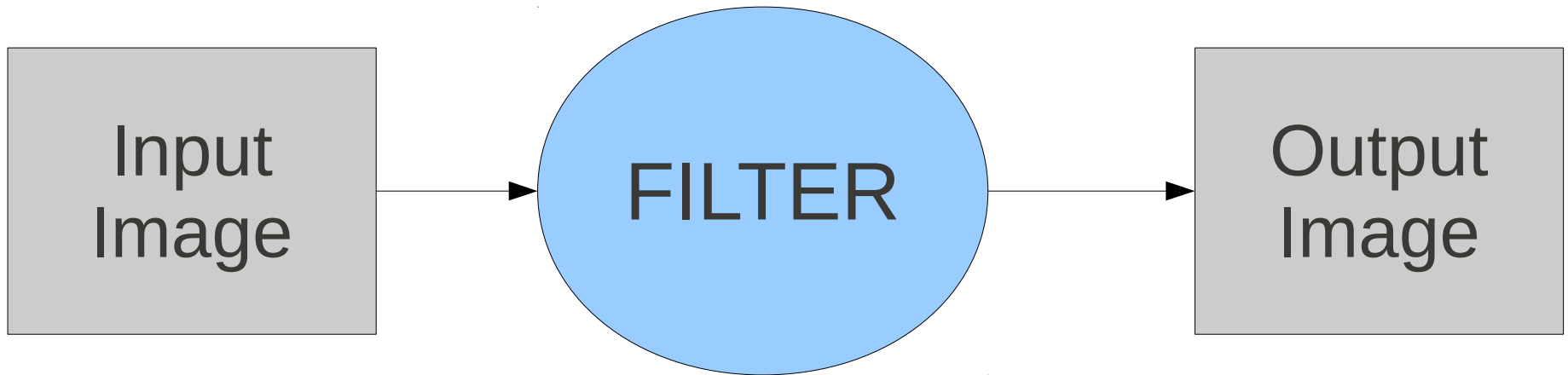


ITKv4 – Spatial Objects

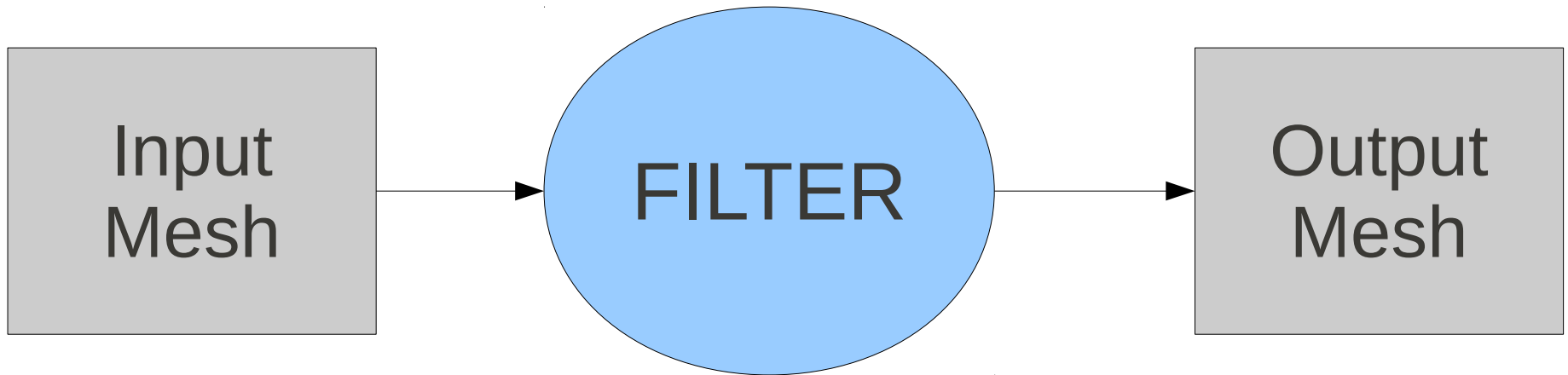
Arnaud Gelas – Luis Ibanez

Beyond the Image...

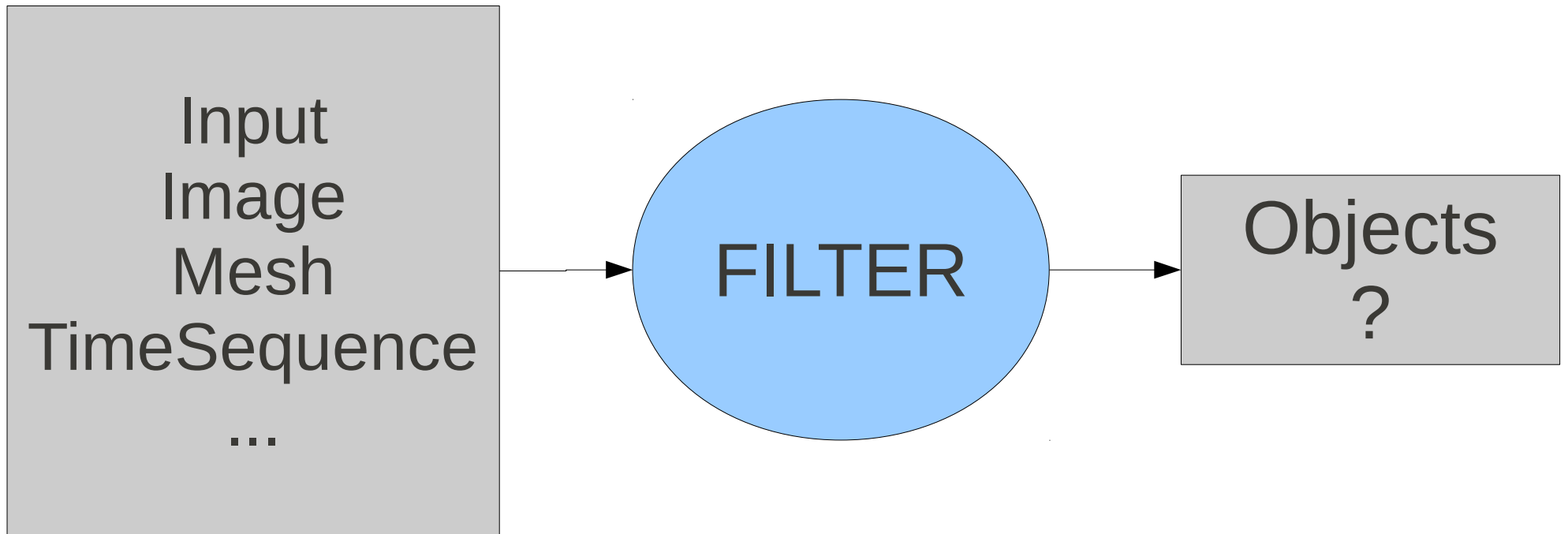
So far...



Only Recently...



The Future...



Spatial Objects

- itk**Arrow**SpatialObject
- itk**Blob**SpatialObject
- itk**Box**SpatialObject
- itk**Contour**SpatialObject
- itk**Cylinder**SpatialObject
- itk**DTITube**SpatialObject
- itk**Ellipse**SpatialObject
- itk**Gaussian**SpatialObject
- itk**Group**SpatialObject
- itk**ImageMask**SpatialObject
- itk**Image**SpatialObject
- itk**Landmark**SpatialObject
- itk**Line**SpatialObject
- itk**Mesh**SpatialObject
- itk**Plane**SpatialObject
- itk**PointBased**SpatialObject
- itk**PolygonGroup**SpatialObject
- itk**Polygon**SpatialObject
- itk**Scene**SpatialObject
- itkSpatialObject
- itk**Surface**SpatialObject
- itk**Tube**SpatialObject
- itk**VesselTube**SpatialObject

Spatial Objects

itk::ImageSpatialObject

itk::Image

Spatial Objects

`itk::MeshSpatialObject`

`itk::Mesh`

At the Beginning...

