In order to approximate the solution of a PDE by the finite element method, the problem domain is generally first subdivided into a collection of cells, like quadrilaterals or triangles. This collection of cells, called a mesh, has a direct impact on the accuracy of the numerical solution, and the properties of 2D and 3D meshes are very well studied. However, some new schemes for solving numerical PDEs require 4D meshes. These schemes, called Space-Time Finite Element Methods (STFEMs), treat time and the spatial variables in the same way when approximating PDEs. As a result, time-dependent problems in three spatial variables are considered in a four-dimensional space-time domain. This talk introduces techniques for creating and manipulating four-dimensional conforming simplicial meshes for use with STFEMs. The approach relies on the theory of combinatorial maps, which will be introduced and considered from the computational perspective. After a discussion of the challenges and benefits of this approach, we present some initial results in creating space-time meshes.