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A review of literature reveals a common theme for finding non-triangulable polyhedra. The process generally begins with a well-known convex polyhedron and then moves the vertices within an ϵ - neighborhood so that diagonals of the faces of the original polyhedron become concave dihedral edges of the newly created polyhedron. This process is reliant on first knowing that there exists no triangulation of the original polyhedron which uses the diagonals that will become concave dihedral angles. Assuming we have a triangulation of each face, known as a surface triangulation, it is then natural to ask if there exists a partition of the polyhedron into tetrahedra which uses all of the diagonals of the surface triangulation. We will explore the techniques in deciding weather a surface triangulation is extendable to either a triangulation or tiling of the polyhedron and in doing so classify surface triangulations of polyhedra containing only regular faces by their extendability hence creating a larger set of non-triangulable polyhedra. (Received September 04, 2014)