Our work on Reoccurring patterns in hierarchical protein materials and music

* What we did
  + Found an analogy between certain aspects of materials and certain aspects of music (structural and functional analogies)
    - Clustering strategies
    - Hierarchical build-up)
  + Made it precise using CT
  + Enhanced version of ontology logs – hierarchical representation
* How we did it
  + “What’s the right way to look at this?”
  + What are the pieces and how do they fit together?
  + Look for correspondences of structure and function between two systems and record it in an olog (aim: find an functorial isomorphism)
* Why we did it
  + Data storage and sharing
    - Ologs as databases
    - Sharing data within and between research groups
  + Education: Humans learn and understand by analogies
    - By creating your own ologs you are forced to thoroughly investigate each systems in order to propose an analogy
    - Insights naturally arise from this process
      * an unexpected connection between H-bond clusters/chord structures
      * damage tolerance in protein sequences/damage tolerance in chord sequences with respect to biological/harmonic functionality
  + Finding cross-disciplinary organizing principles
    - If the same olog describes multiple systems across disciplines, we can deduce overarching principles
      * Principle of attraction in chemistry, physics, and human interaction
      * Principle of lowest energy state
    - Anthropomorphization is more acceptable if the analogy between the given system and human behavior is made explicit.
    - Subsequently equivalent modeling techniques can be applied
* Summary:
  + MIT Charter (1861): “Established for advancement and development of science; its application to industry, the arts, agriculture, and commerce.”
  + Ologs connect these various domains, so that the tools from science can be imported and applied in the others.

