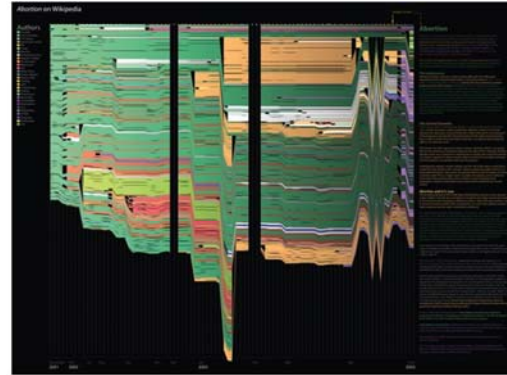
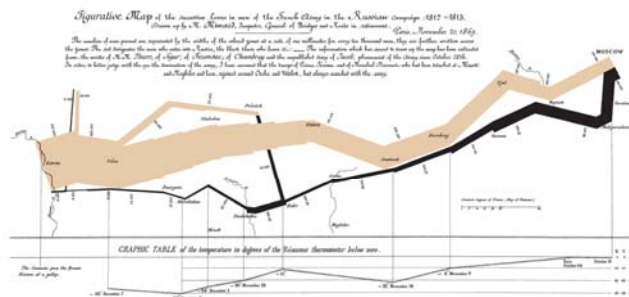
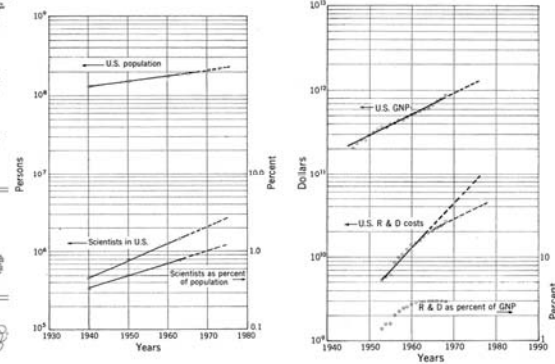


