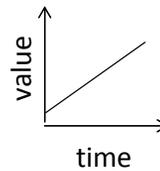## Different Types of Dynamics

Data attributes change:

Use, e.g., temporal graphs (also called chronological graphs) to show changing properties or derivative statistics, see Unit 2.
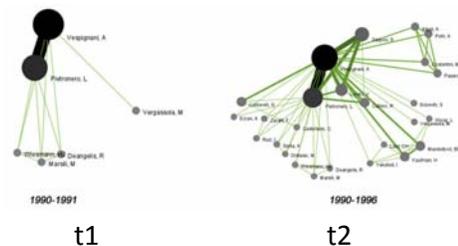
Data and data attributes change:

Overlay dynamic data on static basemaps/reference systems (chart, graph, geomap, or network graph).

t1   t2

Data and reference system change:

Use dynamic basemap with dynamic data overlays—e.g., world map with changing political boundaries and annual migration trajectories or evolving collaboration networks.

t1   t2

47

Information Visualization MOOC

Unit 7: Dynamics & Deployment
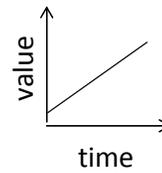
Dynamics
- Different Types of Dynamics
- Time-Slicing Data, see also Hands-on
- Visualization Formats
- (Non-Sequential) Story Telling

Different Types of Dynamics

Data attributes change:

Use, e.g., temporal graphs (also called chronological graphs) to show changing properties or derivative statistics, see Unit 2.


Data and data attributes change:

Overlay dynamic data on static basemaps/reference systems (chart, graph, geomap, or network graph).

t1   t2

Data and reference system change:

Use dynamic basemap with dynamic data overlays—e.g., world map with changing political boundaries and annual migration trajectories or evolving collaboration networks.


1990-1991   1990-1996

t1   t2
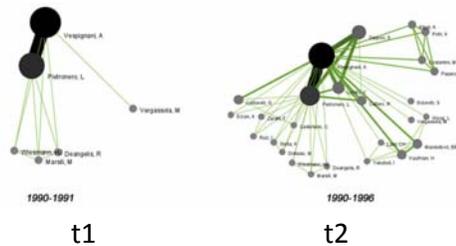
Time Slicing Data, see Unit 2

Resolution: Milliseconds, seconds, minutes, hours, days, weeks, fortnights (fourteen days /two weeks), months, quarters, years, decades, and centuries.

Type*:*
- Disjoint: Every row in the original table is in exactly one time slice.
- Overlapping: Selected rows are in multiple time slices.
- Cumulative: Every row in a time slice is in all later time slices.

Disjoint   Overlapping   Cumulative
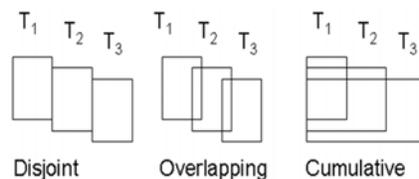
Alignment with calendar: If first event is June 7th, 2006, and yearly slices are chosen, then the first slice will be from
- No: June 7th, 2006, to June 6th, 2007
- Yes: January 1st, 2006, to December 31st, 2006.

Time Slicing Data—Issues

Outliers:

Identify and deal with outliers: e.g., web page gets Slashdotted—

a popular website links to a smaller site causing a massive increase in traffic analogous to a denial-of-service attack.

Seasonality:

Many datasets show the impact of day/night, winter/summer, and other cycles.

Select best frame length:

- Too short: Few data records are visible—e.g., networks might have many isolated nodes.
- Too long: Too many data records are visible—e.g., network is a spaghetti ball.

Visualization Formats

- One static image
- Multiple static images
- Animations which can be started, stopped, fast-forwarded, or rewound interactively.
- Interactive services that support "overview, filter, and details on demand" functionality.
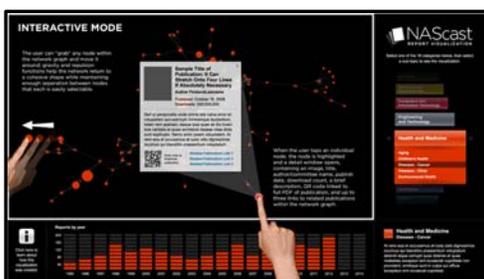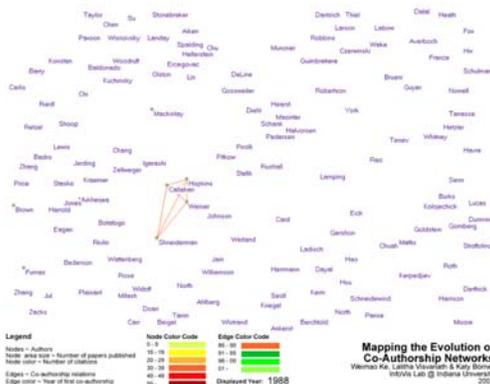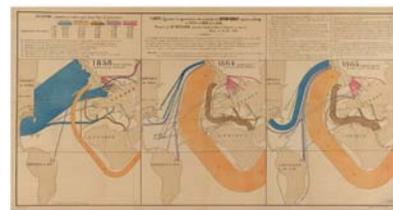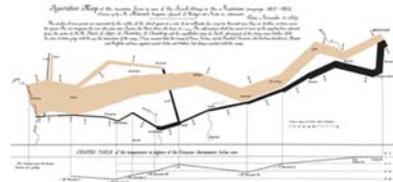
Tell Non-Sequential Stories

"Slides serve up small chunks of promptly vanishing information in a restless one-way sequence."
Beautiful Evidence, Edward Tufte, Graphics Press, 2006, p. 160.

"Overview first, zoom and filter, details on demand."
The Eyes Have It: A Task by Data Type Taxonomy for Information Visualizations, Ben Shneiderman, 1996.

Print solutions:
- Use panels to sequence narratives from left to right, top to bottom.
- Number sections of the display sequentially.
- Suggest visual pathways, e.g., by using arrows.

Tell stories that are
- Simple as possible but not simpler
- Seamless in their integration of words and images
- Sequential, as a narrative
- Informative
- True
- Contextual (past, present, future)
- Familiar (know your audience)
- Concrete
- Personal
- Emotional
- Actionable

See <u>Hans Rosling's Gapminder</u> for an excellent example.