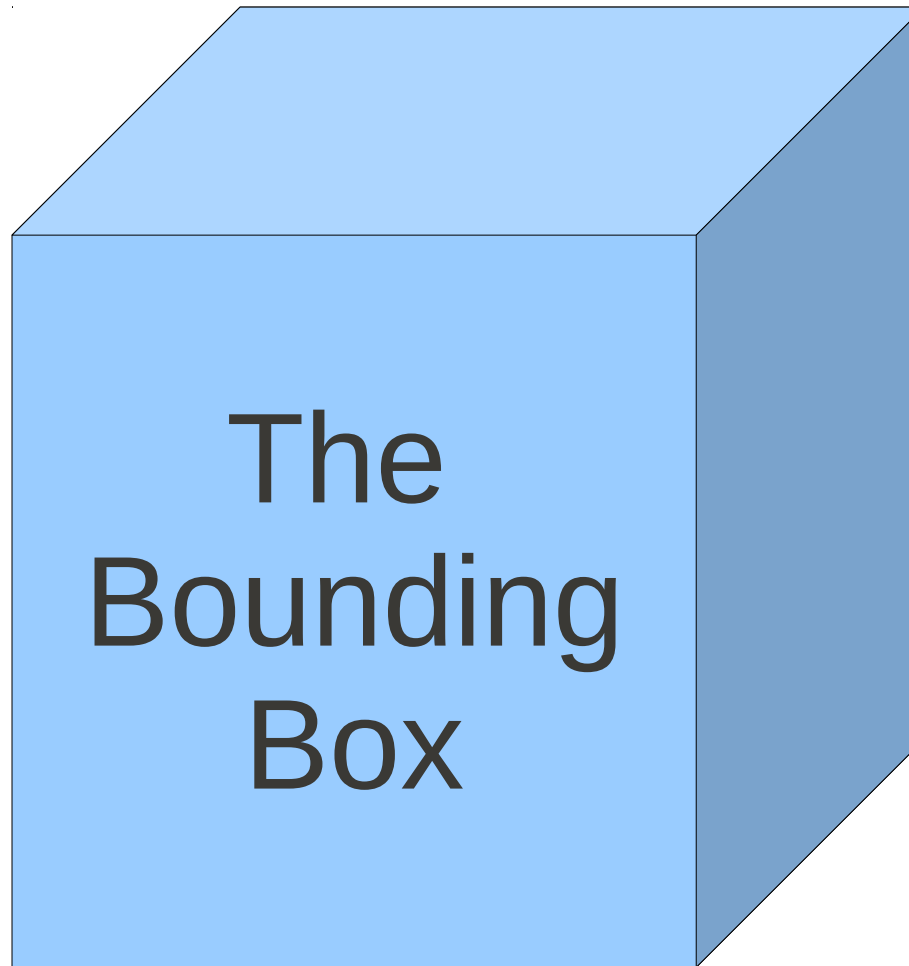
SpatialObject

Region of Space



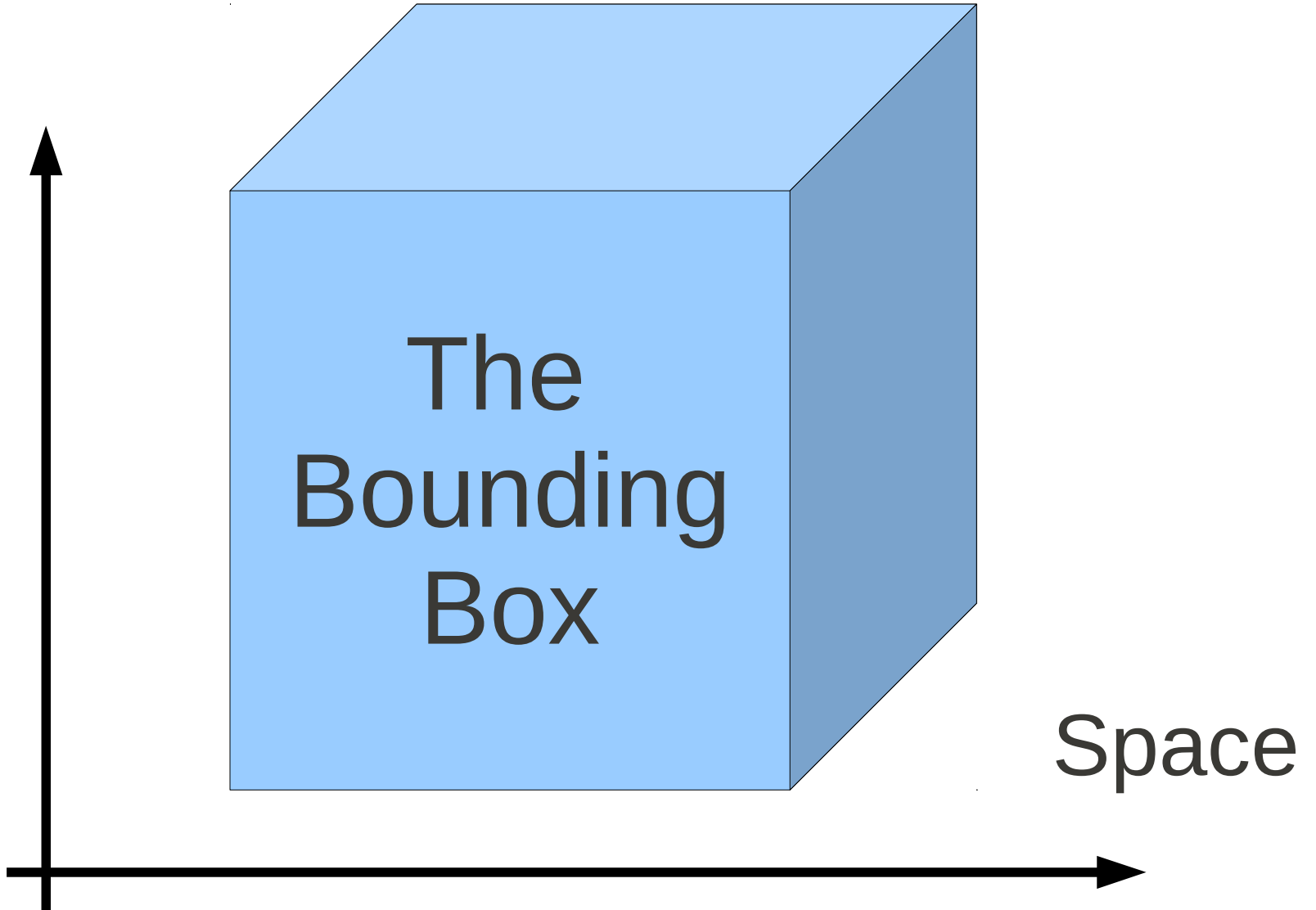
Is P Inside ?

