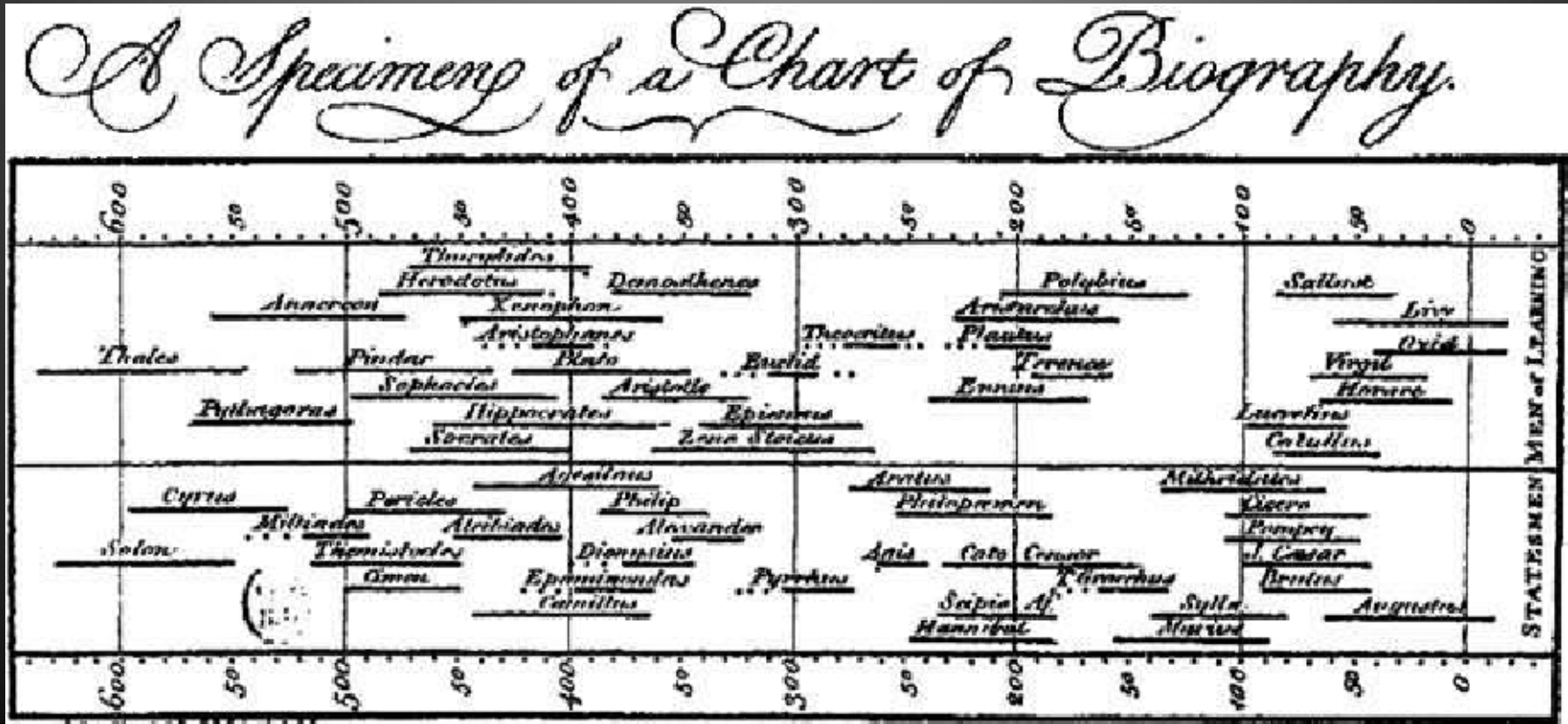


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Joseph Priestly in 1765 developed the idea of describing the life span of famous people (1200 BC to 1750 AD) by using horizontal lines along the time scale detailed in the *Chart of Biography* [9].



Related Works

Timeline
visualization

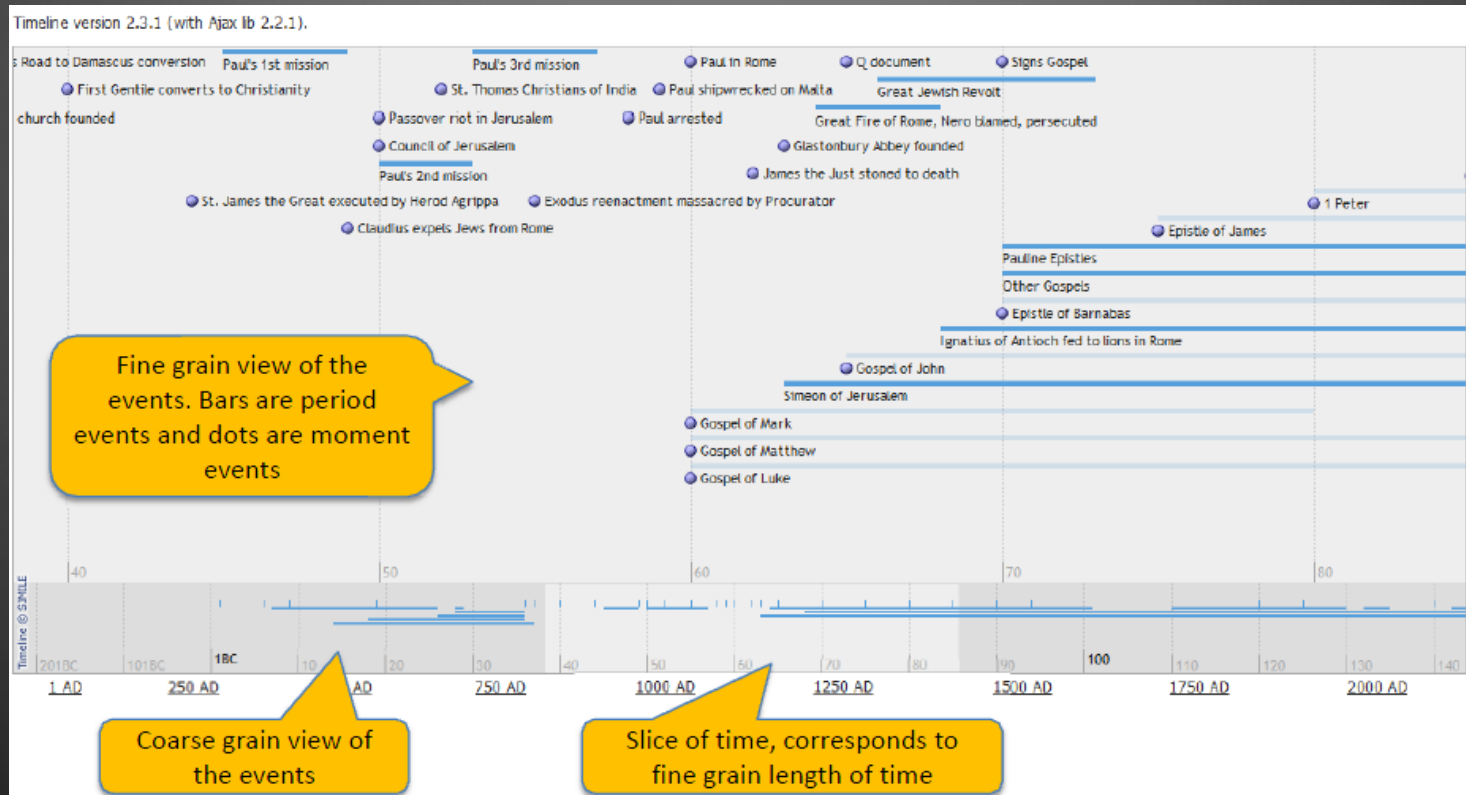


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Omar Alonso *et al* used *SIMILE Timelines* for exploratory search [10], and timeline visualization for search results [11].



