Many fundamental results in geometry and topology have been established through the development of minimal submanifold theory and geometric flow techniques. In this lecture we will show how higher co-dimensional mean curvature flow can be used to obtain topological results for maps between Riemannian manifolds. More precisely, we will see how the flow can be employed to attack and provide some answers to the following general problems:

Problem 1 (Gromov): Is it true that smooth maps between Riemannian manifolds with “small” Jacobian are null-homotopic?

Problem 2 (Smale): Is it true that a diffeomorphism of the sphere can be smoothly deformed into an isometry of the sphere?

Problem 3 (Gromov/Yau): Is it true that a symplectomorphism of CP^n can be deformed into a bi-holomorphic isometry of CP^n?