Spatial Objects



Spatial Objects

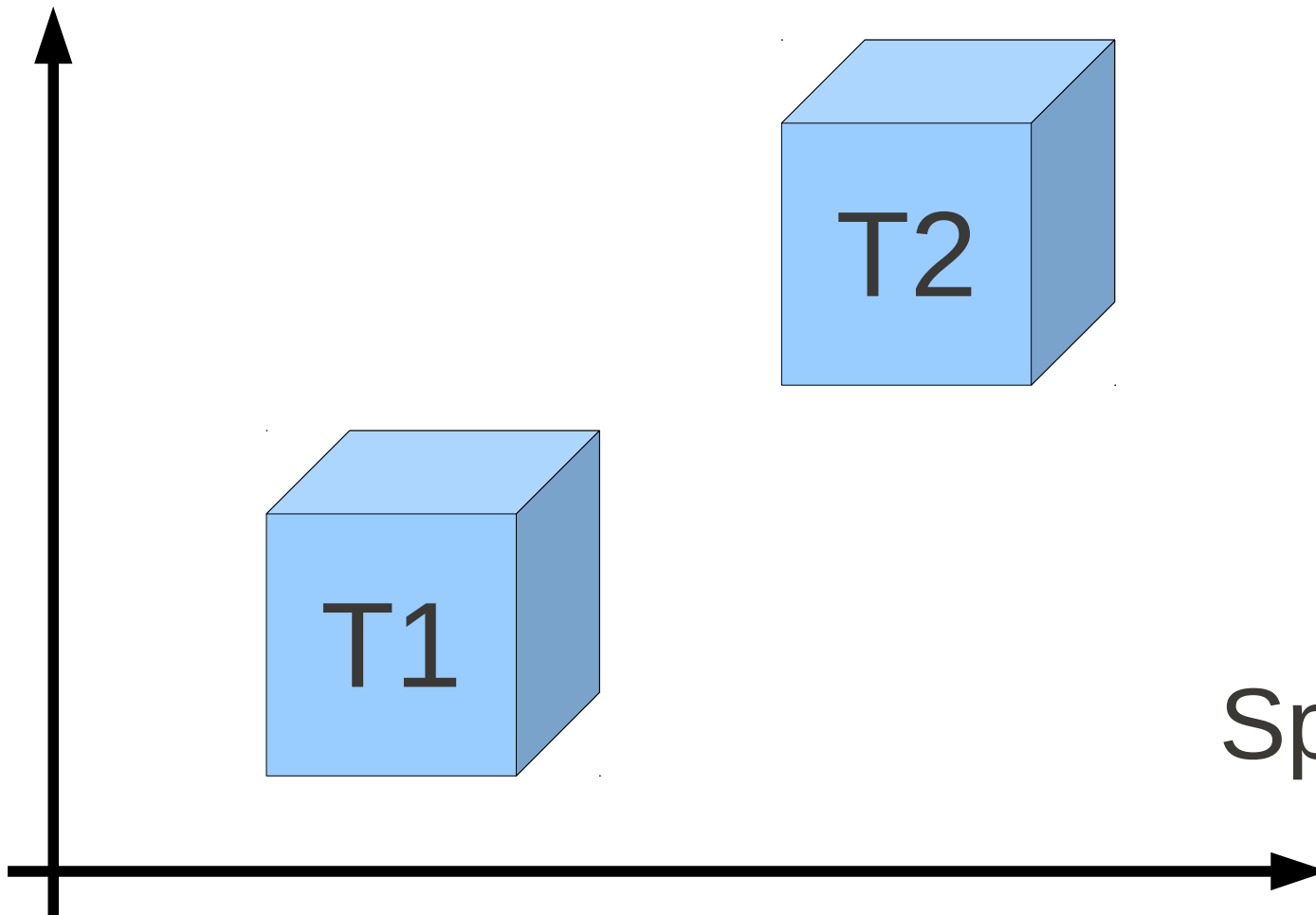
Time



Space

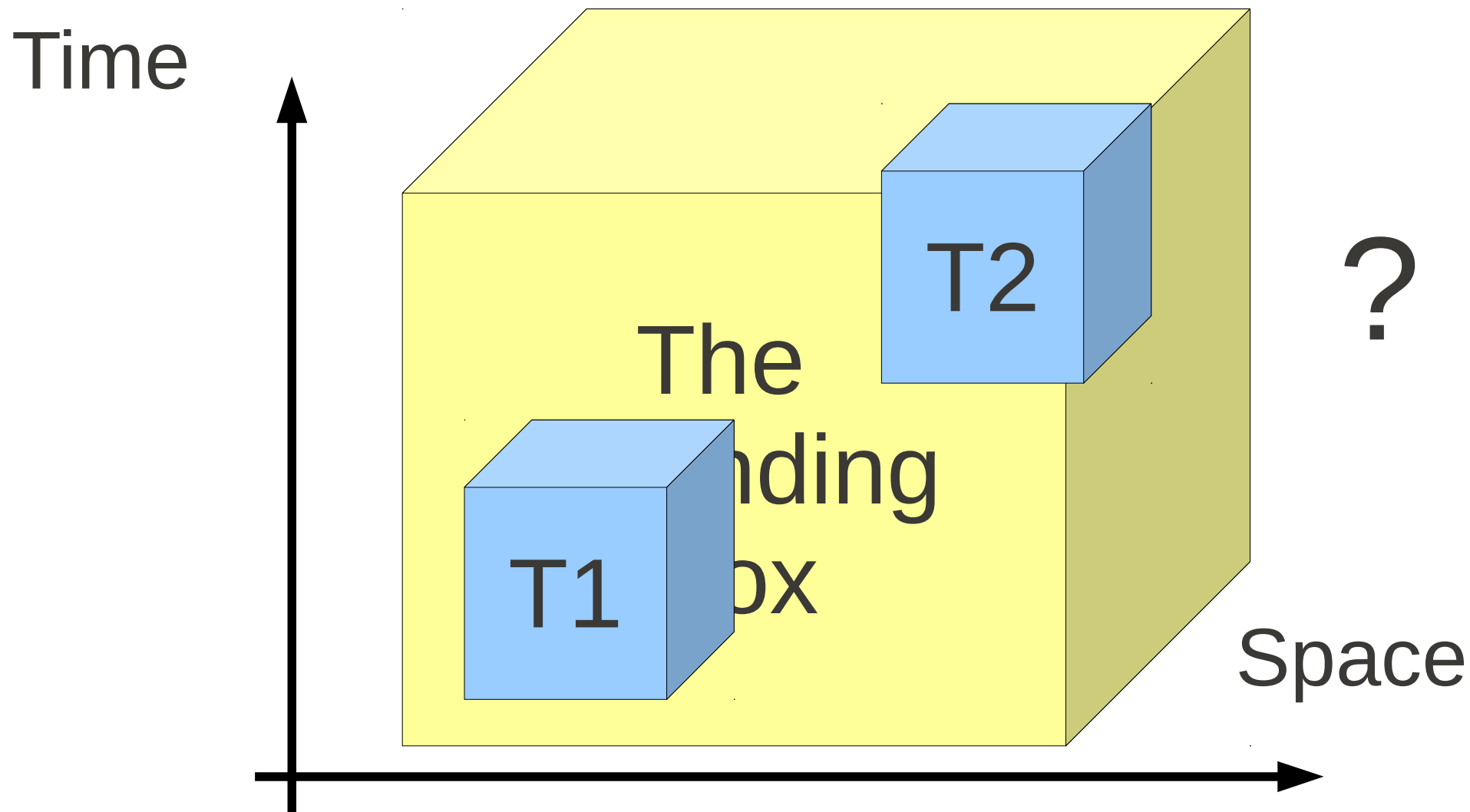
Spatial Objects

Time

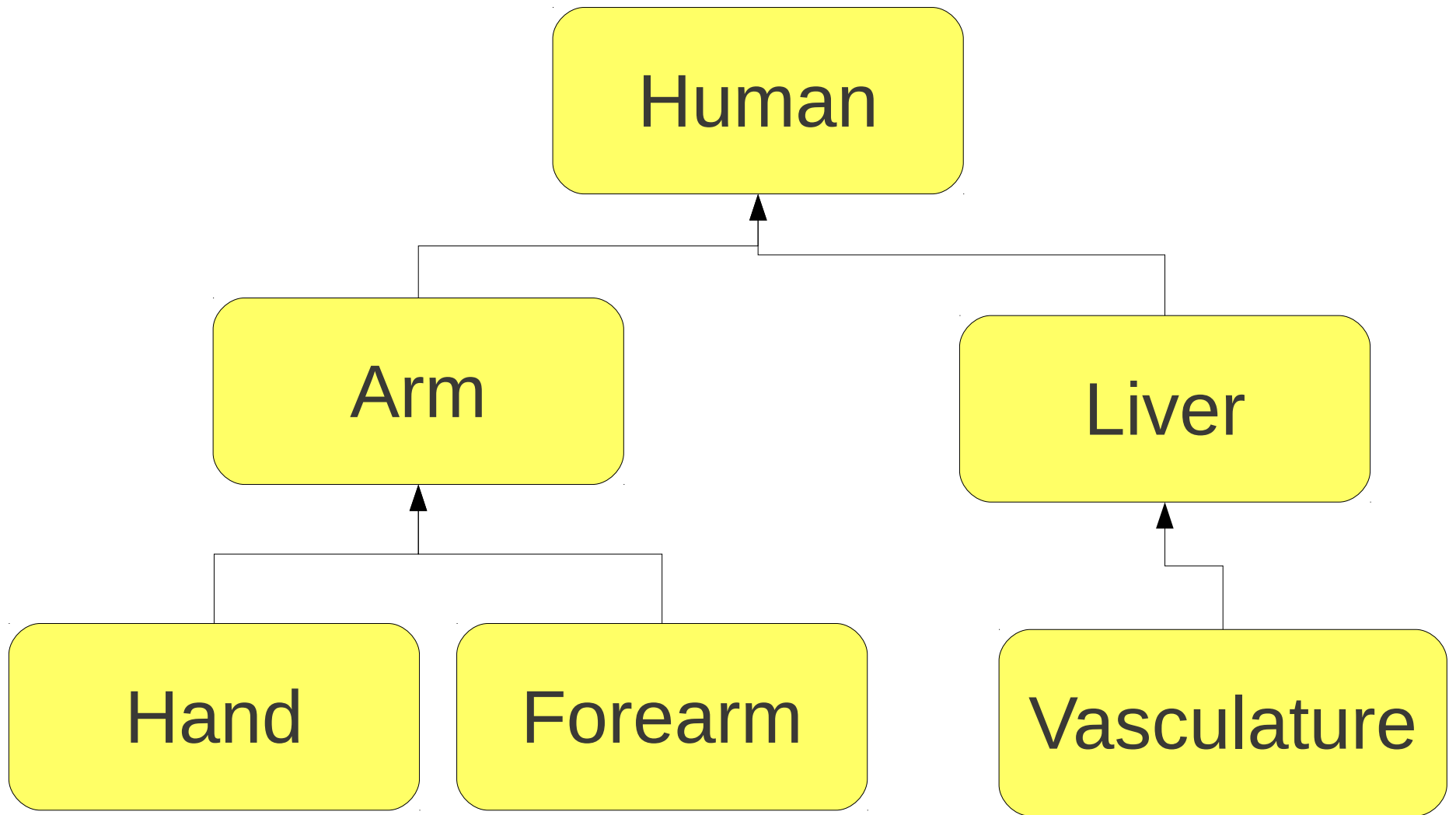


Space

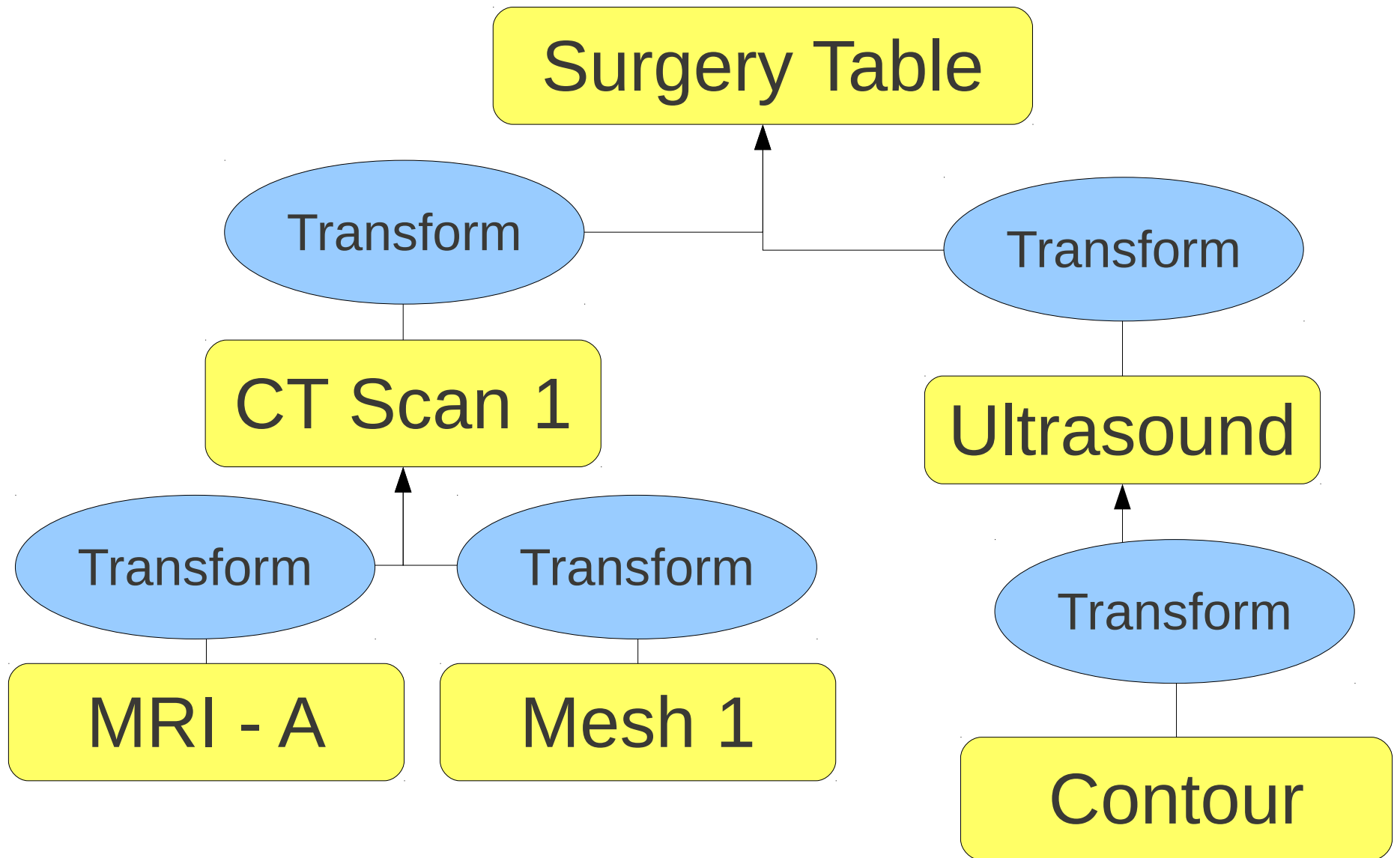
