Image Acquisition Software Development

# DE server functions

# Software from others

* Cornell software include an image panel on the left side with a user determined detector range on the right side. They use a fraction with starting point to determine the scan region, the software is not connected to scan system, detector itself would generate signals to control scan system. Data size generated for each time is around 1GB with 100\*100 scan points each with 128\*128 px image. The whole system is developed on python.
* PNDetector together with JEOL have also developed a GUI for their pixelated detector. Their detector can do DPC with user defined two part of the segmented detector.

# Image Display

* Here images are displayed in Image control in GUI
* Start with array -> create bitmap with new Bitmap(width, height) -> Generate bitmapSource with ConvertBitmapSource(Bitmap) -> initialize writeable bitmap and bin it to image with InitiazlieWBmpRecon/InitializeWBmp
* Another new function that mimic InitializeWBmp needs to be generated if another image needs to be displayed
* Currently when displaying image, there are some undesired smoothing effect, will try to eliminate it 8/18/17
* For DE image display, GRAY16 (16bit per pixel, 0-65535) is used, image display won’t automatically change contrast to display image. GRAY16 is the default output from DE camera
* For recon image, GRAY8 is used, 8bit per pixel, 0-255
* Format can be changed in CovertBitmapSource to adapt for different applications

# Data Storage

* Following C.Ophus, 3D data cube and meta data are going to be stored as .emd file, which is an outlier of hdf5 file developed by HDF group
* Details of HDF5 file can be found at <https://support.hdfgroup.org/HDF5/>
* Description of EMD file, file example, and some python code can be found at <https://emdatasets.com/format/>
* SaveHDF5.cs is used to create HDF5 file, it uses a different class called HDF5
  + InitializeHDF() is used to generate a new EMD file at specific location and create all related attributes, it calls NumberAttributeGenerator and StringAttributeGenerator to create float type attribute and string type attribute