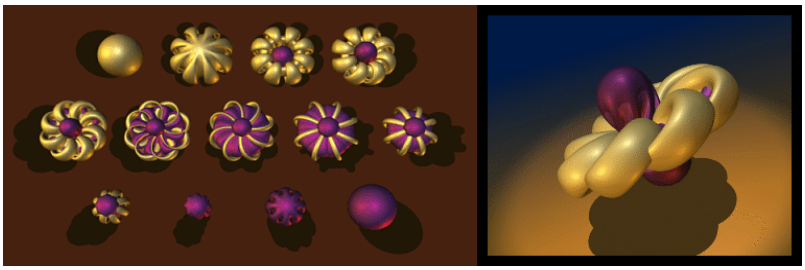
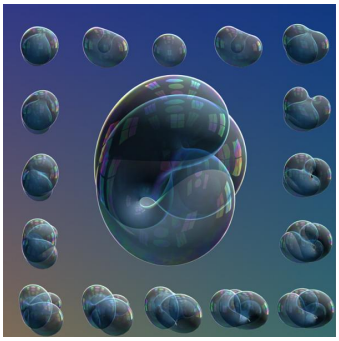
Sphere eversion: a method of turning the sphere inside out without cutting or gluing, but allowing the sphere to pass through itself.

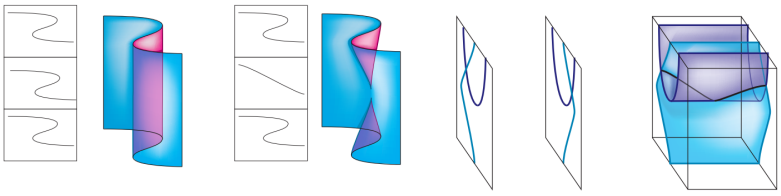
Steve Smale proved it was possible in 1958.

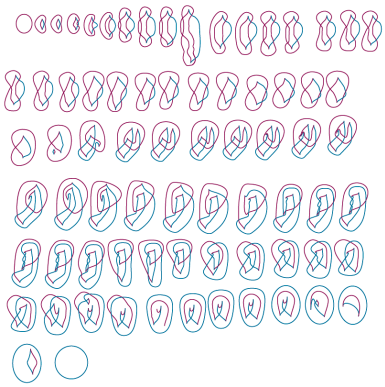
Bill Thurston's eversion via corrugations, animated in **"Outside In"**
http://www.youtube.com/watch?v=wO61D9x6lNY&safe=active





Sullivan, Francis, and Levy's minimax eversion,
animated in **"The Optiverse"**
http://www.youtube.com/watch?v=cdMLLmlS4Dc&safe=active





The **Carter-Gelsinger eversion**
investigates singular sets revealed by
projections and cross sections.

You can read about it in the book
An Excursion in Diagrammatic Algebra:
Turning a Sphere from Red to Blue
http://www.southalabama.edu/mathstat/personal_pages/carter/evert_book-2.pdf
http://www.amazon.com/An-Excursion-Diagrammatic-Algebra-Everything/dp/9814374490

or in the University of South Alabama master's thesis
"On the topology of the singularities of a sphere eversion"

For more information on sphere eversions, see
John Sullivan's "A History of Sphere Eversions" at
http://www.mi.sanu.ac.rs/vismath/sullivan/opt2.htm