Spatial Objects



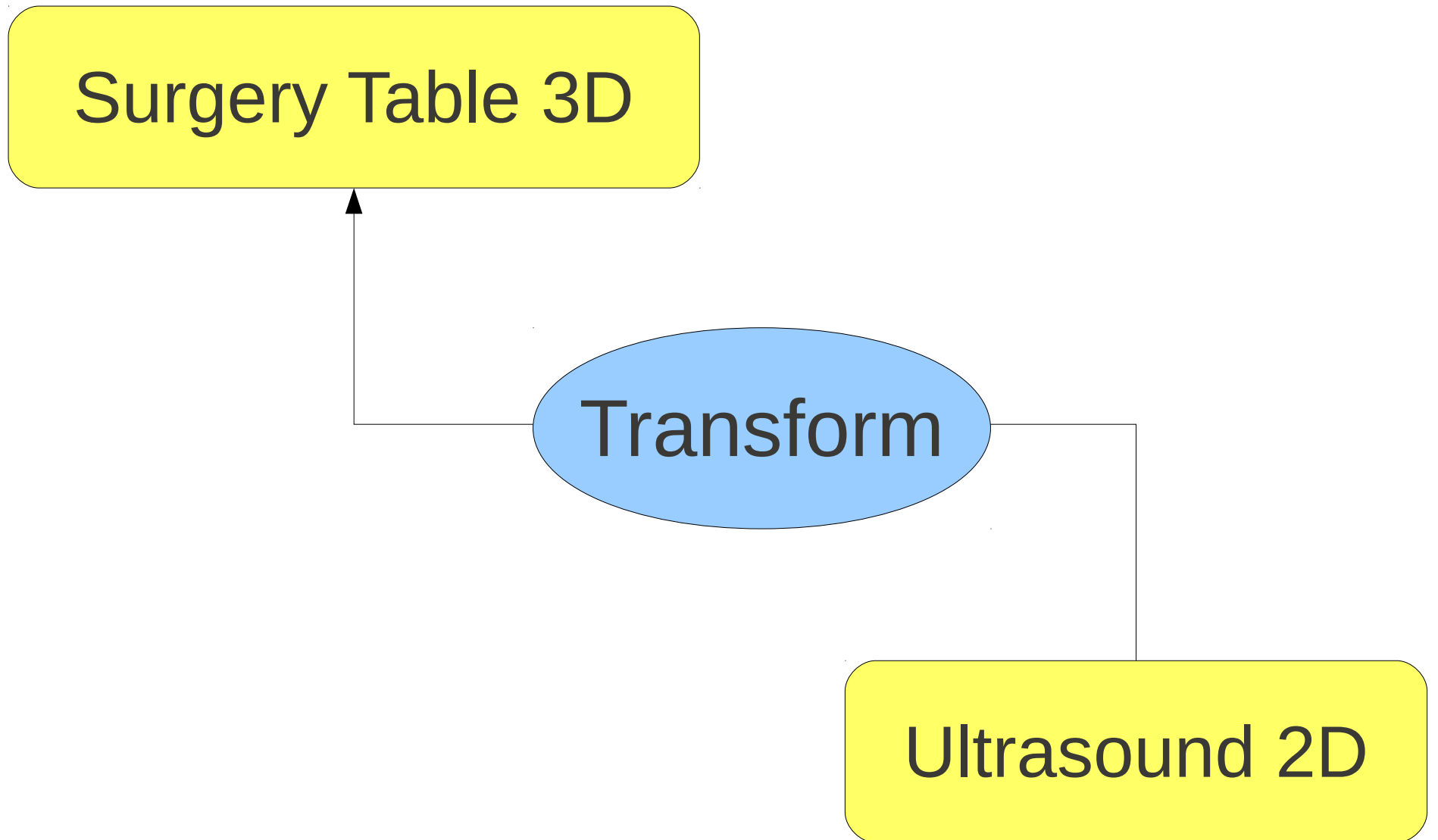
We are all connected...



Scene Graphs...



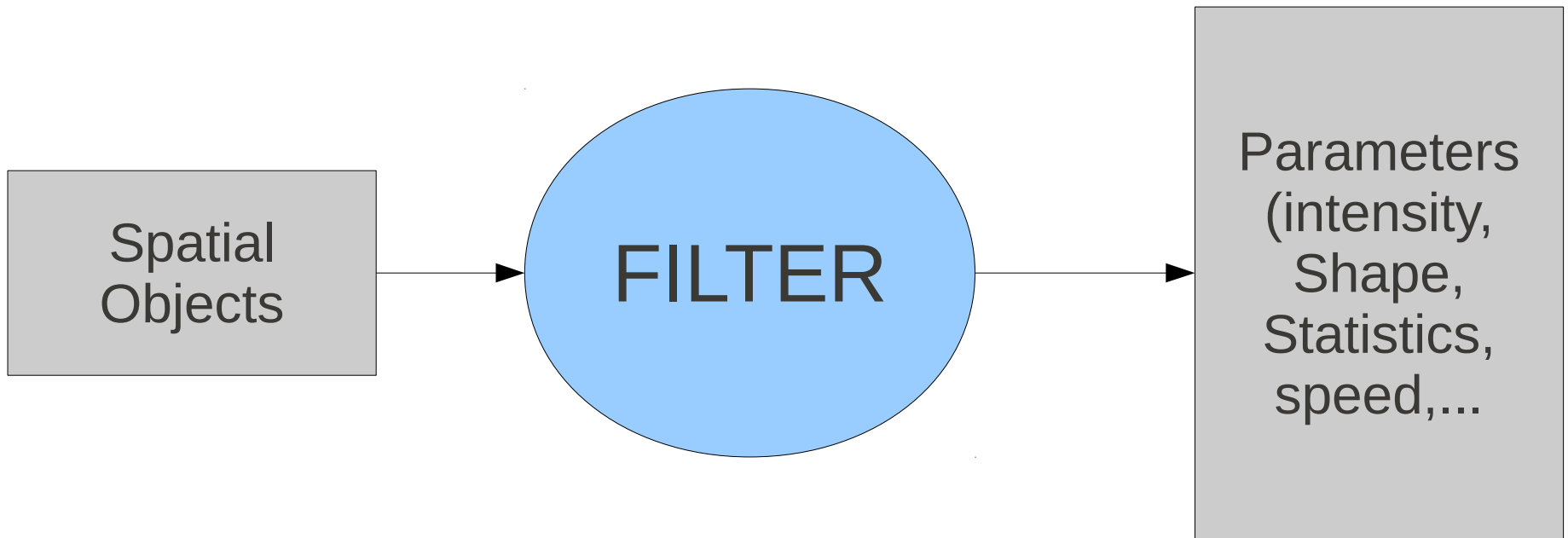
Scene Graphs...



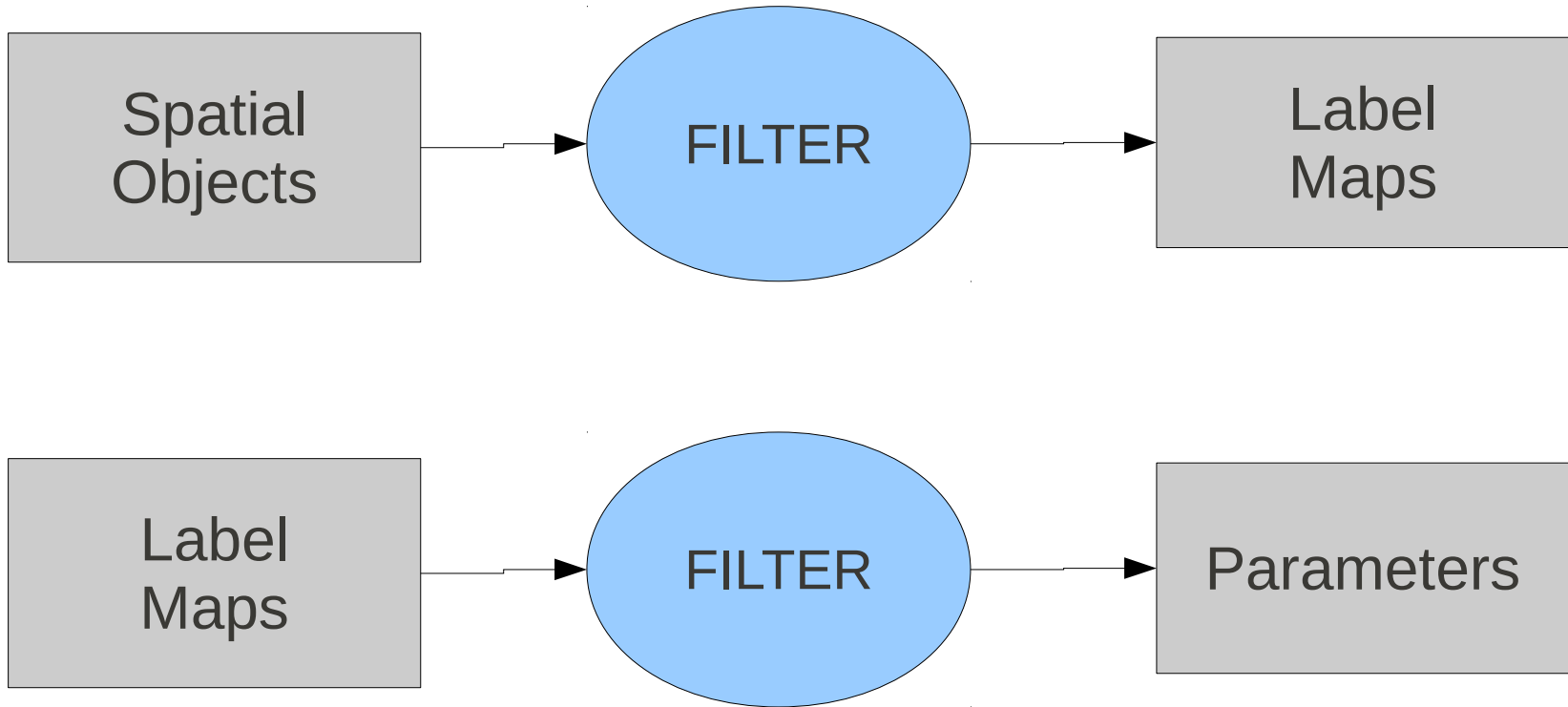
Scene Graphs...

