**Summary**

1. Intro
   * Definition of visualization
     + To convey infromation through visual representations
     + It transforms the symbolic into the geometric
     + Offers a method for seeing the unseen, fosters unexpected insights
     + Computer-based visualization systems provide visual representations of datasets intended to help people carry out some task more effectively.
   * Goals of visualization
     + Map
     + Record
     + Abstract
     + Inspire
     + Clarify
     + Interact
     + Discover
       - Interactively control and drive your application
       - Use the visual representation to understand the phenomena as soon as possible
     + Communicate
       - Allow the non–expert to understand
       - Present specific information in a way that all of us understand
       - Guide the expert into the right direction
     + Insight and analysis
       - Extract the information content
       - Make things/coherences visible that are not apparent
       - Analyze the data by means of the visual representation
     + “The purpose of computing is insight not numbers”
   * Why visualization?
     + Helps us think
     + Reduces load on working memory
     + Offloads cognition
   * Uses the power of human perception
2. Design principles
   * Graphical Integrity
     + Visual encoding
       - = the way in which data is mapped into visual structures
       - Building blocks:
         * Marks (for items) = basic graphical elements like points, lines, areas
         * Channels (for attributes) = properties of marks like length, area, position (ordered), shape, color (categorical)
     + Lie factor
       - Missing scales
       - Changing scales
       - Start / end of scales
       - 3D visualizations
       - = size of effects in graphic / size of effect in data
     + Distortions
       - Design distortions
       - Scale distortions
     + Summary
       - Data should be directly proportional to graphical representation
       - Thorough labeling
       - Data variation, not design variation
       - Use standardized units of monetary measurements
       - Do not show more dimensions as present in data
       - Do not quote data out of context
   * Design Principles
     + Avoid Chartjunk
       - Chartjunk: Extraneous visual elements that distract from the message
       - Any ink on your chart that does not convey data is considered junk (Tufte)
       - Not always bad: Memorability, Engagement, Support of cognitive processes through repetition
     + Maximize Data-Ink Ratio
       - Data-ink = the ink used to show data
       - Data-ink ratio = data-ink / total ink used
     + Data Density
       - = number of entries in data array / area of data graphic
       - Use decomposition
     + Tufte‘s Design Principles
       - Above all else show the data
       - Maximize data-ink ratio
       - Erase non-data ink
       - Erase redundant data ink
       - Revise and edit
     + Design Pyramid
       - A képen szöveg, sor, Betűtípus, diagram látható

         Automatikusan generált leírás
       - Aesthetics
         * Attractive things are perceived as more useful than unattractive ones
       - Style
         * Communicates brand, process, who the designer is
       - Playfulness
         * Encourages experimentation and exploration
       - Vividness
         * Can make a visualization more memorable
   * Design Elements
     + C.R.A.P.
       - Contrast
       - Repetition
       - Alignment
       - Proximity
     + Layering and Seperation
     + Tufte’s Graphical Excellence
       - Interesting data
         * Complex ideas, multivariate data
       - Clear, precise, concise presentation
         * Data-ink ratio
       - Accurate communication
         * Lie factor
     + Graphical displays should
       - Show the data
       - Induce the viewer to think about the substance, rather than about methodology, graphic design, [or] the technology of graphic productions...
       - Avoid distorting what the data have to say
       - Present many numbers in a small space
       - Make large data sets coherent
       - Encourage the eye to compare different pieces of data
       - Reveal the data at several levels of detail
       - Serve a reasonably clear purpose
       - Be closely integrated with the statistical and verbal descriptions
     + Analysis Questions
       - Who is the intended audience?
       - What information does this visualiza.on represent?
       - How many data dimensions does it encode?
       - List several tasks, comparisons or evaluations it enables
       - What principles of excellence best describe why it is good / bad?
       - Can you suggest any improvements?
       - Why do you like / dislike this visualization?

May 14.

From the first part the important part is in the recap section of the second part

The pipeline is important

The tradeoff between the different versions is important