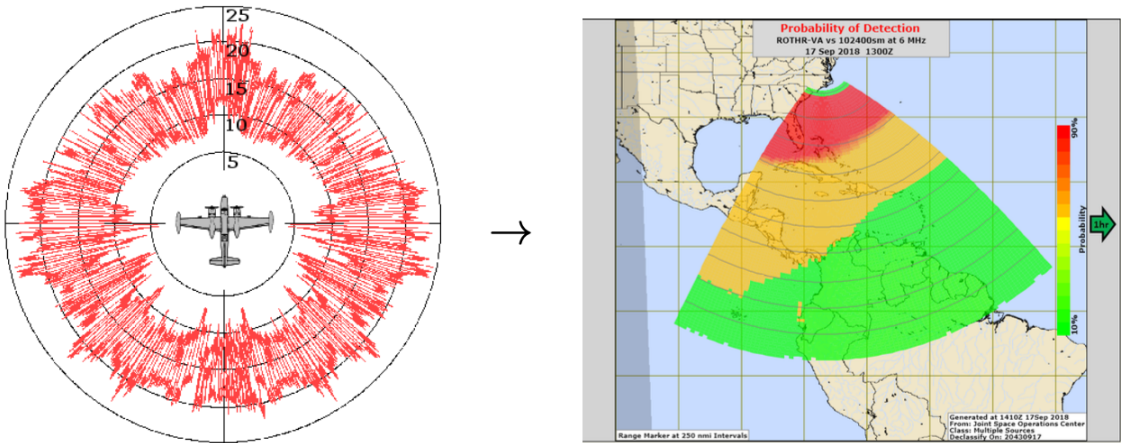


Radar Cross Section Analysis Using Mercury MoM

Goal: Enhance the Dashboard

```
In [10]: from IPython.display import Image
Image(filename="/Users/dantopa/primary-repos/github/python/jupyter/birthing/graphics/goal.png")
```

Out[10]:



Develop a **process** to create and use more realistic radar cross sections in the AFCAP Dashboard.

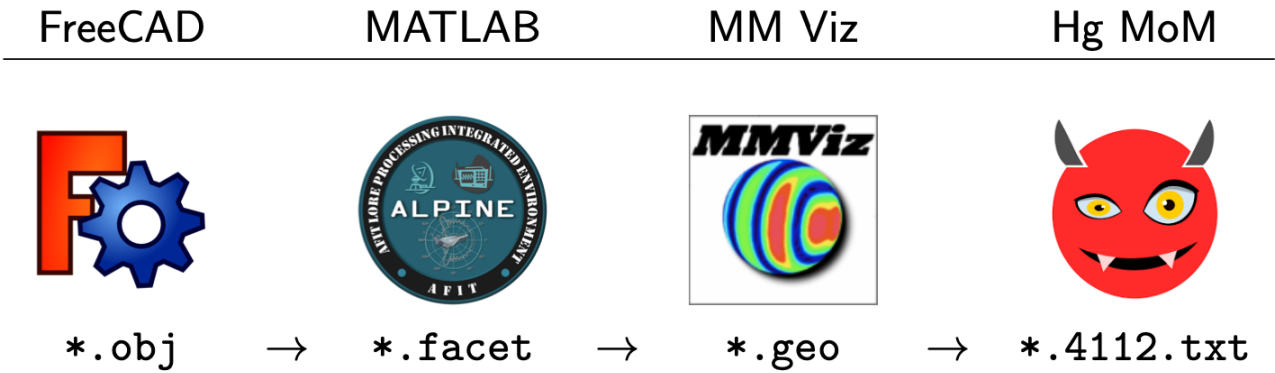
The Process: Then and Now

Sciacca Process

```
In [1]: from IPython.display import Image
Image(filename="/Users/dantopa/primary-repos/github/python/jupyter/birthing/graphics/sciaccia-flow.png")
```

Out[1]:

Table: Sciacca data flow



McGeorge Process

```
In [3]: from IPython.display import Image
Image(filename="/Users/dantopa/primary-repos/github/python/jupyter/birthing/graphics/mcgeorge-flow.png")
```

Out[3]:

Table: McGeorge data flow

FreeCAD

Python

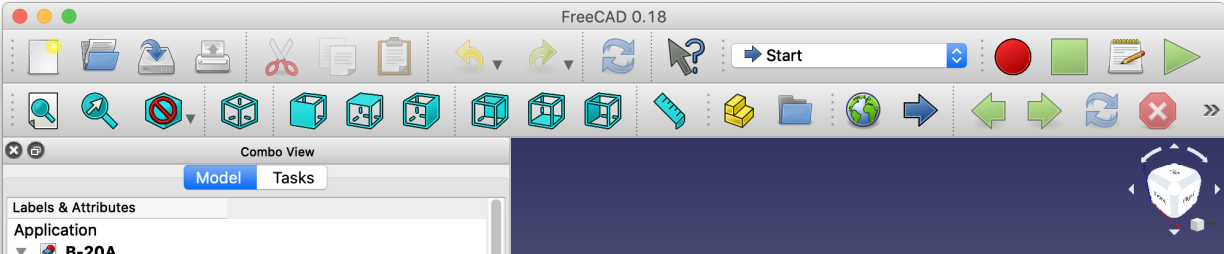
Vim

Hg MoM

```
## FreeCAD - Create Model

In [1]: from IPython.display import Image
Image(filename="/Users/dantopa/primary-repos/github/python/jupyter/birthing/graphics/freecad.png")
```

Out[1]:



FreeCAD - Repair Mesh

```
In [4]: from IPython.display import Image
Image(filename="/Users/dantopa/primary-repos/github/python/jupyter/birthing/graphics/freecad-mesh-repair.png")
```

Out[4]:

Fourier decomposition

An expansion to order  $d$  takes the form  $\sigma_v(\alpha, \beta_0 = \frac{\pi}{12}) \approx \frac{a_0}{2} + \sum_{k=1}^d a_k \cos k\alpha + b_k \sin k\alpha$ .

Finding the decomposition entails finding the amplitudes  $a$  and  $b$  such that

$$\sigma_v(\alpha, \beta_0 = \frac{\pi}{12}) \approx \frac{a_0}{2} + \sum_{k=1}^d a_k \cos k\alpha + b_k \sin k\alpha.$$

Uniform continuity implies given  $\epsilon > 0$ , there exists  $N \in \mathbb{Z}^+$  such that

$$\int_{-\pi}^{\pi} \left( \sigma_v(\alpha) - \frac{a_0}{2} - \sum_{k=1}^N a_k \cos k\alpha + b_k \sin k\alpha \right) d\alpha < \epsilon$$

Example: Run MoM

```
In [8]: !/Users/dantopa/primary-repos/github/python/jupyter/birthing/MoM/MMoM_4.1.12
/bin/sh: /Users/dantopa/primary-repos/github/python/jupyter/birthing/MoM/MMoM_4.1.12: cannot execute binary file
B-20-Materials.lib      B-20.geo
B-20-standard-0.05m.facet MMoM_4.1.12

In [7]: import datetime      # timestamps
import os                  # operating system
import sys                  # python version

if __name__ == "__main__":
    print "Diagnostic information"
    print datetime.datetime.now()
    #print( "source: %s/%s" % ( os.getcwd(), os.path.basename( __file__ ) ) )

Diagnostic information
2020-05-05 20:52:56.360359
python version 2.7.16 (default, Feb 29 2020, 01:55:37)
GCC 4.2.1 Compatible Apple LLVM 11.0.3 (clang-1103.0.29.20) (-macos10.15-objc-
```