- Is it a TREE ?
- Is it a GRAPH ?

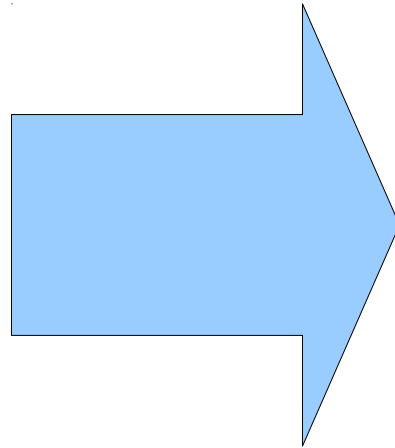
We want Numbers !



We want Numbers !



Time is more than an Illusion...



Time is more than an Illusion...

(x, y, z, t)

Time is more than an Illusion...

itk::Point

At time $T...$

Time is more than an Illusion...

itk::SpatialObject

At time T...

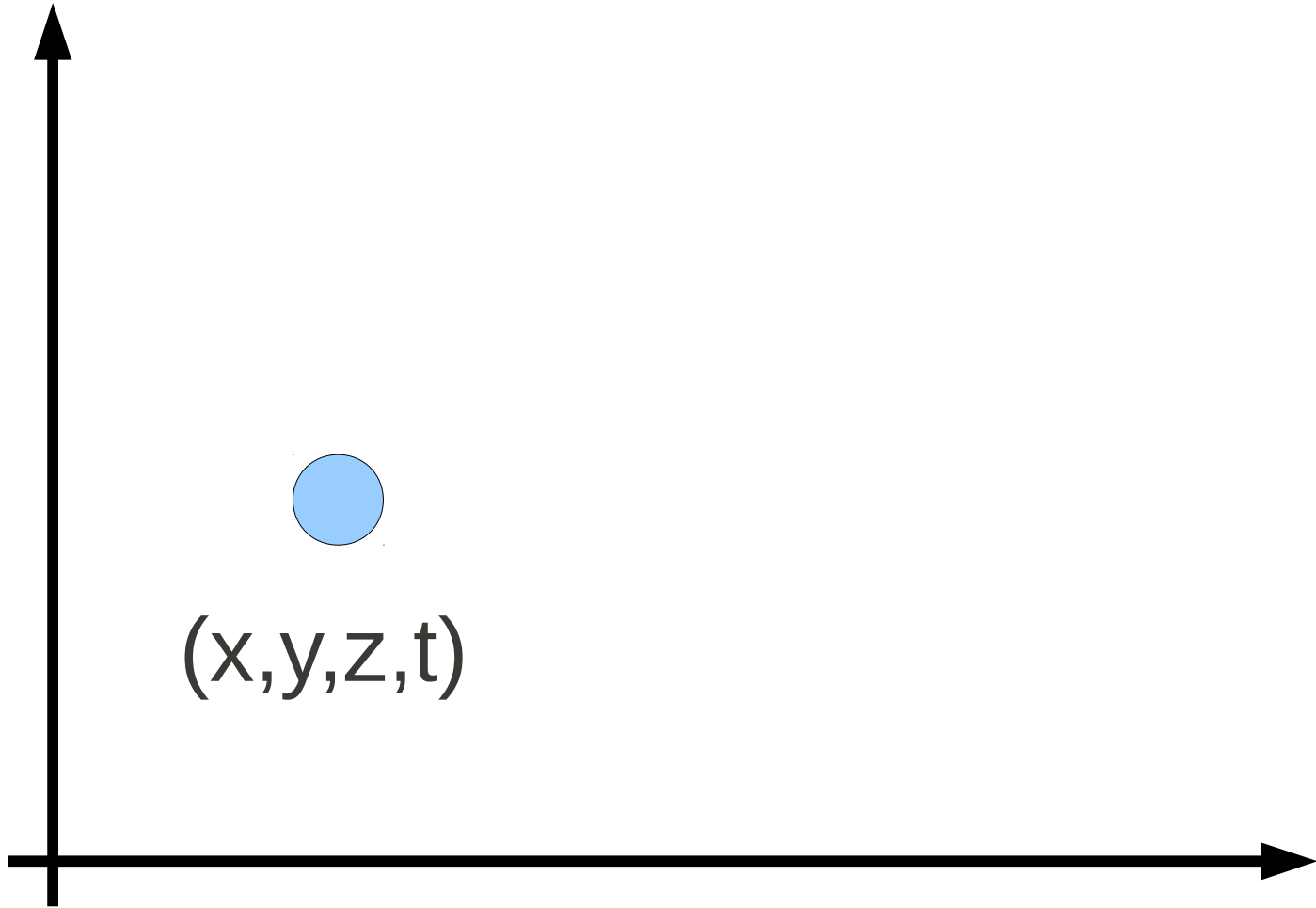
Time is more than an Illusion...

itk::SpatialObject

Or Across Time...

Minkowski Diagrams...

Time

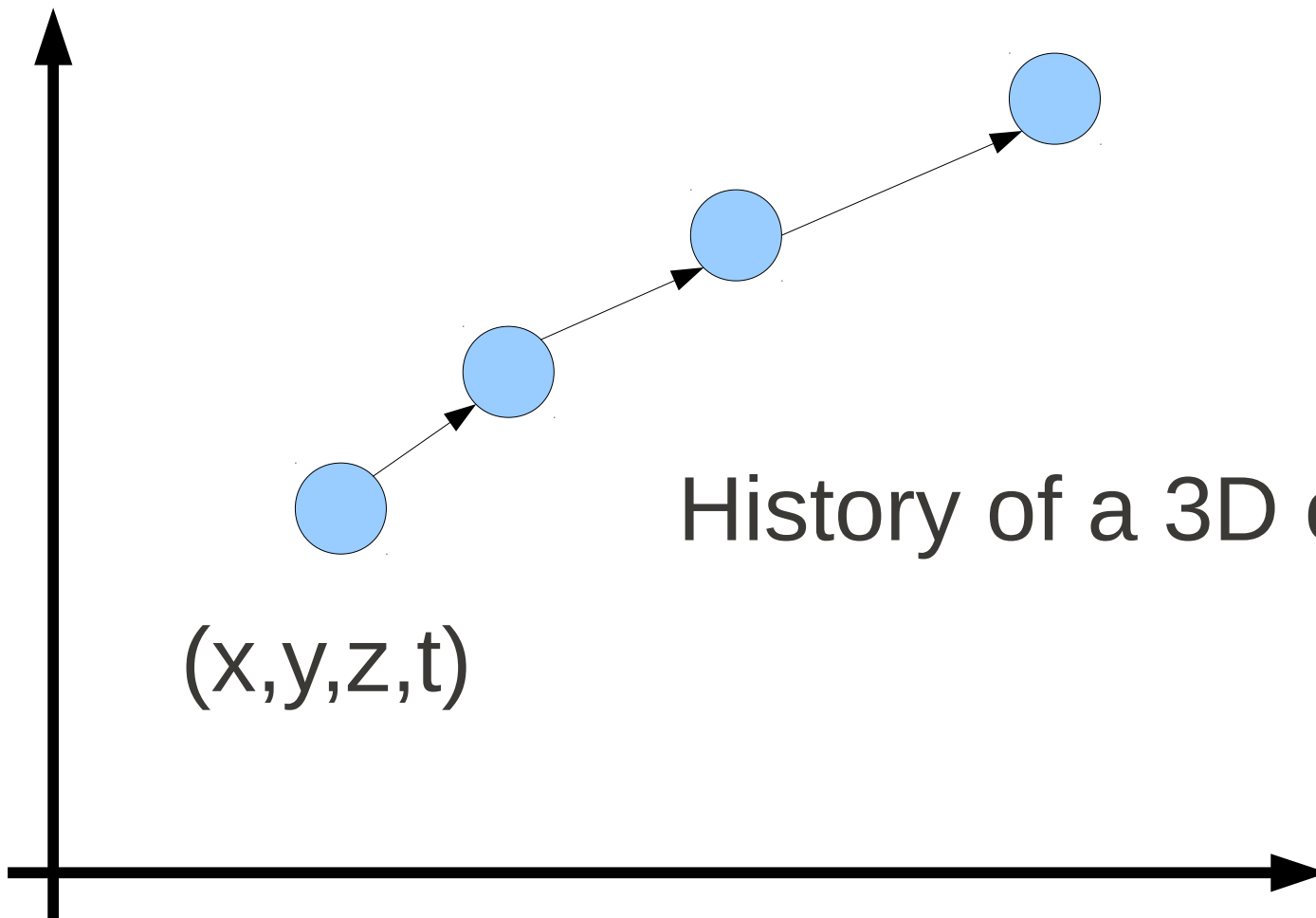


(x, y, z, t)

Space

Minkowski Diagrams...

