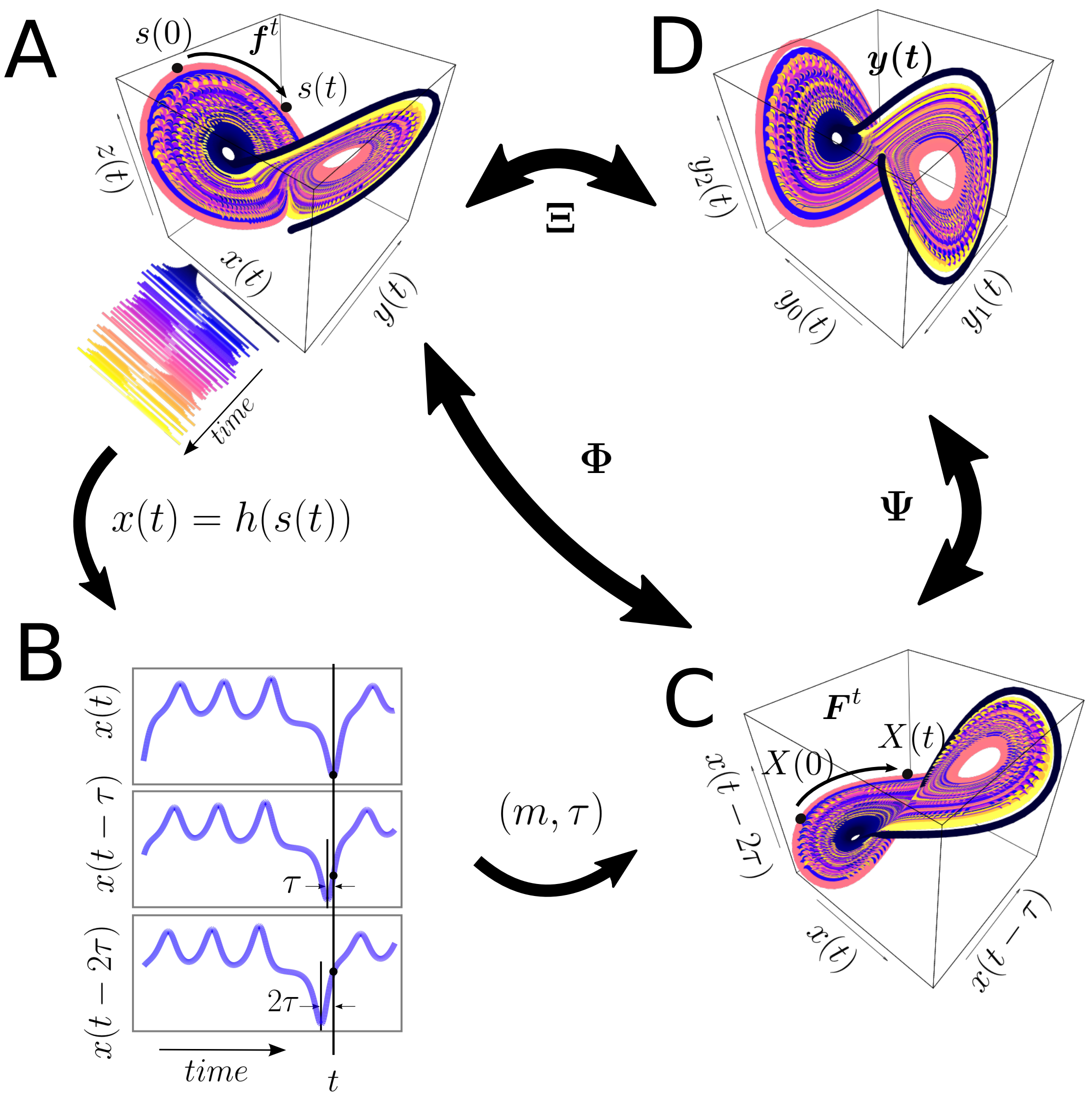

Fig. 3.1 **State space reconstruction methodology.** State space reconstruction is based on $x(t) = h[s(t)] = h[f^t[s(0)]]$ where $h[]$ is a function $h : M \rightarrow \mathbb{R}$, defined on the trajectory $s(t)$. f is the true dynamical system, $f : M \rightarrow M$, defined as evolution function and f^t, with time evolution $t \in \mathbb{N}$ which is the t-th iteration of f that corresponds to an initial position $s(0) \in M$. The time-delay embedding represented as the Φ, maps the original $d-$dimensional state $s(t)$ into the $m-$dimensional uniform time-delay embedding matrix $\boldsymbol{X}(t)$. The transformation map Ψ maps $\boldsymbol{X}(t)$ into a new state $y(t)$ of dimensions $n < m$. (A) $M-$dimensional state space (e.g. Lorenz system); (B) Delayed copies of $1-$dimensional $x(t)$ from the Lorenz system; (C) $m-$dimensional reconstructed state space with m and τ, and (D) $y(t)$ is the $n-$dimensional reconstructed state space. The total reconstruction map is represented as $\Xi = \Psi \circ \Phi$ where Φ is the delay reconstruction map and Ψ is the coordinate transformation map. This figure is adapted from the work of Casdagli et al. (1991); Quintana-Duque (2012); Uzal et al. (2011) and R code to reproduce the figure is available from Xochicale (2018).