

**State space**  $X$

**Sample space**  $Y \subset X$

**System states**

$$x(t) \in X$$

$$\omega(t) \in Y$$

**Internal states**

$$r(t) \in R$$

**Active states**

$$a(t) \in A \subset R$$

**External states**

$$s(t) \in S$$

**External mapping**

$$\varphi_S : \mathbb{R} \times Y \times A \times S \rightarrow S$$

**Internal mapping**

$$\varphi_R : \mathbb{R} \times R \times S \rightarrow R$$