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In this work, we develop an innovative alternative stochastic hybrid dynamic model for time-to-event processes in a systematic and unified way. The presented approach is motivated by parameter and state estimation of time-to-event processes in biological, chemical, engineering, epidemiological, medical, military, and social dynamic processes under the influence of discrete-time intervention processes. The developed results are applied to time-to-event data sets. (Received September 26, 2017)