Dynamic System Property: $_{atis}$DynamicProperties

(*Dynamic system properties* are those properties that are part of the theory and describe patterns in time as change occurs within a system or between a system and its negasystem.)

Dynamic Properties:

The dynamic properties are defined by the transition functions that change the properties of the system or describe the state of the system over time.

Feed-Function Schema. The "feed-" functions, $\oint_F$; that is, $\oint_I$, $\oint_O$, $\oint_T$, $\oint_B$, $\oint_S$, $\oint_N$, and $\oint_E$, are defined as follows:

$$\oint_F: X_{\mathcal{P}} \to Y_{\mathcal{P}} \mid \oint_F(\mathbf{x}) = \mathbf{y}.$$

$X_{\mathcal{P}}$ and $Y_{\mathcal{P}}$ are the corresponding "-put" sets defined for each function. For example,

$$\oint_I: T_{\mathcal{P}} \to I_{\mathcal{P}} \mid \oint_I(\mathbf{x}) = \mathbf{y}.$$

-Put Set Schema. For all of the "–put" sets, P; that is, $T_{\mathcal{P}}$, $I_{\mathcal{P}}$, $F_{\mathcal{P}}$, $O_{\mathcal{P}}$, and $S_{\mathcal{P}}$, and the qualifier sets, $\mathscr{L}$ and $\mathscr{L}'$, a **time function**, f_t, is defined from the product set of a "-put" set and its corresponding qualifier set into the real numbers, $\Re$.

$$f_{P\mathcal{P}(t)}: P_{\mathcal{P}} \times \mathscr{L} \to \Re = P_{\mathcal{P}}^{\Re}\text{; or } f_{P\mathcal{P}(t)}: P_{\mathcal{P}} \times \mathscr{L}' \to \Re = P_{\mathcal{P}}^{\Re}$$

For example, $f_{T\mathcal{P}(t)}: T_{\mathcal{P}} \times \mathscr{L} \to \Re = T_{\mathcal{P}}^{\Re}$; or $f_{I\mathcal{P}(t)}: I_{\mathcal{P}} \times \mathscr{L}' \to \Re = I_{\mathcal{P}}^{\Re}$.

-Put Entropy Function Schema. For $\mathscr{L}^{\Re}$ and $\mathscr{L}'^{\Re}$ a **"-put" entropy function**, $f_{H|P}$, is defined that maps each qualifier set restricted by $P_{\mathcal{P}}$ into H, as follows:

$$f_{H|P}: \mathscr{L}|P_{\mathcal{P}}^{\Re} \to H\text{; such that, } f_{H|P\mathcal{P}}(\mathbb{L}_{x|t}) = H(x|t) = \nu.$$

ν is the entropy of $\mathbb{L}_{x|t}$; that is $\mathbb{L}$ at time t for x. For example,

$$f_{H|T\mathcal{P}}: \mathscr{L}|T_{\mathcal{P}}^{\Re} \to H\text{; such that, } f_{H|T\mathcal{P}}(\mathbb{L}_{x|t}) = H(x|t) = \nu.$$

State-Transition Function Schema. Then the **state-transition function**, σ, is defined by the following composition:

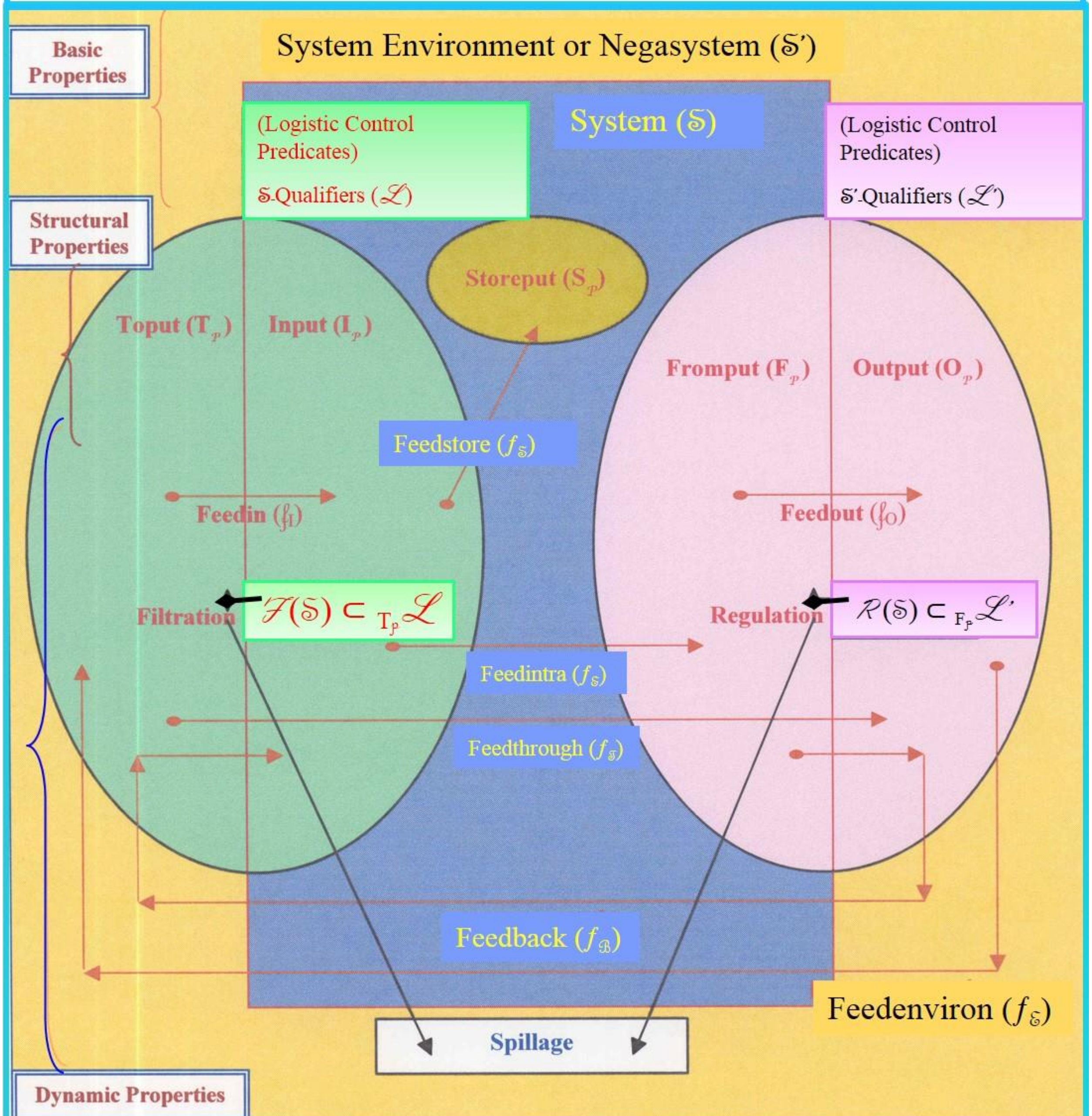
$$\sigma_{X}(f_{H|P\mathcal{P}} \circ f_{P\mathcal{P}\,(t)} \circ \not{f}_{F}) = \nu = 0 \supset X \in \not{f}_{F}(P_{\mathcal{P}}).$$

The dynamic properties are shown in the diagram below.

As seen, the dynamic properties are: feedin, feedstore, feedout, feedintra, feedthrough, feedenviron, and feedback.

Diagram of System Properties

Universe of Discourse ($\mathcal{U}$) $\mathcal{G} =_{df} (\mathcal{A}, \mathcal{P}, \mathcal{Q}, \mathcal{T}, \mathscr{T}, \sigma)$[1,2]



[1] $\mathcal{G}$ is the *General System*, $\mathcal{A}$ is the *Family of Affect Relations Set*, $\mathcal{P}$ is the *Object Partitioning Set*, $\mathcal{Q}$ is the *Qualifier Set*, $\mathcal{T}$ is a *Transition Functions Set*, $\mathscr{T}$ is a *Linearly-Ordered Time Set*, and σ is the *System State Transition Function*.

[2] $\mathcal{A}_1, \mathcal{A}_2, \ldots, \mathcal{A}_n \in \mathcal{A}$; $T_p, I_p, F_p, O_p, S_p, L_p, \mathbb{S}_{BX}, \mathbb{S}'_{BY} \in \mathcal{P}$; $\mathscr{L}, \mathscr{L}' \in \mathcal{Q}$;

$f_{\mathfrak{I}}, f_{\mathfrak{O}}, f_{\mathfrak{T}}, f_{\mathfrak{B}}, f_{\mathfrak{E}}, f_{\mathfrak{S}} \in \mathcal{T}$; and $t_1, t_2, \ldots, t_k \in \mathscr{T}$.