

VirMat: 3D virtual microstructure creator

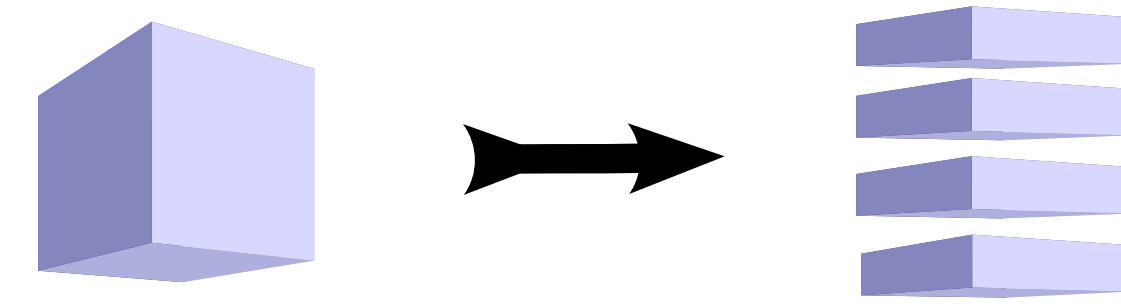
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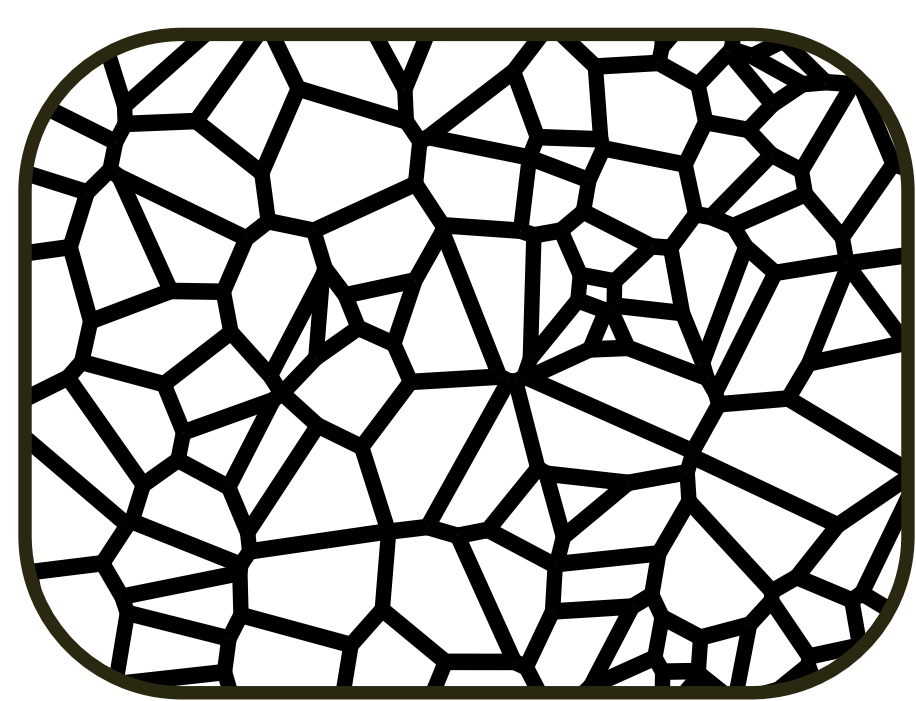
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Introduction

3D measurements of real materials are possible but consume relatively high amount of financial and time resources.



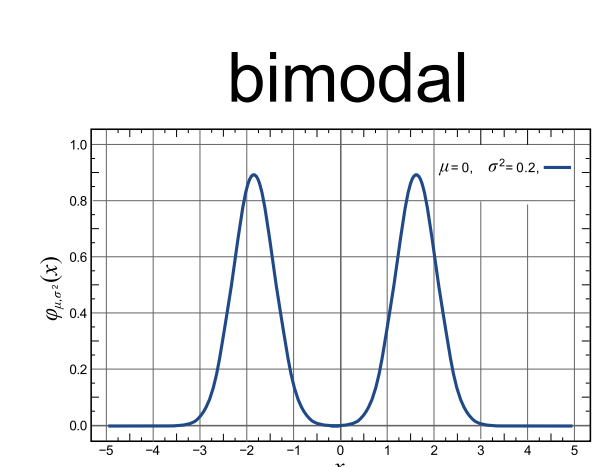
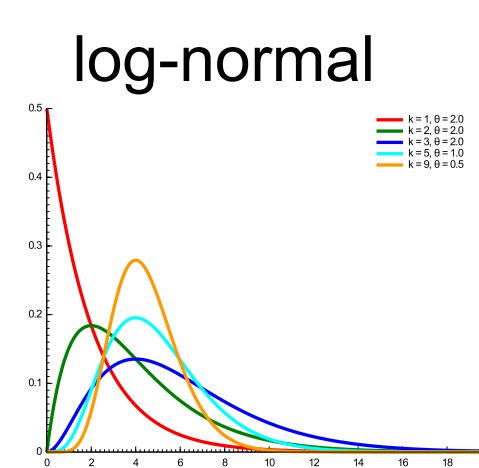
Virtual material is an abstraction that represents characteristics of a microstructure in a computer data structure.