SIMILE Timeline demonstrates *History of Christianity*

Related Works

Timeline
visualization

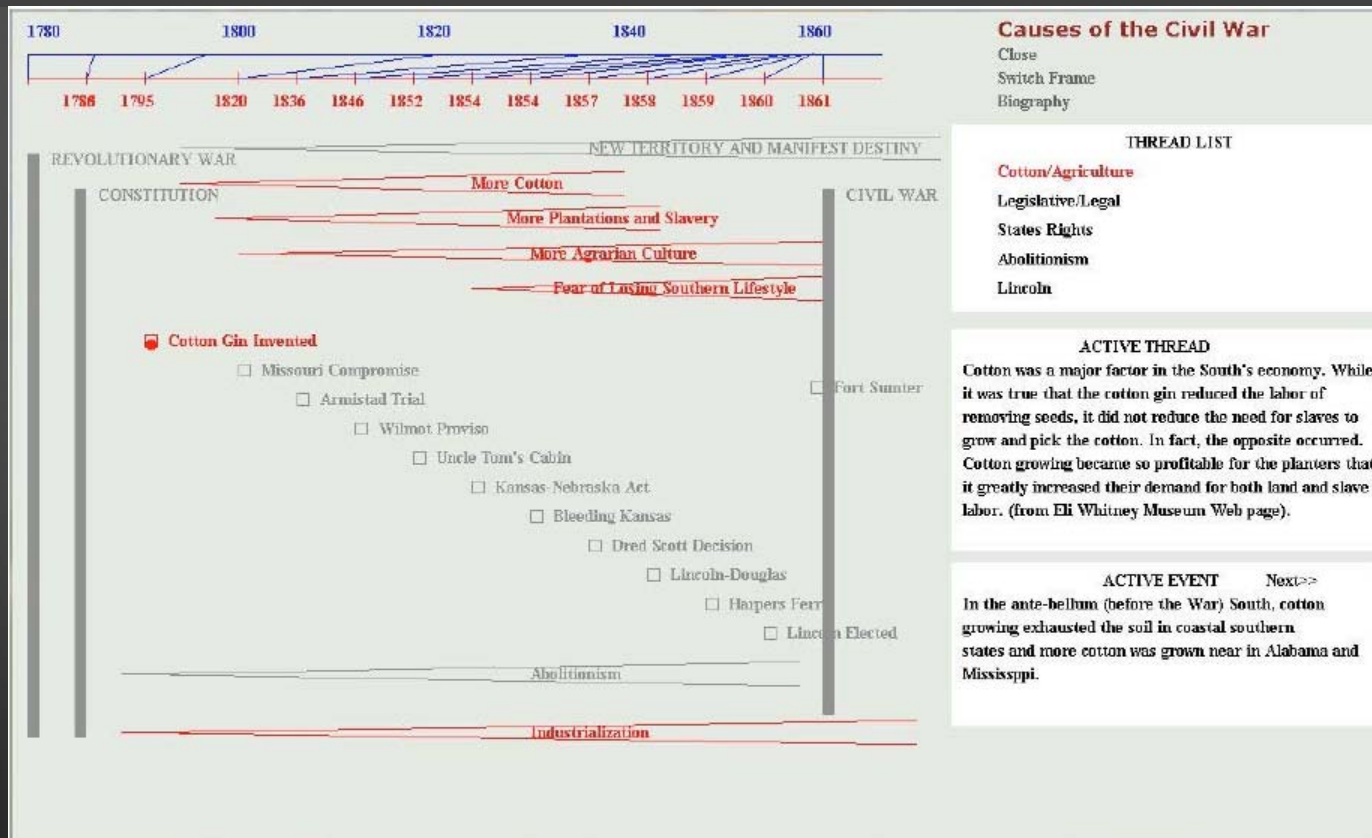


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- R B Allen put forward the issues of *causation* in history in and provided the schema for visualization [12].



- Supernaturalism
 - God Centric (Life is created on purpose)
 - Souls Centric (Something must be worth of doing)
- Naturalism
 - Subjectivism (Depending on each one's variable mental states)
 - Objectivism (Constituted by something physical independent of the mind)
- Nihilism (Supernaturalism and atheism)

Life is an experience determined by the function of belief and wisdom. Which way we see it, is the way it is we experience life. We experience every event through the passage of *a posteriori*, while the fact that happened is *a priori*.

Life and Events

Events



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Lexical Meaning:

- That which comes, arrives, or happens; that which falls out; any incident, good or bad.
- Something that happens at a given place and time.

Therefore, events, in life, are things that happens, such things are births and deaths, swimming and singing, meeting and dating.

The perspectives that manifest the meaning of life establishes the individual's view of assimilating an event as it happens.

Life and Events

The river metaphor



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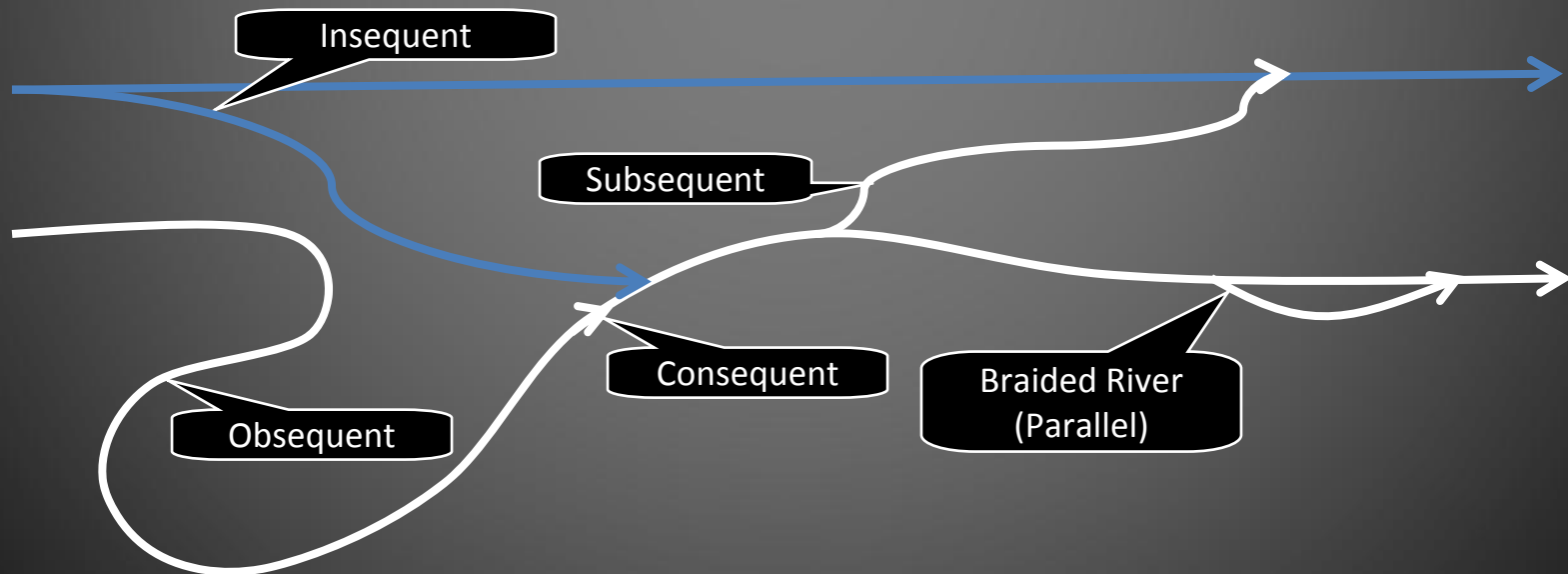
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Your life begins small, something like the drops of rain which become small streams and eventually great rivers which flow into the ocean. Like these streams and rivers, we encounter obstacles and challenges. The streams and rivers overcome these obstacles by wearing them down or finding a path around or through them...

- Robert Taylor

Geological classifications of rivers [16]



An old philosophical query, ceaseless dynamism of the natural phenomena with no logical or convincing explanation [15].₁₃

Event Definition

Aspects of events [17]



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- Temporal
 - Relative time (Chronostatic): A numberless reference to time.
 - Absolute time (Chronometric): A quantitative measure of time.
- Spatial
 - Physical : Characterized by geo-coordinates.
 - Logical: Spatial domain concept.
- Informational : Type, description, stories.
- Experiential: Association with documents and medias.
- Structural: Decomposition of high level events into low level events.
- Causal: Chain of events.

