Ehresmann Connections Discussion

I searched far and wide for a good reference on this, from the perspective that I like. It seems like the wikipidea page on Ehresmann connections and maybe some sections of M.J.D Hamilton's "Mathematical Gauge Theory". I am otherwise open to suggestions. Also please draw many pictures. I think this talk should be mostly definitions and pictures (otherwise we need to have like a proper 4 day discussion, which we do not have time for).

I) Explain the idea of parallel transport.

II) What is a horizontal distribution?

III) What is a covariant derivative in terms of the horizontal distribution?

IV) What is a connection form and how does it encode the information about the horizontal distribution? (Think about kernel of connection form and what the image is).

V) Write down the ODE for parallel transport in terms of the connection.

VI) Write down the solution to the ODE (how is it different to the usual thing we see in MAT267?)

VII) Define curvature (particularly I want you to give the definition of $F(X,Y) = dA(\pi_H(X), \pi_H(Y)))$

VIII) Define the chern number for complex line bundles. State that this is independent of choice of connection on the line bundle.