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Nice and Bad Triangulations of Manifolds

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The construction of a combinatorial manifold, from simplices or other polyhedral facets, is largely determined by the valence – how many facets fit around each face of codimension two. Equivelar surfaces and periodic 3-dimensional foam structures are particularly nice examples with valence restrictions.

In contrast, triangulations of 3-balls and 3-spheres that contain knotted triangles with few edges in their 1-dimensional skeleta can be bad in various respects: they can be non-shellable, non-constructible, even non-collapsible and can force an optimal discrete Morse function on a triangulated 3-ball to have three critical cells.

In this talk I will present the various constructions.