Event Definition

Event relationships



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- Structural: Connecting events by “part-of” relationship.
- Causal: Connecting events by “caused by” relationship.
- Temporal: Connecting events by temporal relationship.
- Spatial: Connecting events by topological relationships.

Event Definition

Definition



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$EV = [evid, T, L, le, R]$, where:

- *evid* is the unique identifier for an event (e.g., SWeb id)
- *T*, defines the temporal collocation of an event, i.e., the interval or moment.
- *L*, defines the spatial collocation of an event, i.e., its location.
- *le*, describes the informational aspect of an event, e.g., type, actions, states, participants, etc.
- *R*, defines the relation to other event(s), i.e., whether a causal event, sub or discrete event.

And $R = [EV^R, r]$, where:

- EV^R is the event being related to the eliciting event *EV* and the definition of EV^R is same as *EV*.
- *r* refers to the type of relation by which two events are bound. For instance, if EV^1 is a super event of EV^2 , then EV^2 is a sub-event of EV^1 .



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The two perspectives:

- Colin Wares perspective: Seeing through eyes and understanding with mind is the fundamentals for humans perception of the world.
- Robert Spences perspective: When experiencing the world we build cognitive maps (mental models) that guide our understanding and knowledge of this world.



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• Gestalt Principles

- Proximity
- Similarity
- Continuity
- Closure
- Symmetry
- Figure/Ground

• Psychology of Colors [13]

 Green: Color of nature, refreshing and relaxing.

 Yellow: Symbol of optimism, overpowering. Causes temper to loose.

 Purple: Color of royalty, luxury, wealth, and sophistication. It is also feminine and romantic.

 Brown: Solid and reliable brown is the color of earth. Light brown implies genuineness.

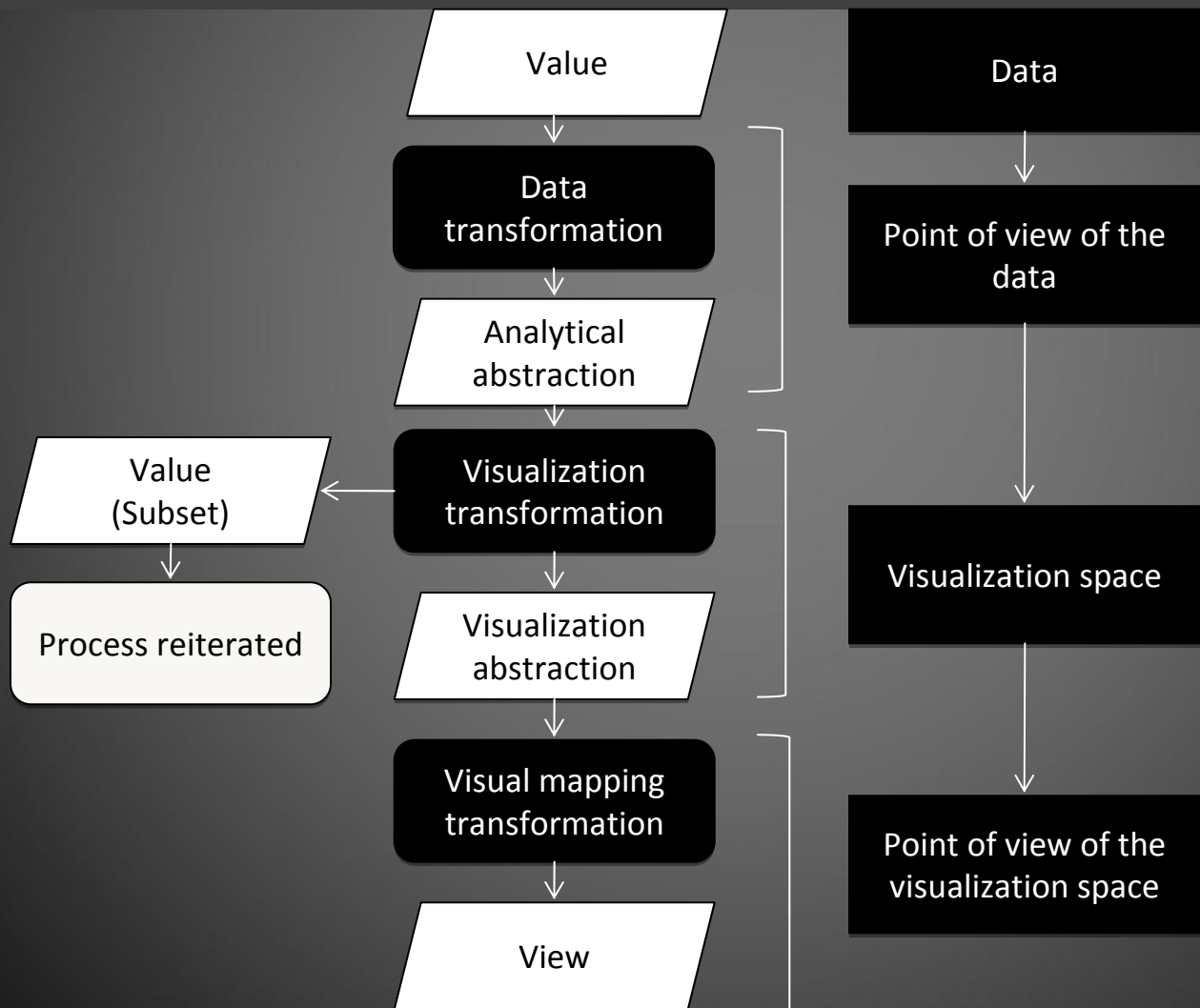
Event Visualization

Visualization model



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Data visualization reference model, extended from Chi [14]



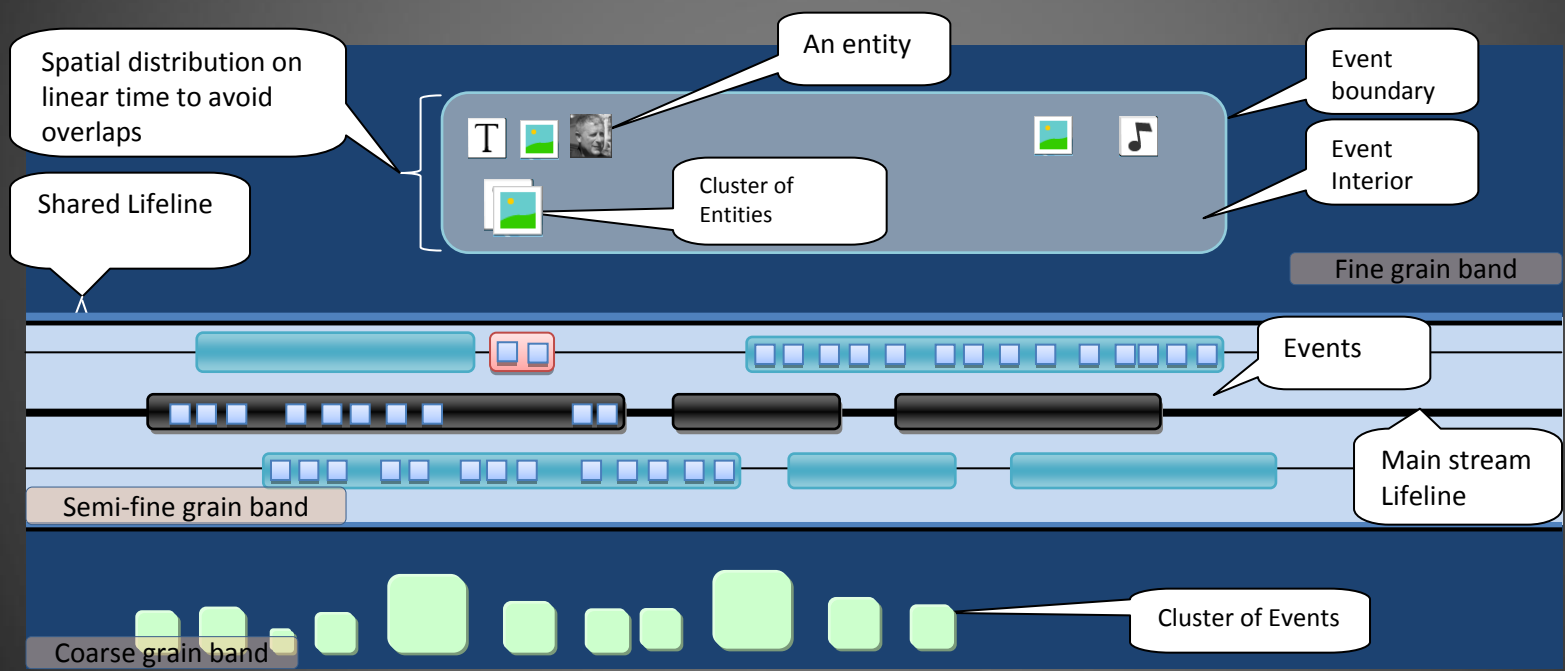
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Visualizing data elements



