T cell immunity is essential to the fight of cancer and infection. At the same time, it is implicated in many autoimmune diseases. Recent advances in T cell based cancer immunotherapy have demonstrated amazing results. However, to further improve the efficacy of T cell based cancer immunotherapy and to make T cell based therapy to other diseases require us to have a comprehensive understanding of the complex T cells repertoire and their interaction with potential ligands. In the past several years, we have developed several tools to profile the T cell repertoire from T cell receptor diversity to T cell receptor affinity to high-throughput linking antigen specificity to single T cell receptor sequences in large scale. In this talk, I will first introduce these tool and then give examples on how we use them to answer some of the fundamental questions in systems immunology, which in turn help us design new approaches in immune engineering.