

## cr-explanation-es-le<sup>13,45</sup>

$$\begin{aligned} & \forall es:ES, Cmd:Type, In:AbsInterface(Cmd), isupdate:(Cmd \rightarrow \mathbb{B}), Sys, Out:AbsInterface(Top). \\ & (E(In) \subseteq_r E(Sys)) \\ & \Rightarrow (E(Out) \subseteq_r E(Sys)) \\ & \Rightarrow (\forall e:E(In). (\neg(\uparrow(isupdate(In(e)))))) \Rightarrow (\uparrow(e \in_b Out))) \\ & \Rightarrow (\forall f:sys\text{-antecedent}(es;Sys). \\ & \quad (\forall u:E(Sys). (f(u) = u \in E) \Rightarrow (\uparrow(u \in_b In))) \\ & \quad \Rightarrow \text{fifo-antecedent}(es;Sys;f) \\ & \quad \Rightarrow (\forall e:E(In). f(e) = e \in E) \\ & \quad \Rightarrow (\forall chain:(E(Sys) \rightarrow (Id List)). \\ & \quad \quad \text{chain-consistent}(f;chain) \\ & \quad \Rightarrow (\forall b:E(Sys), a:E(In). \\ & \quad \quad (\uparrow(isupdate(In(a)))) \Rightarrow a \leq_{loc} b \Rightarrow (a \in \text{cr-explanation}\{i:l\}(es; Sys; f; b)))))) \end{aligned}$$