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Basic visualization of elements



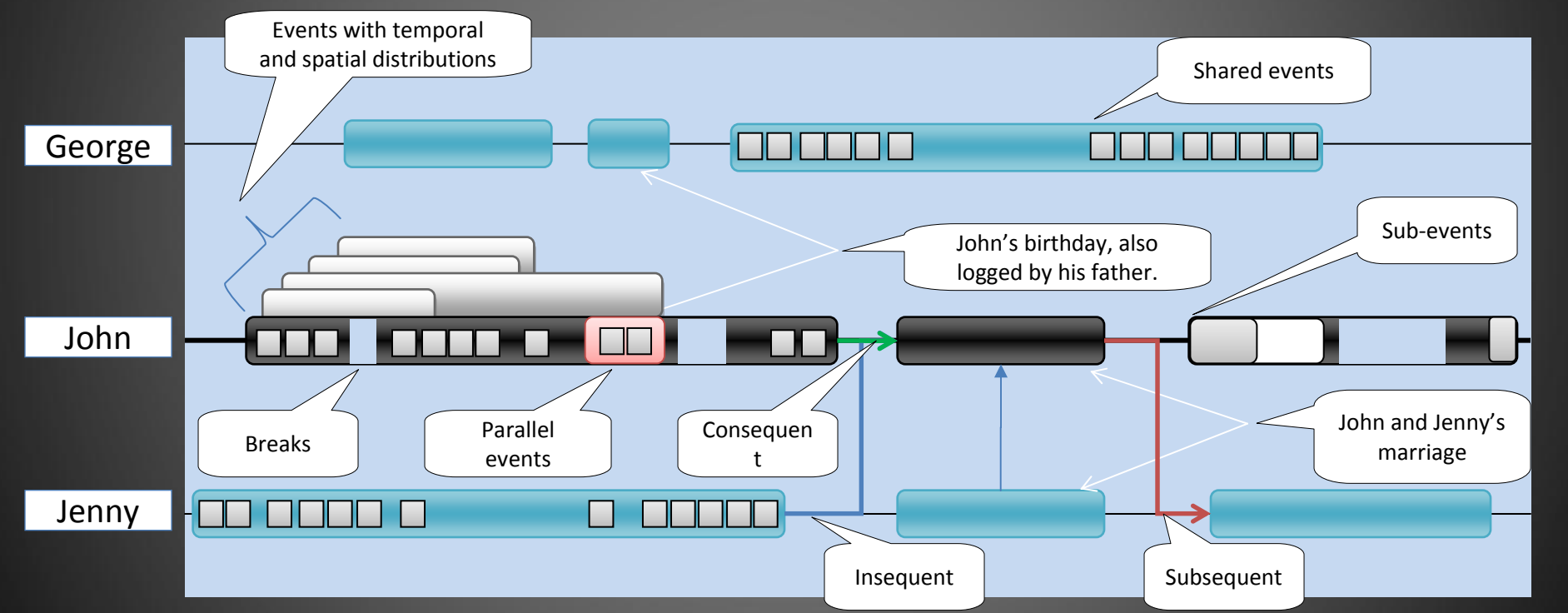
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Visualizing data elements



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Lifelines with interrelations



Metadata

Visualization

The context



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Three questions

1. How much metadata is necessary to recognize an entity
2. What are the most important ones
3. In which order they should be arranged

Five context for survey

1. The person is very well known to the user (brother/sister)
2. The person is more known by his/her name and work (favorite author)
3. The person is more known by his/her face and work (favorite actor/actress)
4. The person is remembered from childhood memories (childhood friend)
5. The person is not known, but a few of his/her words (unknown)

Nine metadata

1. Picture of the person
2. Full Name
3. Nick name
4. Current location
5. Profession
6. Date of birth
7. Hometown
8. Nationality
9. List of literatures (2), List of movies (3), List of schools (4), List of similar quotes (5)

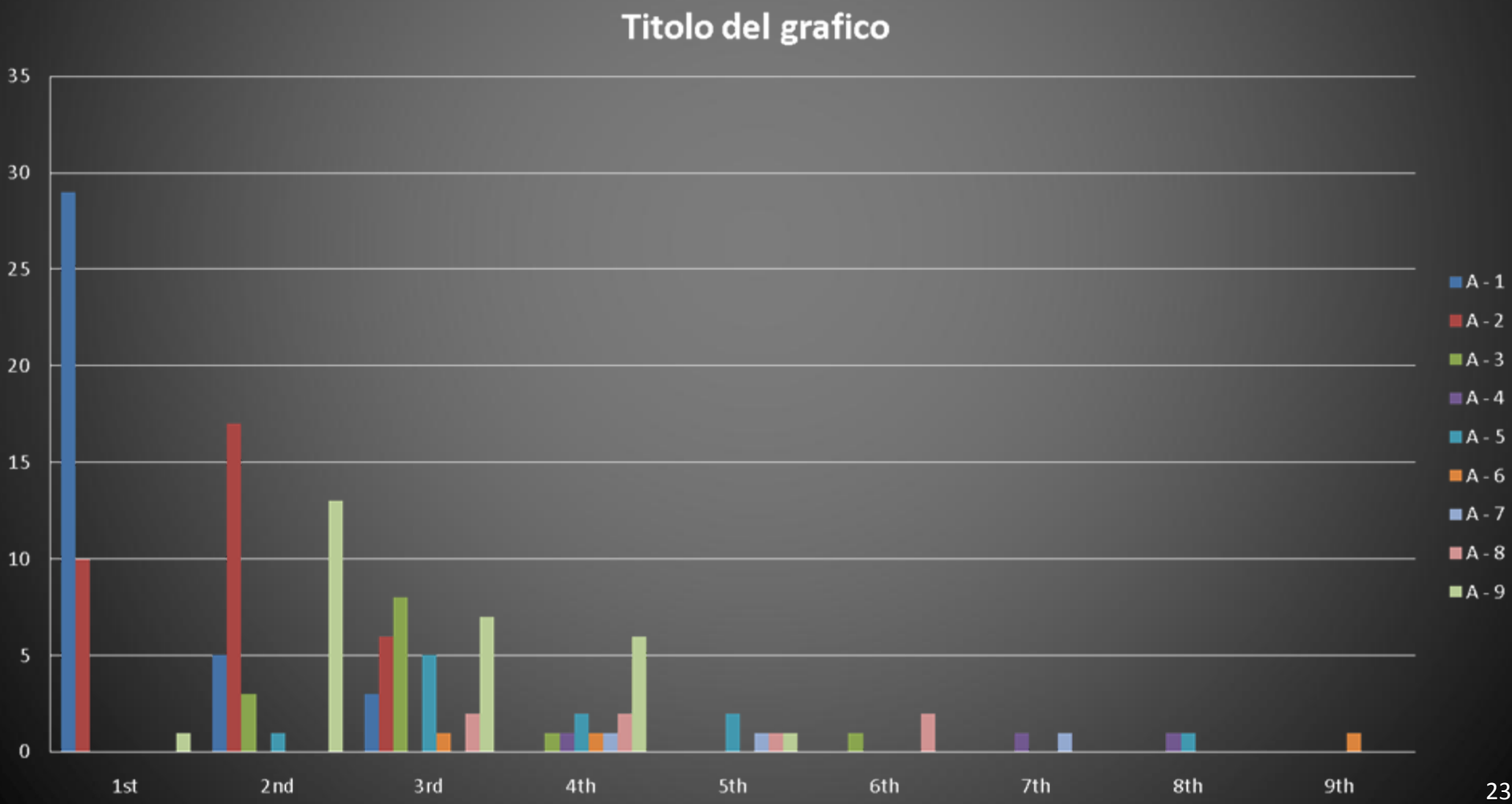
Metadata Visualization

Amount, type and order

○ ● ○ ○

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You are looking for your favorite actor/actress on the net, what are the information would you think sufficient to identify him/her from a list of people?