Time



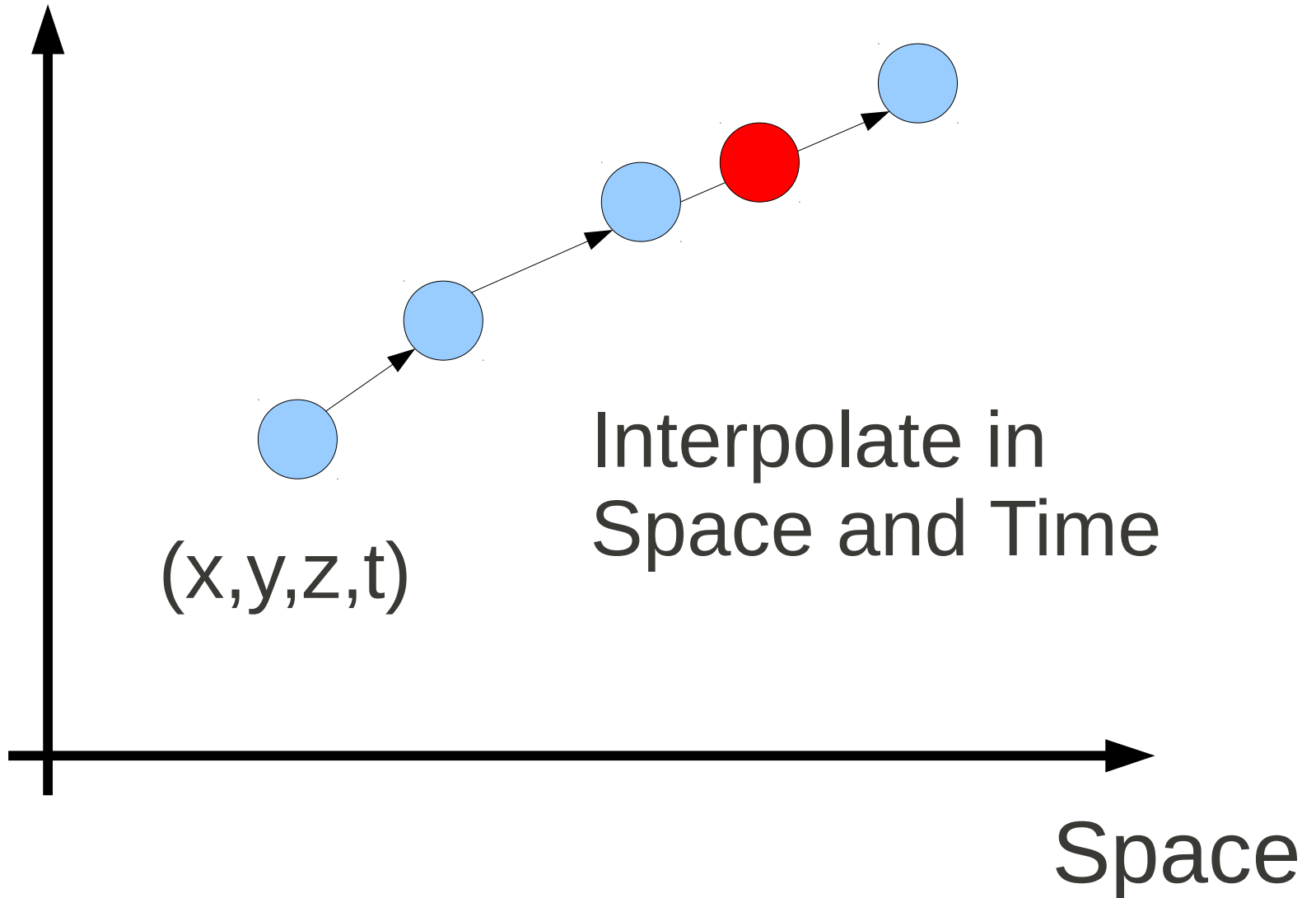
History of a 3D object

(x, y, z, t)

Space

Minkowski Diagrams...

Time



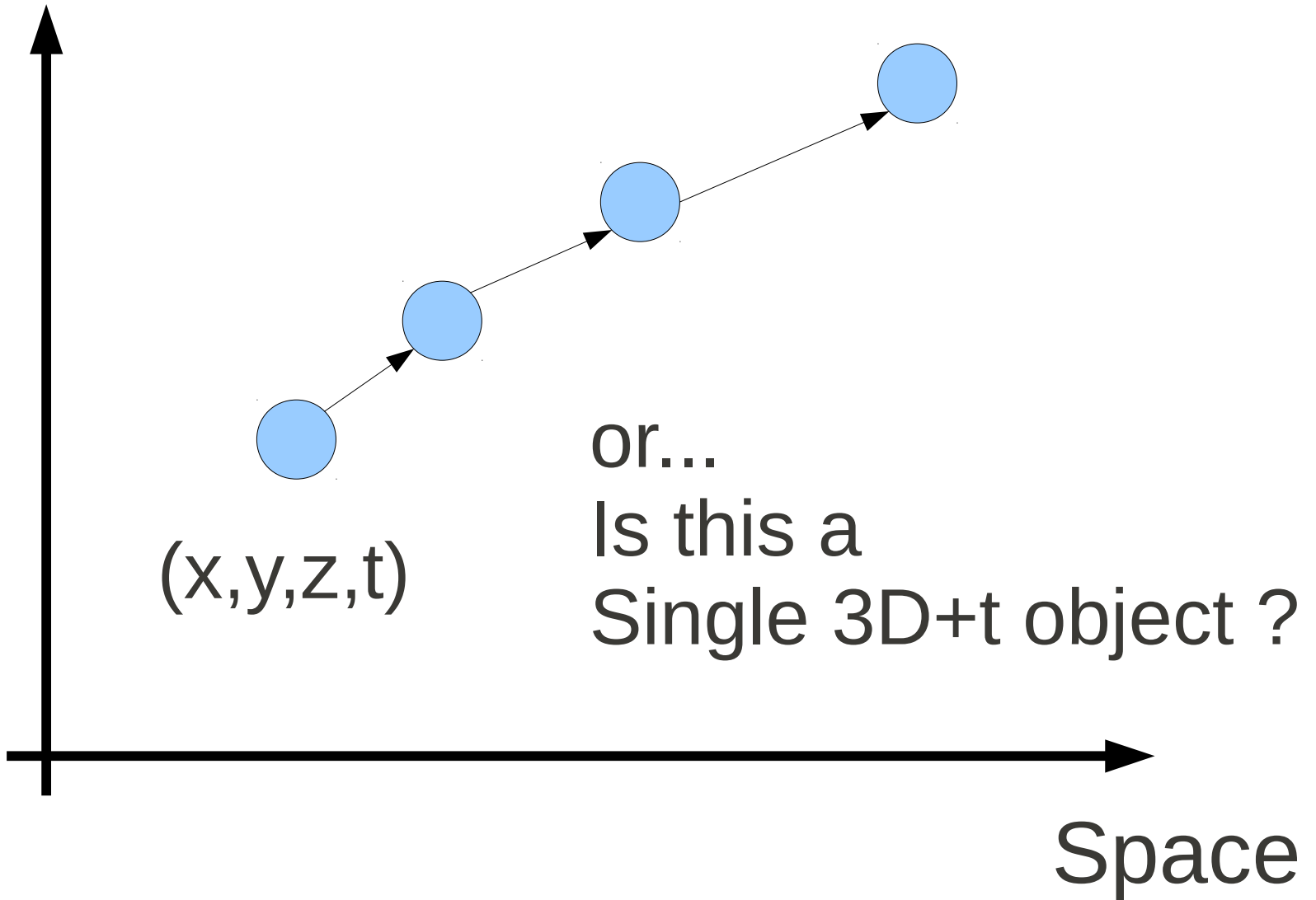
(x, y, z, t)

