Astronomy is about data

- Images (pixels)
- Catalogs (numbers, text, and codes)
- Hybrid data products (spectra in tables)
- Metadata (headers)
- AstroInformatics and the VO
VO planning is top down:

- AstroInformatics
- Metadata (headers)
- Hybrid data products (data models)
- Catalogs (numbers, text, and codes)
- Images (pixels)
Progress requires traction

- Traction occurs where rubber meets road
- Start from the bottom up
  - FITS tiled-image convention (1998)
  - FITS tiled-table convention (now)
    - ...
  - FITS and AstroInformatics (see Vatican)
Image compression

- Astronomical images have special characteristics:
  - Illuminated rectangular grid
  - Gaussian / Poisson noise model
  - PSF defined by optics
  - etc.

- Physics constrains computer science
...as a result

- Lossless FITS tile-compression using the Rice algorithm is appropriate for a wide range of astronomical images.
- Lossy ("technically lossy") compression using FPACK q-scaling and subtractive dithering is widely beneficial, especially for images that would otherwise be cast as floating-point.
Table compression

- Tables are used for diverse purposes
- Values in tables are not simply constrained
- Schema are not optimized
- Data types are ad hoc
...as a result

- Parameters must be quite general purpose
- Selection of defaults must be driven by sample of representative table use cases
- Without special insight into particular tables, all use cases require lossless techniques
- The most important step occurs when designing the table schema