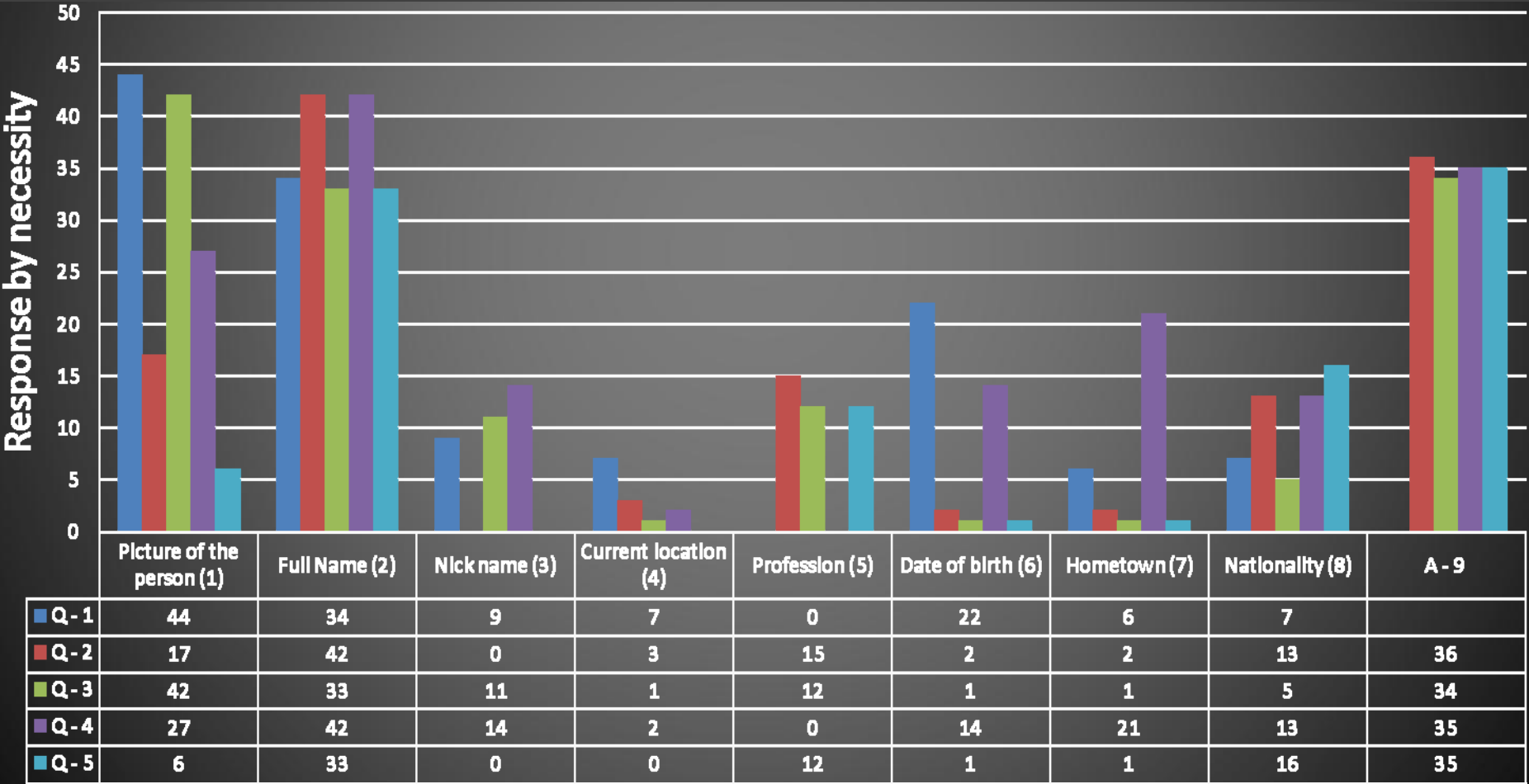


Metadata Visualization

Amount and type
{Summary}

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Responses to important metadata
(Reflecting importance and amount)



Metadata Visualization

Example

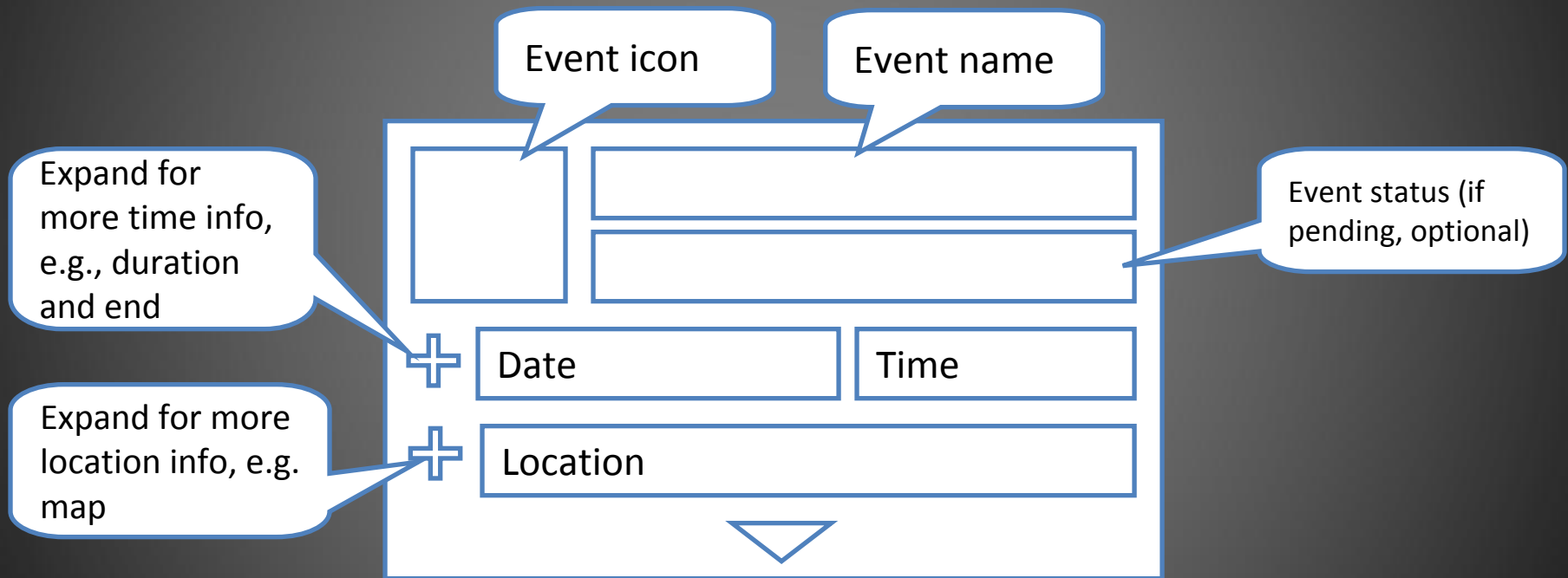


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Minimalist entity metadata visualization example



User Interface

Design goals



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- Maximize content visualization area.
- Minimize UI component visualization overload.
- Allocate rational space and location for tools and components.
- Separate controls and data integration to visual space.
- Manifest real life experience of visual elements distribution in space.

