In this thesis, we present an overview of some of the known facts about k-stage Euclidean and quasi-Euclidean rings and domains, certain generalisations of the concept of Euclidean ring, as well as some new results. Among the new results, the norm-free characterization of k-stage Euclidean rings based on a transfinite construction of k-stage Euclidean ring is fundamental and has many applications. Statements providing a way to construct new k-stage Euclidean rings from other k-stage Euclidean rings recieve special attention (with the integral domain case in mind). Also, we present an example of a 3-stage Euclidean integral domain which we believe is a good candidate for not being 2-stage Euclidean.