Interpolate in
Space and Time

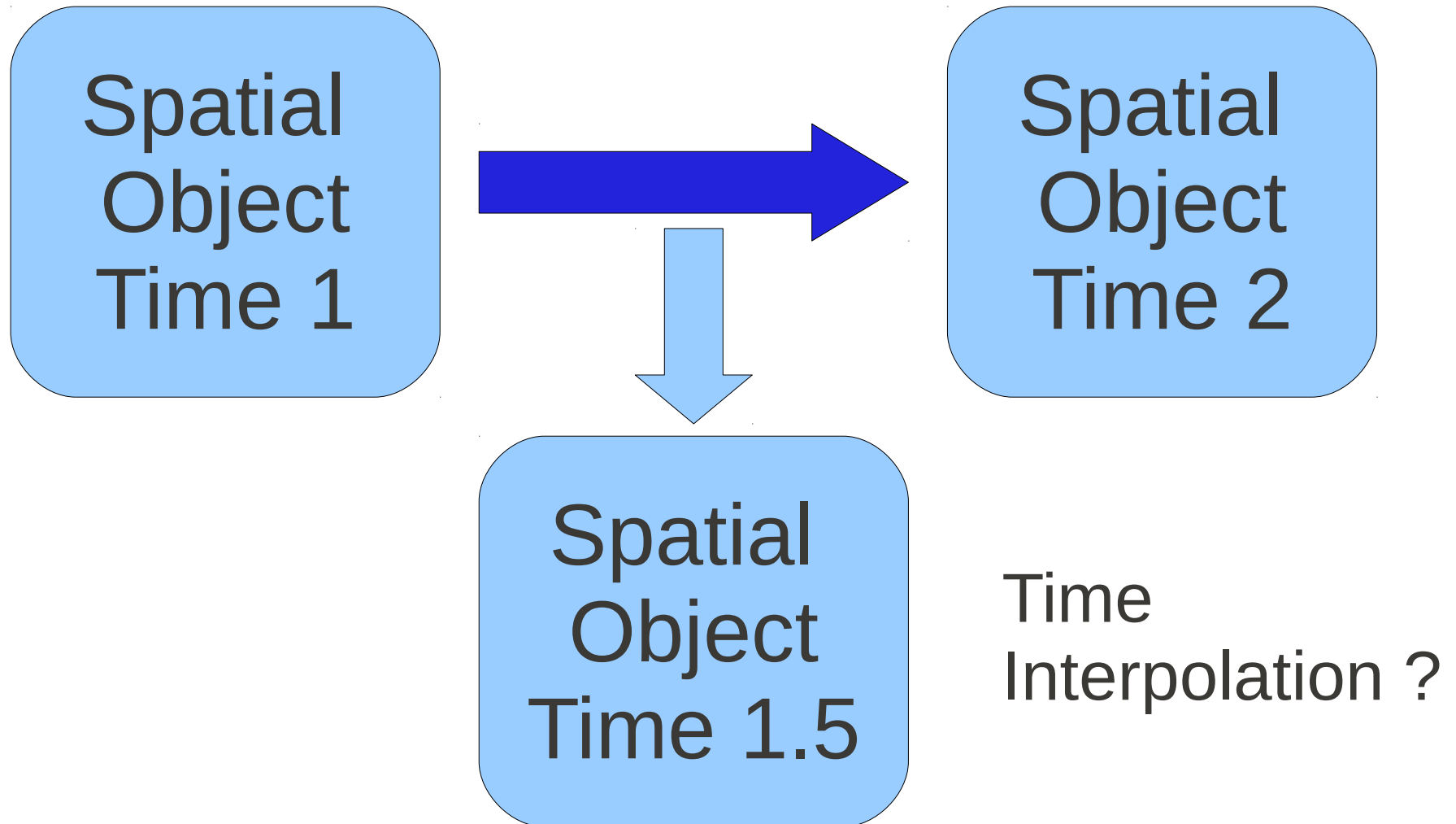
Space

Minkowski Diagrams...

Time

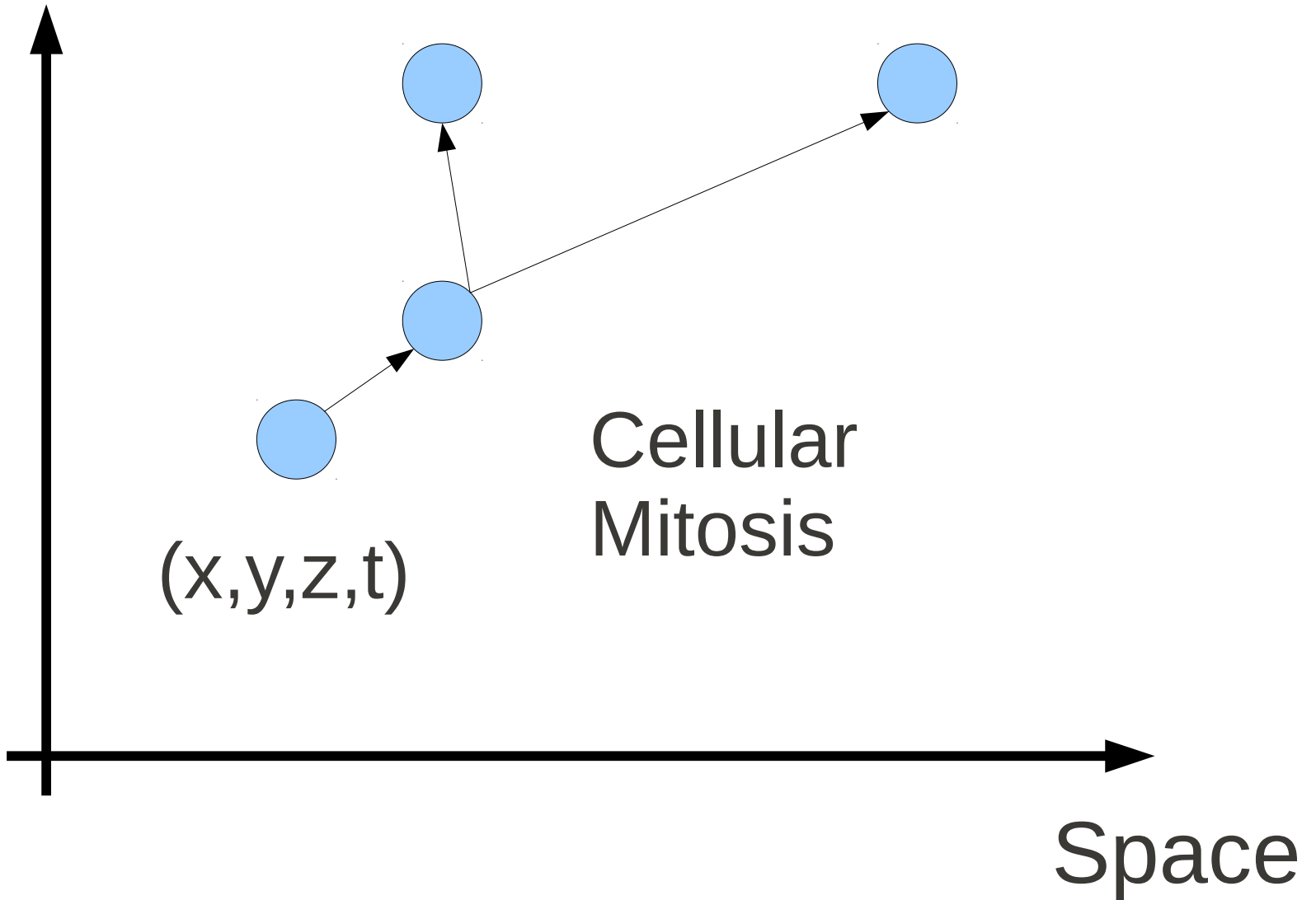


The Time Continuum...



Topological Changes

Time



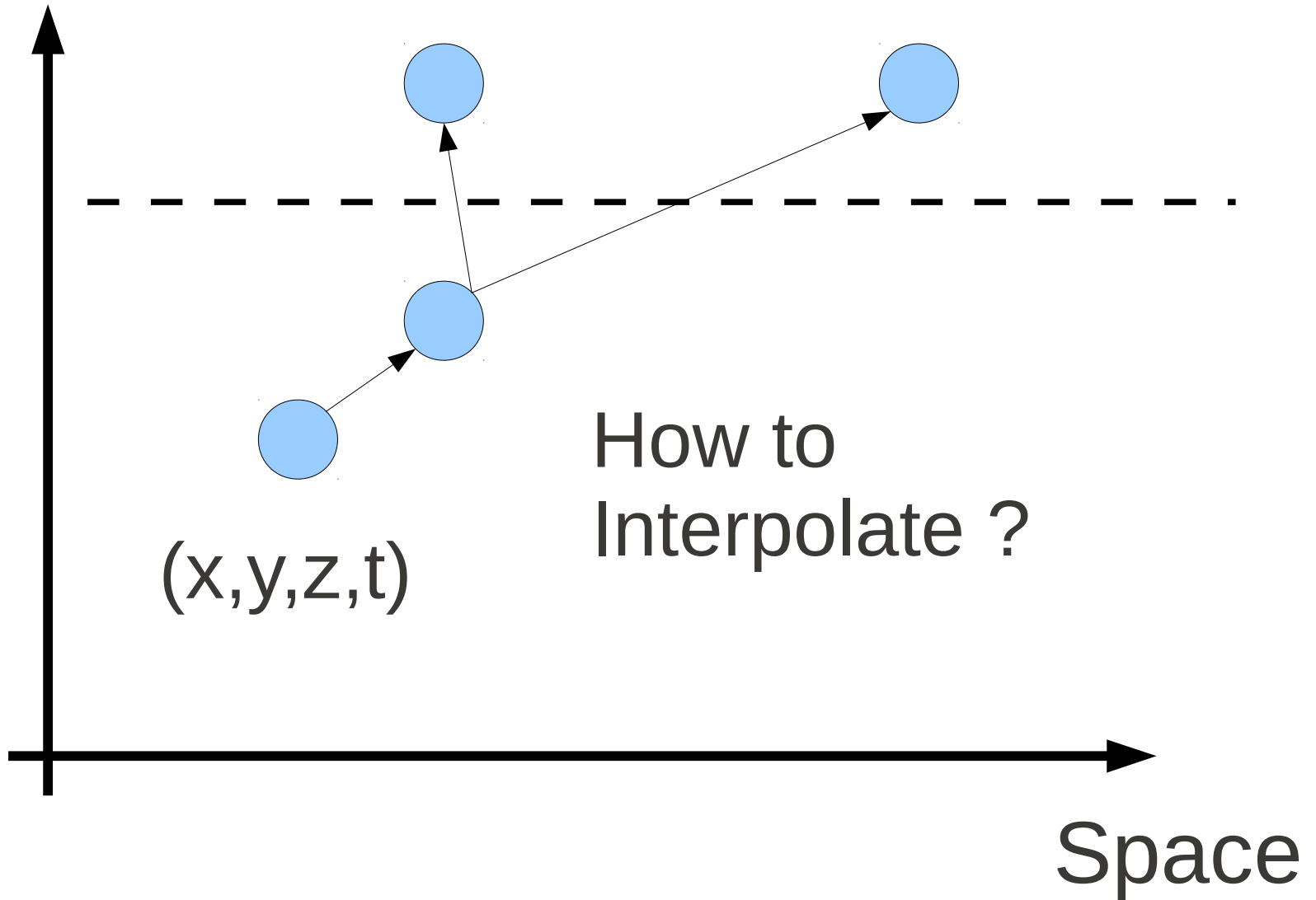
(x, y, z, t)

