

Homotopy pushouts can be constructed as higher inductive types in the logical framework of Homotopy Type Theory, where one may engage syntactic methods to explore their properties, and formalize them in a proof assistant. This thesis focuses on the descent property, due to Rijke, which characterizes type families over pushouts; the flattening lemma, due to Brunerie, which characterizes the total spaces of such families; and the universal property of identity types of pushouts, due to Kraus and von Raumer. We also build elementary infrastructure for sequential colimits, following a paper of Sojakova, van Doorn, and Rijke. We then use the built machinery to provide a partial formalized proof of Wörn's zigzag construction of identity types of pushouts as sequential colimits, leaving one coherence problem open. The thesis was simultaneously formalized in the proof assistant Agda and results contributed to the `agda-unimath` library.