## Science and Society in Equilibrium



2

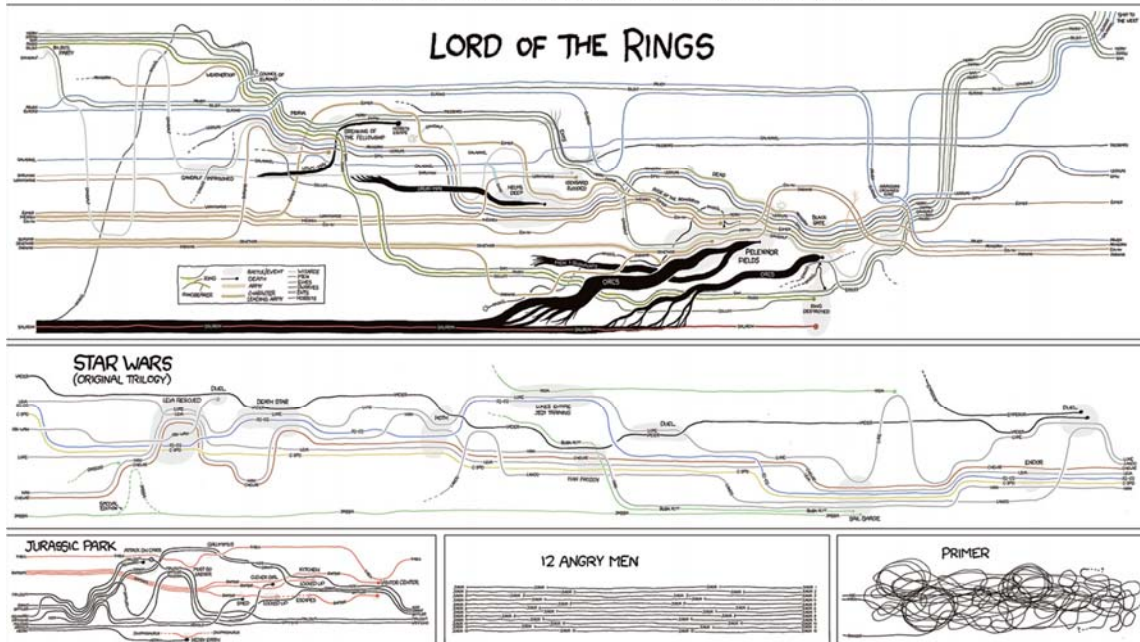
# Information Visualization MOOC

## Unit 2 – “When”: Temporal Data

### Exemplary Visualizations

**Relevant Research Disciplines:**  
Mathematics, Statistics, Information Visualization

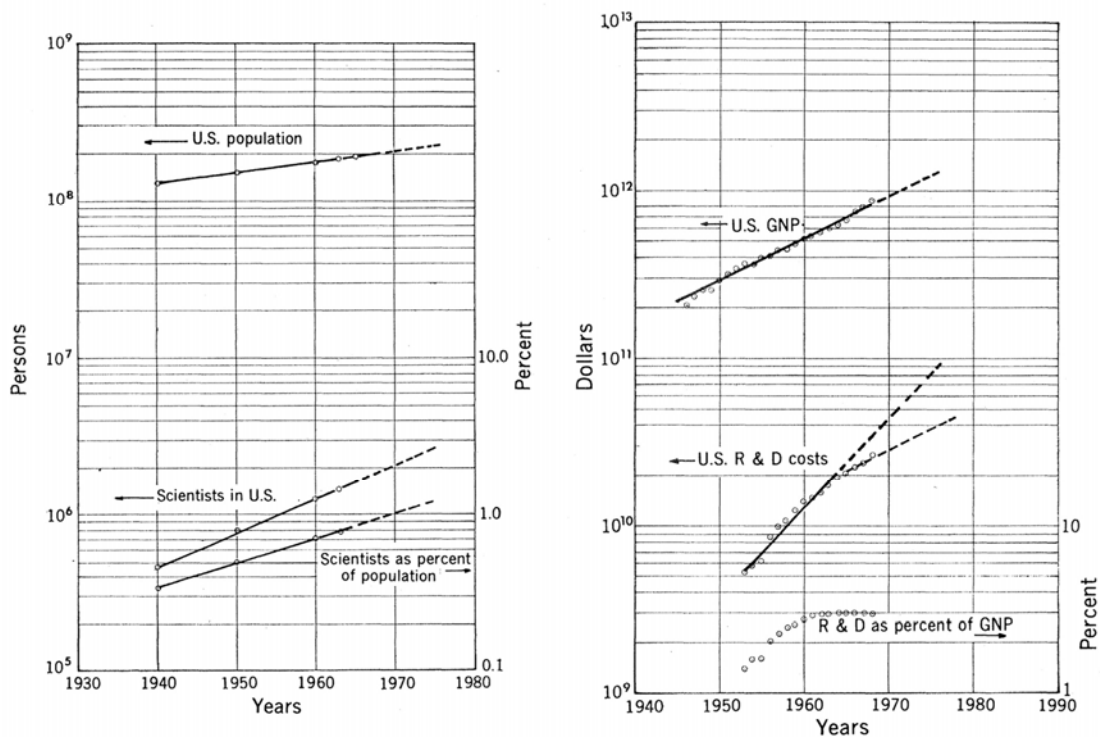
THESE CHARTS SHOW MOVIE CHARACTER INTERACTIONS.  
THE HORIZONTAL AXIS IS TIME. THE VERTICAL GROUPING OF THE  
LINES INDICATES WHICH CHARACTERS ARE TOGETHER AT A GIVEN TIME.