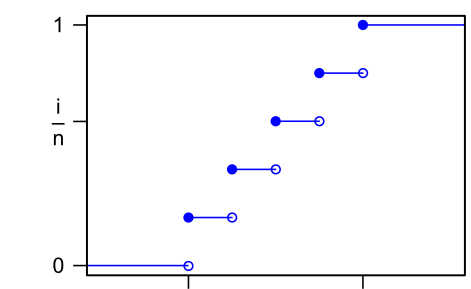
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During decades and centuries our colleagues have decomposed and parametrized the microstructure in metals.

Now we will collect this information and walk in the reverse direction. From a set of parameters we will recreate, virtually, a material.



discrete or custom



Grain Morphology



Grain Boundary Character Distribution

$$f(g) = \sum_{l=0}^{\infty} \sum_{m=-1}^l \sum_{n=-1}^l C_l^{mn} \cdot T_l^{mn}(g)$$

$$\frac{dV}{V} = f(g)dg$$

$$\oint f(g)dg = 1$$

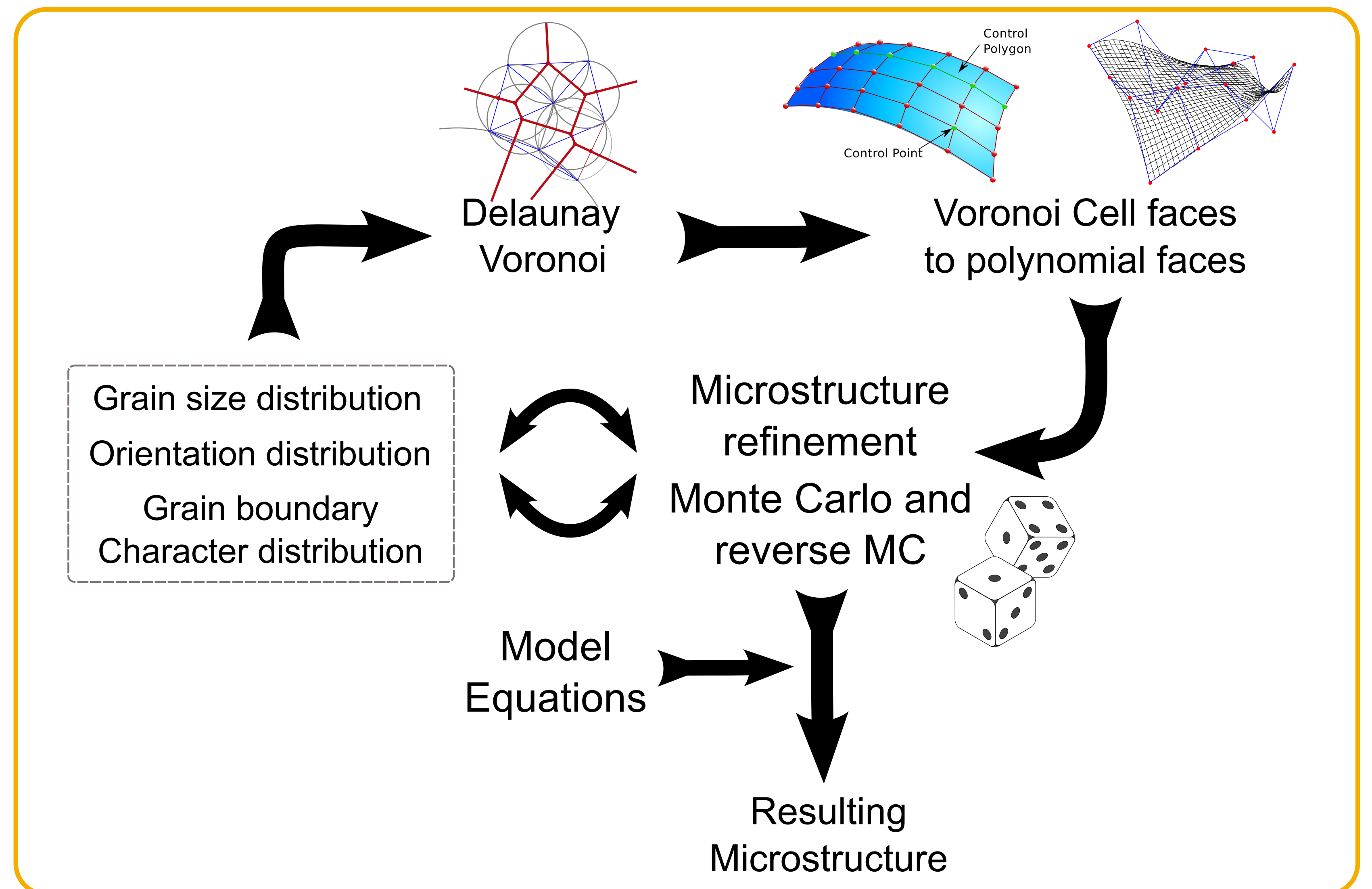
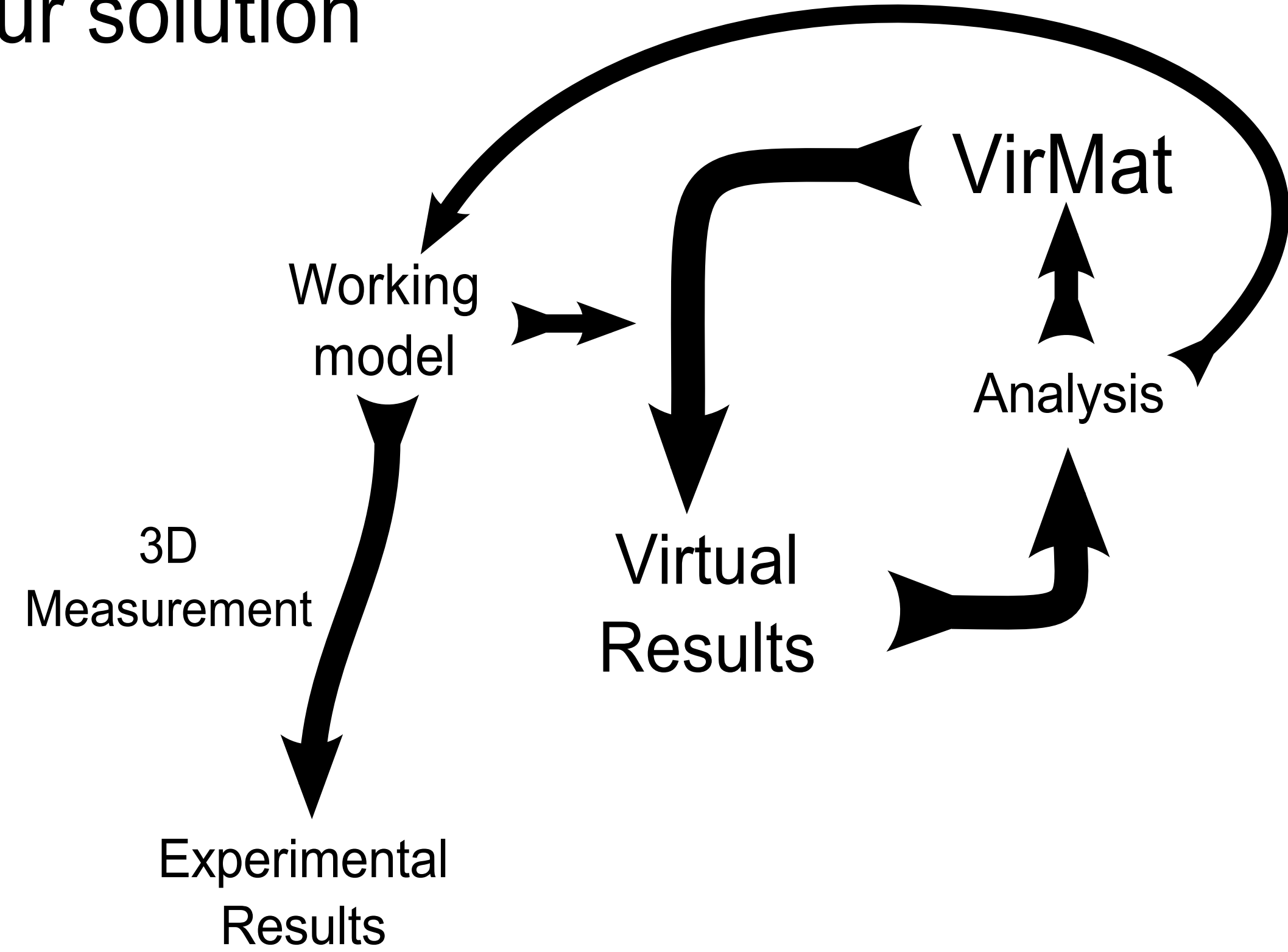
Texture

$$F(g) = \int f(g)dg$$

$$X = F_g^{-1}(Y)$$

inverse transformation method or Smirnov transform

Our solution



Preliminary Results

1st stage: Voronoi generation