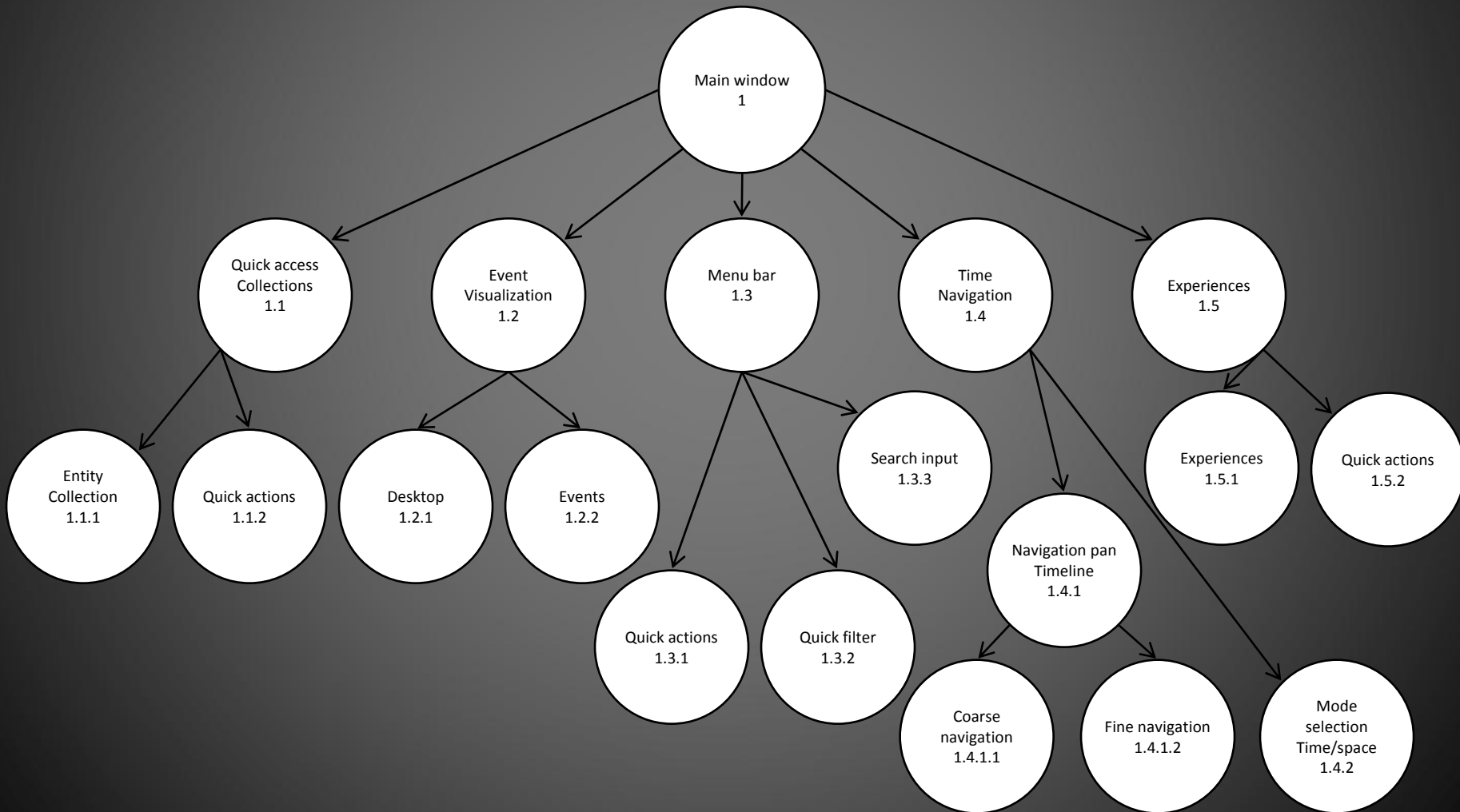
User Interface

The design



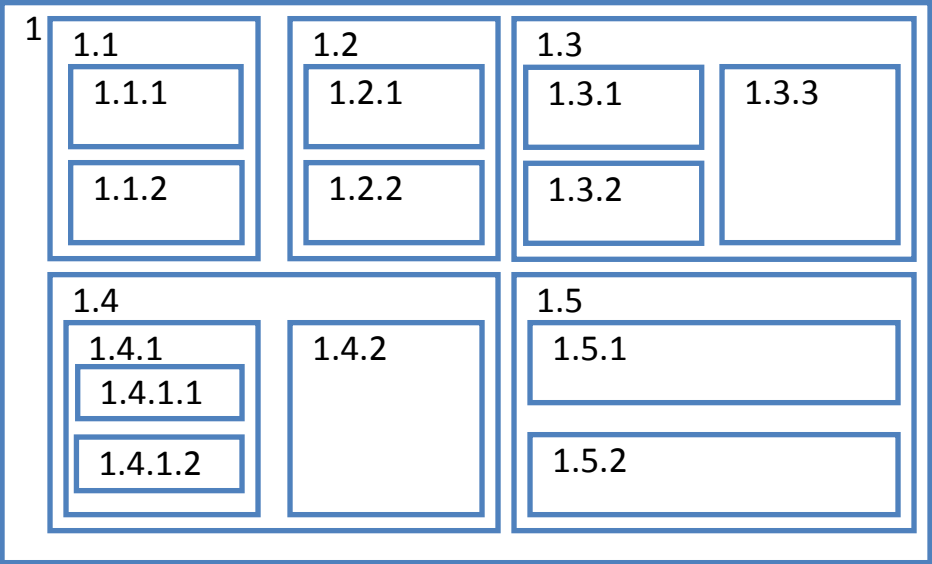
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UI Frame Hierarchy Dependency Graph



<input type="radio"/> Contributions	<input type="radio"/> Life and Events	<input type="radio"/> Usability Evaluation
<input type="radio"/> The Context	<input type="radio"/> Event Definition	<input type="radio"/> Future Works
<input type="radio"/> The Problem	<input type="radio"/> Event Visualization	<input type="radio"/> Conclusion
<input type="radio"/> The Solution	<input type="radio"/> Metadata Visualization	<input type="radio"/> Acknowledgements
<input type="radio"/> Related Works	<input checked="" type="radio"/> User Interface	<input type="radio"/> References

