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James Keesling* (kees@ufl.edu), **James Maissen** and **David Wilson**. *Topological Group Actions on Compactifications*.

Topological group actions are an important part of many diverse areas of mathematics. Perhaps the most famous problem still standing in this area is the Hilbert-Smith Conjecture which is the last remaining part of Hilbert's Fifth Problem from 1900. The conjecture states that a compact group acting freely on a manifold must be a Lie group.

There are many results related to this famous problem, but none seem close to a solution. This talk will review what is known, some equivalent formulations of the problem, various approaches to the problem, and some recent results.

A novel approach to the problem would be to consider what compactifications can extend an action of a compact group acting on a separable metric space. If one had a compact non-Lie group acting on a compact manifold, then one could look at the action as extending the action on a dense invariant subspace. Knowing how compact group actions extend to compactifications might show how a compact manifold action could be constructed or perhaps why such an action cannot exist.

We will give several examples and theorems. (Received January 19, 2011)