Cellular
Mitosis

Space

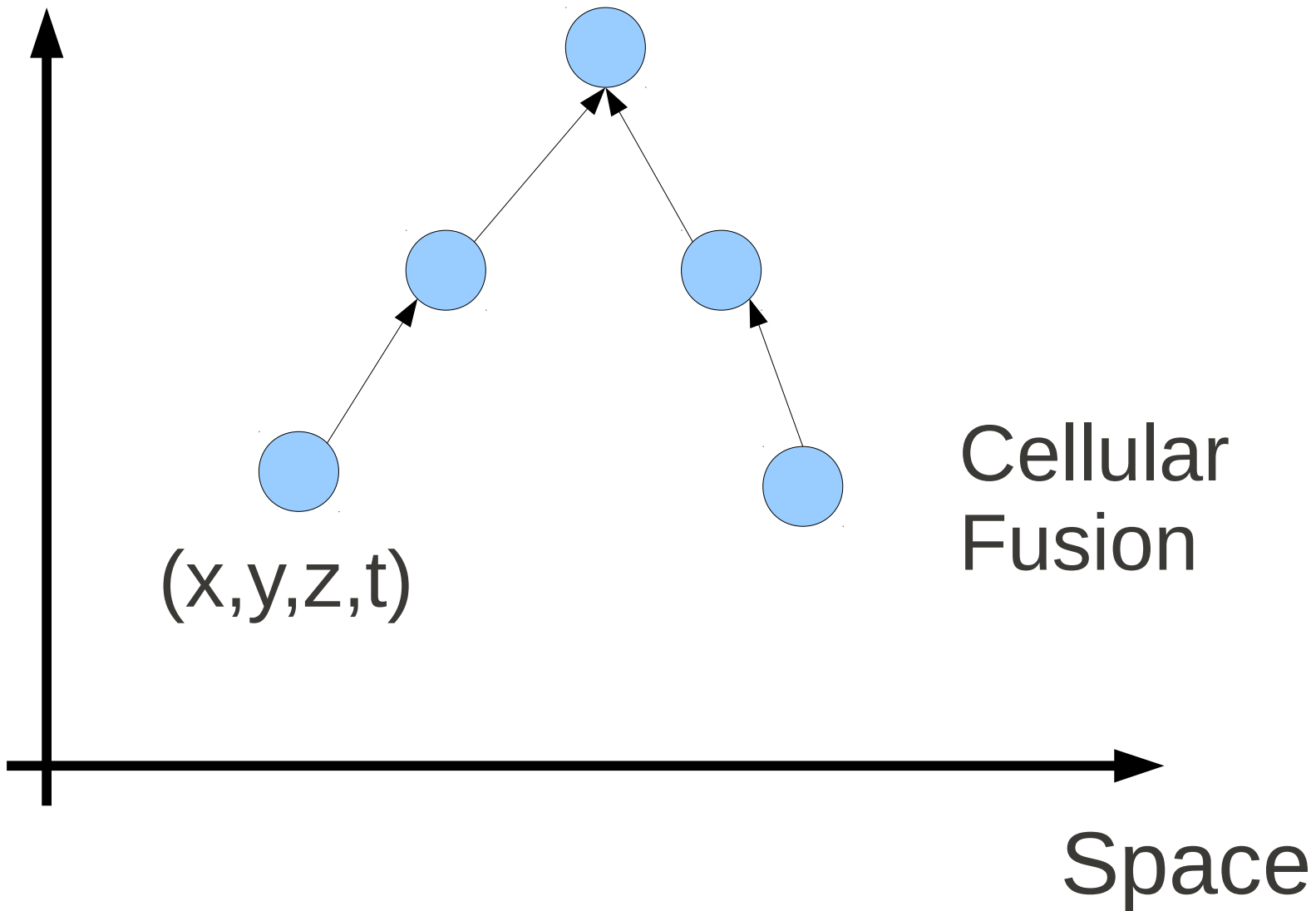
Topological Changes

Time



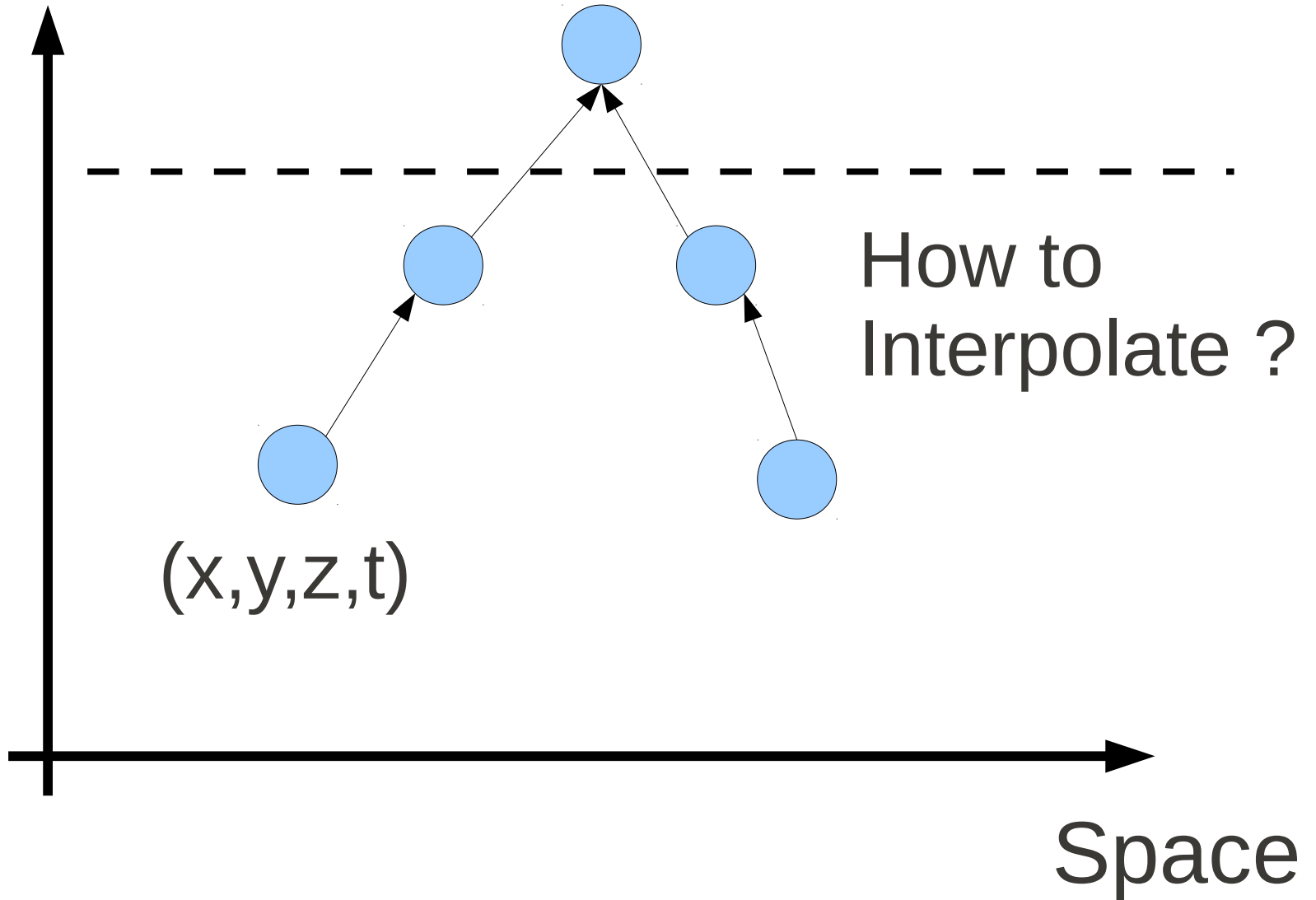
Topological Changes

Time



Topological Changes

Time



End

Discussion

- Model to image registration
 - Optimize over SO, shape parameters
- Moving from App level representation towards the lower level in ITK (e.g. to share among apps such as V3D, GoFigure,...)
- Create a `itk::GraphObject` ?
 - Use Boost graph library ? (as a module)
 - Nick wrote one...(at the time we didn't want Boost..)
 - Data in nodes & data in edges (e.g. transforms)..

Discussion

- What information to put in Nodes ?
 - What to put in Edges ?
- How to manage IO ?
 - get it from boost ?
 - Use graphviz ?
- ItkGraphObject
 - Nodes → Template argument
 - Edge →

Discussion

- What information to put in Nodes ?
 - What to put in Edges ?
- How to manage IO ?
 - get it from boost ?
 - Use graphviz ?
- ItkGraphObject
 - Nodes → Template argument
 - Edge →