In the framework of the AdS/CFT correspondence, the problem of explaining the structure of some correlation functions for large temporal and spatial separations, is tied to non perturbative properties. For spatial separations behind a Black Hole horizon this led to the introduction of a notion of quantum complexity as an significant feature of the boundary QFT. The quantum complexity continues to evolve for times much by far longer than thermalization time scales. Several definitions were proposed for the complexity in the boundary QFT, and its precise holographic dual.

After reviewing some of those definitions of Complexity in the QFT and their proposed duals we introduce and explore a definition of operator complexity which depends only on the starting operator and the Hamiltonian of the system and does not depend on tolerance parameters. We analyze its behavior at short and long times for a finite system and find that they reproduce generic features one expects for complexity of quantum many-body systems.