BFO 2020 History Axioms

(1) History of is functional on second argument
\[ \forall p,q,r (\text{historyOf}(p,q) \land \text{historyOf}(p,r) \rightarrow q=r) \]

(2) History of is functional on first argument
\[ \forall p,q,r (\text{historyOf}(p,q) \land \text{historyOf}(r,q) \rightarrow p=r) \]

(3) Every material entity has a history
\[ \forall m (\exists t \text{instanceOf}(m,\text{materialEntity},t) \rightarrow \exists h \text{historyOf}(h,m)) \]

(4) Every history is of a material entity
\[ \forall h (\exists t \text{instanceOf}(h,\text{history},t) \rightarrow \exists m \text{historyOf}(h,m)) \]

(5) History of and has history are inverse relations
\[ \forall a,b (\text{historyOf}(a,b) \leftrightarrow \text{hasHistory}(b,a)) \]

(6) History of has domain history and range material entity
\[ \forall a,b (\text{historyOf}(a,b) \rightarrow \exists t \text{instanceOf}(a,\text{history},t) \land \exists t \text{instanceOf}(b,\text{materialEntity},t)) \]

(7) Material entity and its history exist at exactly the same times
\[ \forall m,h (\text{historyOf}(h,m) \rightarrow \forall t (\text{instanceOf}(m,\text{materialEntity},t) \leftrightarrow \text{instanceOf}(h,\text{history},t))) \]

(8) A material entity participates in its history
\[ \forall h,m (\text{historyOf}(h,m) \rightarrow \forall t (\text{existsAt}(m,t) \rightarrow \text{participatesIn}(m,h,t))) \]