Movie Narrative Charts - Randall Munroe - 2009

4

## Science and Society in Equilibrium



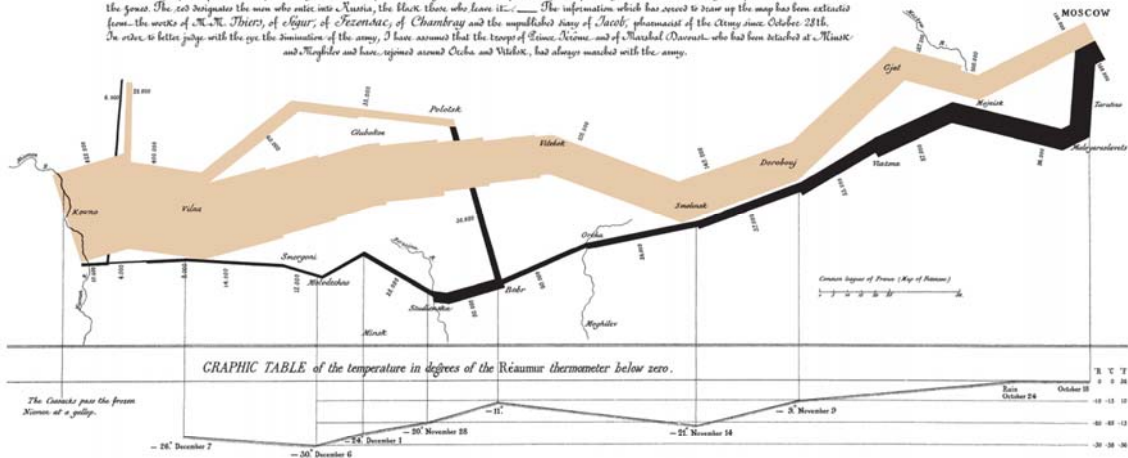
Science and Society in Equilibrium - Joseph P. Martino - 1969

5

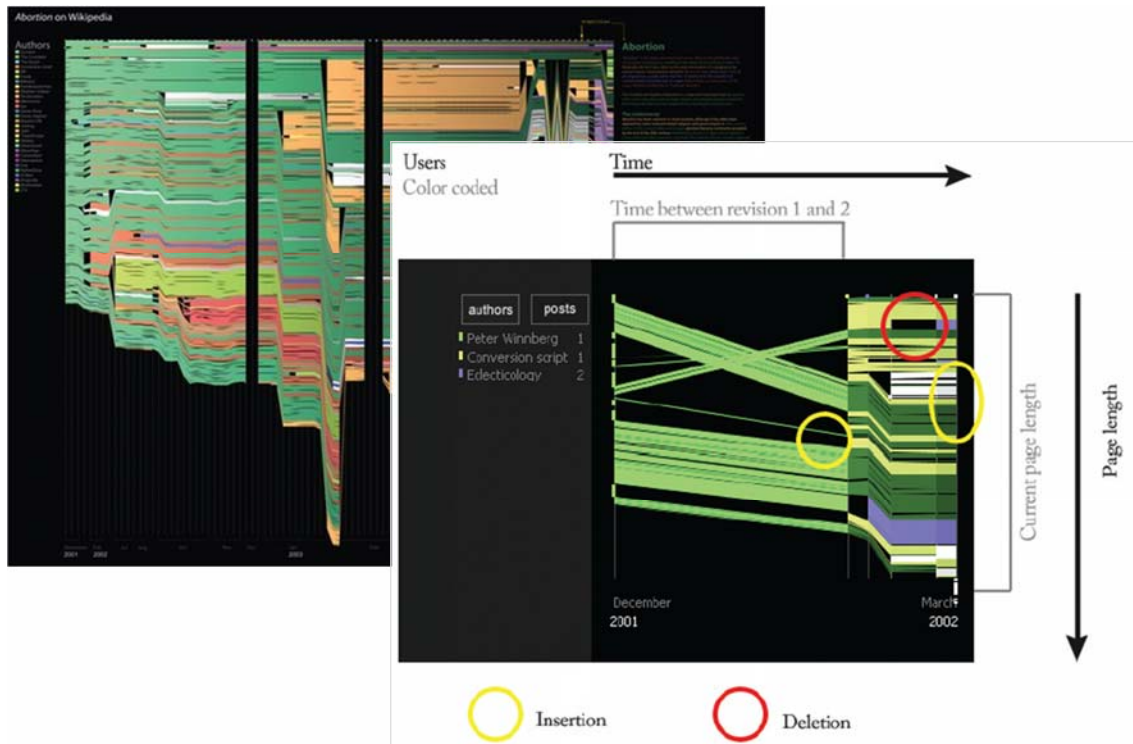
*Figurative Map of the Successive Losses in men of the French Army in the Russian Campaign 1812-1813.*

Drawn up by M. Minard, Inspector General of Bridges and Roads in retirement. Paris, November 20, 1869.

