**CAS Working Group (2019)**

**Data Visualization**

**Work Stream 1 – Fundamentals**

1. **Introduction to Data Visualization**
   1. Definition of “Data Viz”
   2. Background (Brief)
   3. Why Actuaries Need to Know Data Visualization basics
2. **Consider the Audience**
   1. Things to Consider about the Audience
      1. What is their role? What is their background?
      2. How technical are they? What do they already know?
      3. Who are their constituents? What are their motivations?
      4. How much detail do they really need? How much will suit them?
   2. “What is the message?”
      1. What does the Audience need know to influence the decision?
      2. What is the Audience supposed to DO with the information?
      3. Write down what Audience should takeaway
3. **How to Choose the Type of Visualization**
   1. Text-Only
      1. When to Use
      2. Example
   2. Table
      1. When to Use
      2. Example
      3. Heatmap colors by magnitude
   3. Line
   4. Bar
      1. Start at zero
   5. Scatterplot
   6. Box & Whisker, Violin
   7. Map
   8. Small Multiples aka Trellis charts
   9. Sparklines
   10. Nodes and Connections
   11. Visualizations to Avoid
       1. Pie and Donuts
       2. 3D
       3. Double-Axis
4. **How to Design the Visualization**
   1. Default settings are usually poor data viz
   2. How to Simplify
      1. High Data-to-Ink Ratio
      2. Remove or use gray to tone-down Borders, Axes, Gridlines, tick marks
      3. Combine Title and the Message, or callout box for the Message
      4. Short Axis names
      5. No vertical text
      6. Approx. 2:1 for length:width aspect ratio
   3. How to Make the Data ‘POP’
      1. Cognitive Load; short-term memory
      2. Pre-attentive Attributes and Gestalt principles…
         1. List of PP and Gestalt…
      3. Hierarchy of comparisons of magnitude
         1. Position along common scale
         2. Position along non-aligned scale
         3. Length
         4. Direction/Angle
         5. Area
         6. Color and Shading saturation
         7. Color hue
         8. Volume
      4. Hierarchy of identifying Categories
         1. Spatial Region
         2. Color
         3. Motion
         4. Shape
5. **Summary(?)**placeholder; perhaps a one-page guide?
6. **Appendix (?)** placeholder
7. **References**
   1. *Storytelling With Data;* Cole Nusbaumer-Knaflic
   2. *Show Me the Numbers;* Stephen Few
   3. *Visualize This*, Nathan Yau
   4. *Visual Display of Quantitative Information; Beautiful Evidence*; Edward Tufte
   5. *Visualization Analysis & Design,* Tamara Munzner