Individual and institutional investors are typically concerned with finding satisfactory balance between reward and risk associated with an investment process. Various measures, typically referred to as measures of performance (MOP), have been developed to quantify this balance. Recently, Cherny and Madan (2009) originated an effort to provide a mathematical framework to study these measures in a unified way. Our goal is to elevate the mathematical framework for studying MOPs to a dynamical, multi-period setup where cash flows are considered as random processes, and one needs to assess their acceptability consistently in time. In particular, we are concerned not just with the total cumulative terminal value of the cash flow as seen from the initial time of the investment process, but also with all remaining cumulative cash flows between each intermediate time and the terminal time of the investment process. We will show that there exists a duality between dynamic MOPs and dynamic risks measures (extensively studied in the past decade). Also, we will prove a representation theorem for the corresponding dynamic risk measures. Finally, we discuss how to dynamize some classical measures of performance such as Sharpe Ratio, Gain Loss Ratio, and Risk Adjusted Return on Capital, followed by several numerical examples.