The number of men present are represented by the widths of the colored zones at a rate of one millimetre for every ten thousand men; they are further written across the zones. The red designates the men who enter into Russia; the black those who leave it. The information which has served to draw up the map has been extracted from the works of M. Thiers, of *Esquisse*, of *Chambray* and the unpublished diary of Jacoby, physician of the Army since October 28th. In order to better judge with the eye the diminution of the army, I have assumed that the troops of Prince Jerome and of Marshal Davoust, who had been detached at Minsk and Mlogdew and have rejoined around Ocha and Vitebsk, had always marched with the army.



Napoleon's March to Moscow - Charles Joseph Minard - 1869



History Flow Visualization of the Wikipedia Entry on Abortion - Martin Wattenberg, Fernanda Viegas - 2006

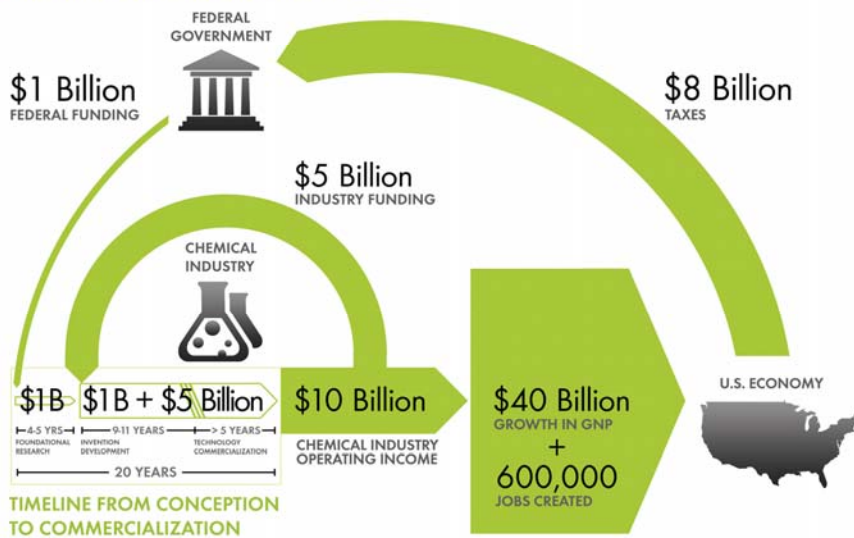
# Chemical Research & Development Powers the U.S. Innovation Engine

Macroeconomic Implications of Public and Private R&D Investments in Chemical Sciences

**The Council for Chemical Research (CCR)**

has provided the U.S. Congress and government policy makers with important results regarding the impact of Federal Research & Development (R&D) investments on U.S. innovation and global competitiveness through its commissioned 5-year two phase study. To take full advantage of typically brief access to policy makers, CCR developed the graphic below as a communication tool that distills the complex data produced by these studies in direct, concise and clear terms.

## INVESTMENT IN CHEMICAL SCIENCE R&D



The design shows that an input of \$1B in federal investment, leveraged by \$5B industry investment, brings new technologies to market and results in \$10B of operating income for the chemical industry, \$40B growth in the Gross National Product (GNP) and further impacts the US economy by generating approximately 600,000 jobs, along with a return of \$8B in taxes. Additional details, also reported in the CCR studies, are depicted in the map to the left. This map clearly shows the two R&D investment cycles; the shorter industry investment at the innovation stage to commercialization cycle; and the longer federal investment cycle which begins in basic research and culminates in national economic and job growth along with the increase tax base that in turn is available for investment in basic research.

*Chemical R&D Powers the U.S. Innovation Engine - The Council for Chemical Research - 2009*