Corresponding Tree Map



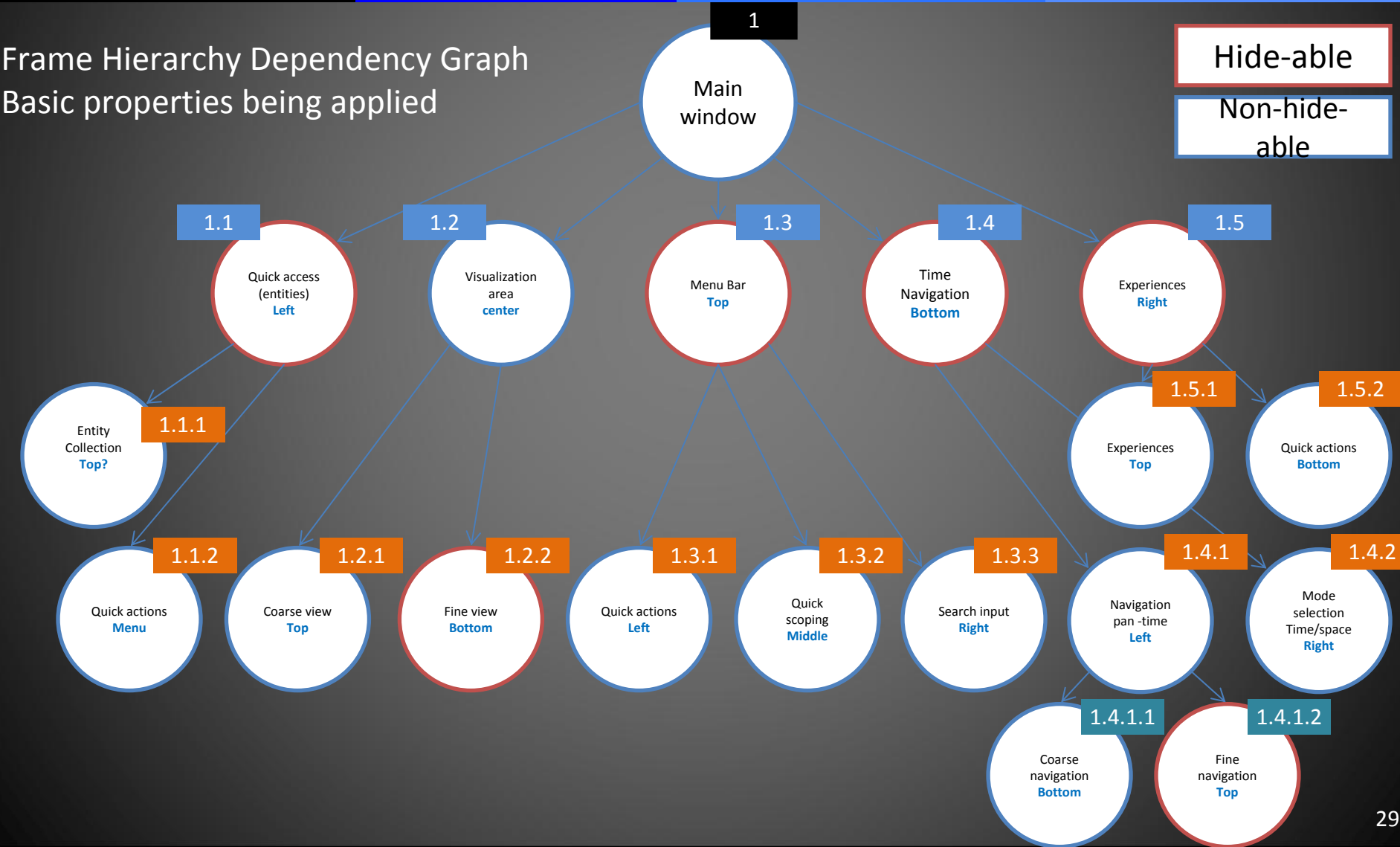
User Interface

The design



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Frame Hierarchy Dependency Graph
Basic properties being applied

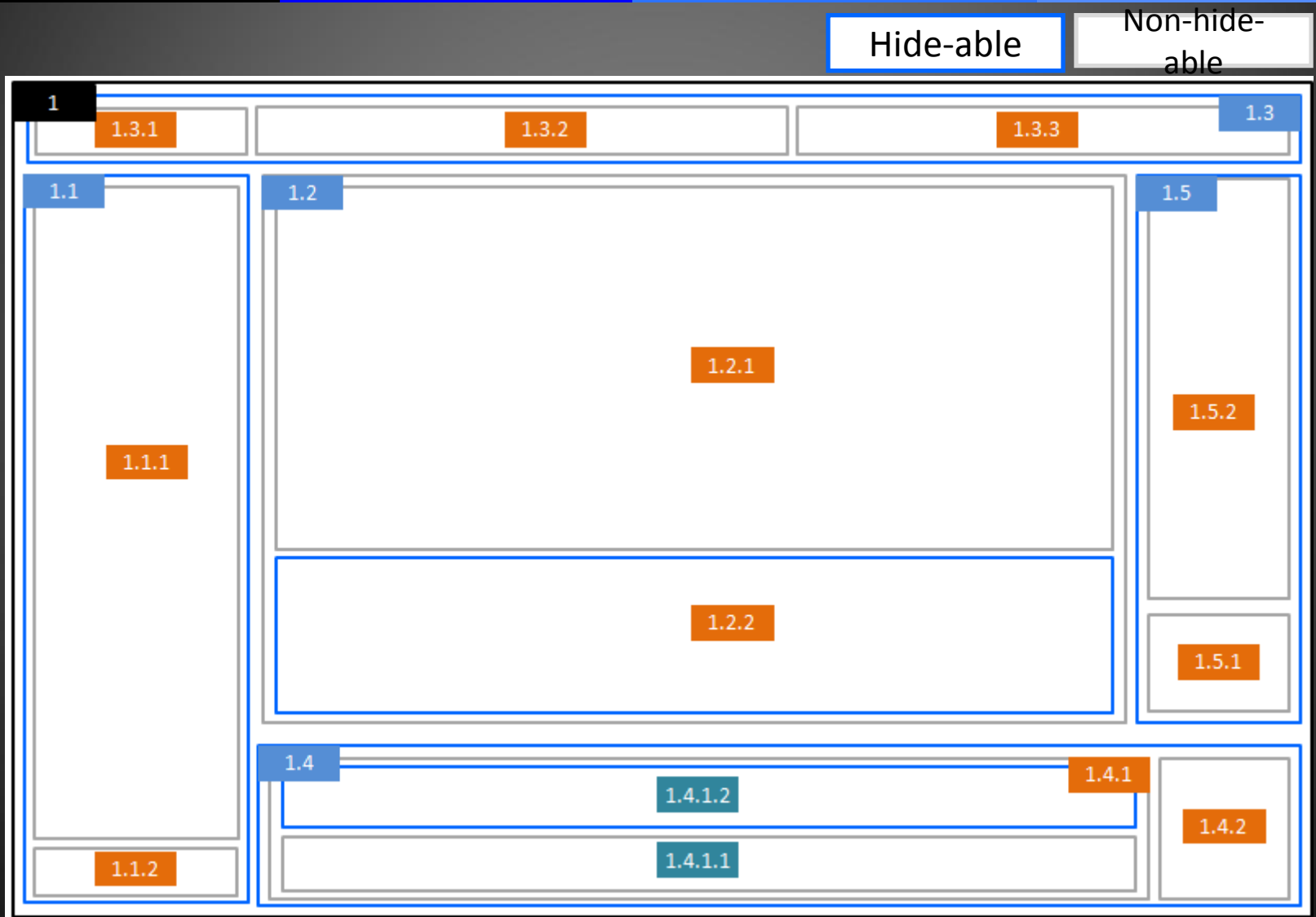


User Interface

Final layout



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User Interface

Final interface



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Implemented by Ahmed Tawfik

Evaluation

Discovery of features
Cognitive walkthrough



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User was left alone to discover the system features. The only information was provided that the system was intended for personal event management

Available features	Discovered	Time} (mm:ss.oo)
Left panel (Entity collection), Bottom panel (Timeline and Calendar), Upper panel (Desktop)	Left panel (Entity collection), Bottom panel (Timeline)	1:57.03
Create		
From menu	Meeting created	2:38.42
Drag/drop multiple entity from left panel	Not found	
Drag/drop multiple entity from left panel	Not found	
Drag/drop existing event from desktop	Not found	
Right click on timeline	Not found	
Navigate		
From timeline	Not found	
From calendar	Meeting found	2:19.29
From calendar	Dating found	1:05.24
From search	Not found	
Update		
By drag/drop	Not found	
From menu	Not found	
From context menu	Updated meeting	0:23.35

Evaluation

Heuristic evaluation
(Guided)



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User was provided with a task package scenario to perform. Time was recorded and compared with the benchmark time. Following are the tasks asked to perform.

1. Create an event of type "Anniversary" from menu
2. Create event of type "Dating" drag and drop from entity type collection
3. Create event of type "Dating" by Drag/drop type, person and location from entity type collection
4. Save "Anniversary" event to desktop
5. Create event from saved desktop event
6. Update dating event using context menu
7. Update dating event using Drag/drop

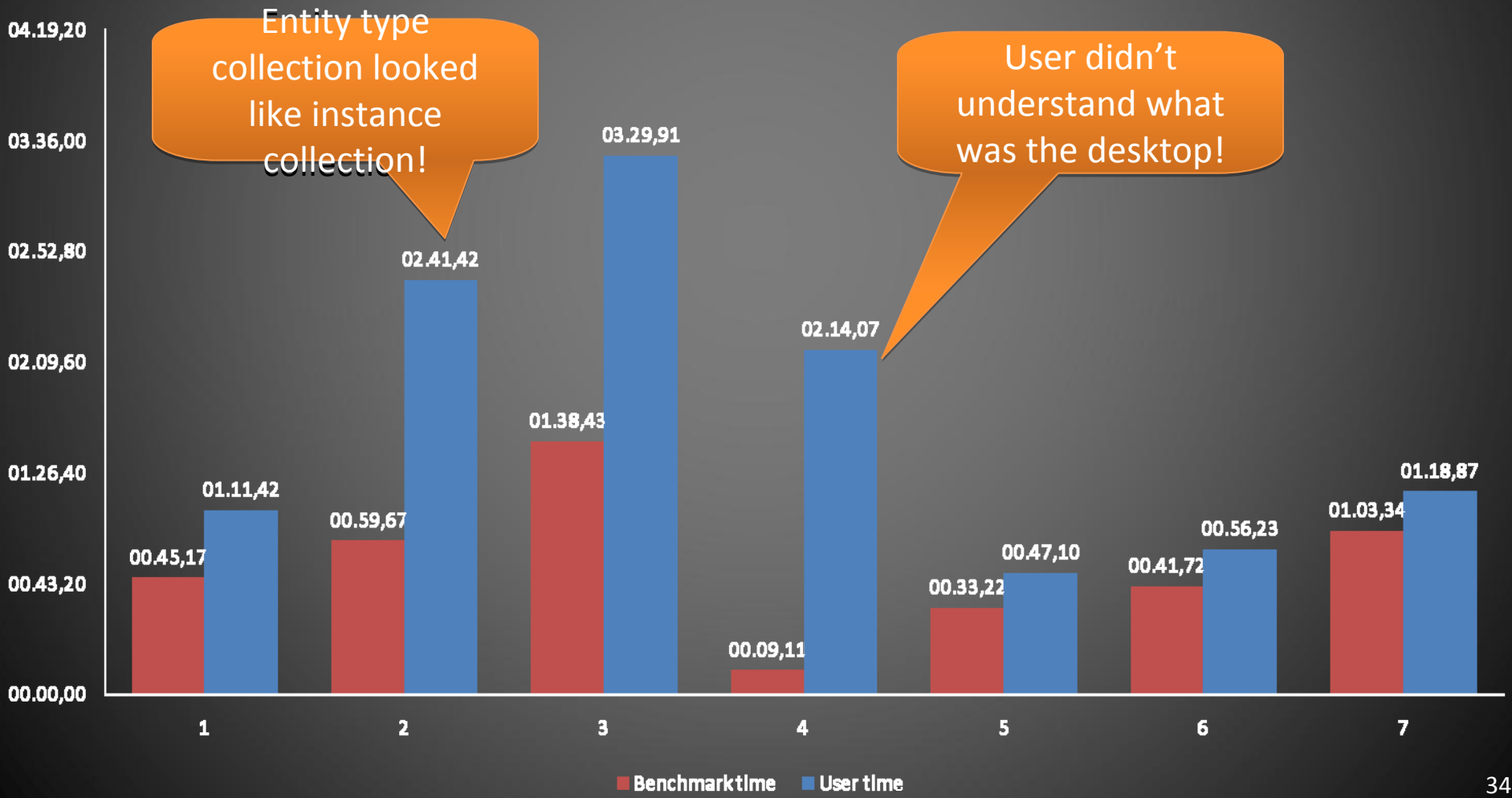
Evaluation

Heuristic evaluation
(Guided)



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The graph shows the comparison between the benchmark and user time of task completion



Evaluation

User satisfaction



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User satisfaction on offered features. The grading ranged from 1 to 5, where 1 for “minimum satisfaction” and five for “excellent”

Features	{Rating} (1 to 5)
Event creation from menu	3
Event creation by drag/drop	4
Event creation from existing event	3
Timeline navigation	2
Calendar navigation	3
Event update from context menu	3
Event update from timeline	2

Future works

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- Navigating through relative time that facilitates users semantic memory.
- Visualization for geographic context, i.e., spatial visualization of time-oriented linear data.
- Navigation through cultural context.
- Open areas:
 - Crime investigation
 - Patient monitoring
 - Emergency/disaster tracking
 - Epidemic control

Conclusion

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- Nature of the problem was thoroughly investigated from various perspectives.
- Not all proposed design and concepts was implemented in our first prototype.
- A full scale usability evaluation was hard to make due to lack of stability both at back and front end.
- Grounding should open wide areas of related applications where *life events* are concerned.

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Prof. Fausto Giunchiglia – The Big Umbrella

Ilya Zaihrayeu – The Tail Twister

Victor Pravdin – The Robot Guy

Marco Marasca – The Codex

Gaia Trecarichi – The Living Memories!

Ahmed Tawfik – The Widget Master

Neroz Farazi – The Geo-mad

Pierre Andrews – The HCI

S. R. H. Noori – The Interface

Bhawanathi Dutta – The Signal Library

Ivan Tankoyeu – The Image Processor

Juan Pane – The Lather Flask

Anand Kumar Pandey – The Panditjee

Vincenzo Maltese – The Logic Guy

Alethia Hume – Ms. Seminar

Aliaksandr Autayeu – World Sense Demolition (WSD)

Special thanks to the Bangladeshi students (The Bengal Tigers) in Trento who shared my every pain

Questions

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Feel free to ask any questions

I am still nervous!

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References

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- ☐ Event Definition
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- ☐ Future Works
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Related Works

Temporal data
management



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- Modern science of chronology was introduced by Joseph Scaliger in 1583 [1].
- Shoshani and Kawagoe in 1986 described a framework for the management of temporal data. The concept of two dimensional time sequence array (TSA) was introduced [2].
- Rotem and Segev [3] proposed a multi-dimensional partitioning scheme in 1987.
- Eric Freeman and David Gelernter materialized the organization of user collections in the line of time, having the objects being temporally characterized.
- Rekimoto's work went another step toward a time-centric approach for the information environment. This work leads to the concept of *time machine computing (TMC)* that allows user visit past and future state of computing through the time dimension [5].

Related Works

Temporal data
visualization

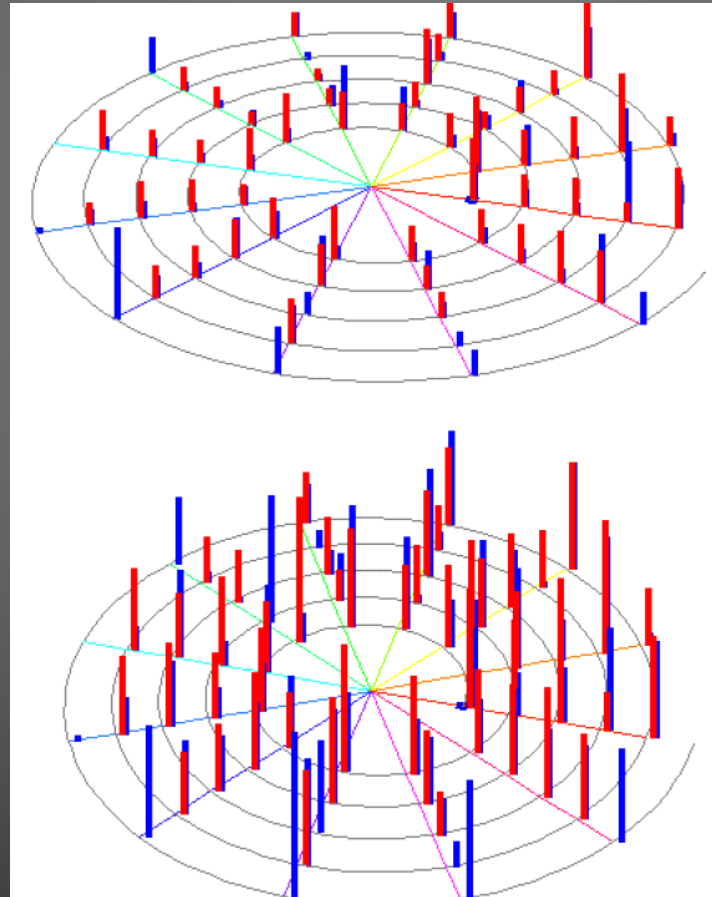


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- A planar spiral technique has been proposed by John Carlis *et al* for the visualization of periodic patterns of serial data [6].



Related Works

Temporal data
visualization



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- Daniel A. Keim proposed pixel-oriented arrangements in circle segments for visualizing large amount of data on multi-dimension scale. This technique used value to screen pixel correspondings for the visualization [7].
- TimeSlider, a time navigation technique used for specifying time points in non-linear time scale is a different approach [8].

Metadata

Visualization

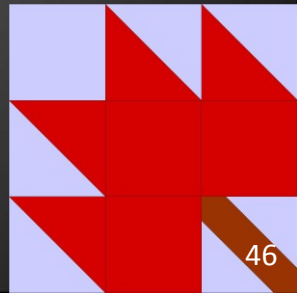
Visual metadata
Color and shape



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Metadata

Visualization

Visual metadata
Shape and texture



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