Viewing the world systemically.

ATIS—the Feed-Transition Functions of Intentional Systems

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The Feed-Transition Functions of Intentional Systems

Overview

Whereas an analysis of the structure of a system can predict the behavior of that system, an analysis of the dynamics of the system is also required in order to determine the boundaries of that behavior.

Feed-Transition Functions, ∱_X

The *feed-transition functions* map the movement of components from one partition to another. The movement is defined by the *state-transition function*. Any change in a system's components or relations is a change in state, requiring the application of the *state-transition function*. The transition functions define which partitions are being changed that result in a change of system state.

Feed-Transition Function Schema:

The *feed-functions*, ∱_V; that is, feedin, ∱_I; feedintra, ∱_N; feedstore, ∱_S; feedfrom, ∱_F; feedout, ∱_O; feedthrough, ∱_T; feedback, ∱_B; and feedenviron, ∱_E, are *state transition functions* between two disjoint sets, $X_{\mathcal{P}}$ and $Y_{\mathcal{P}}$, defined as follows:

$$\sigma(\varkappa_{X_{\mathcal{P}}})(\text{∱}_V \circ \text{ℊ} \circ f) \in Y_{\mathcal{P}} \mid \sigma(\varkappa_{X_{\mathcal{P}}}) = \varkappa_{Y_{\mathcal{P}}}\text{; where } f\colon X_{\mathcal{P}} \times {}_{X_{\mathcal{P}}}\mathscr{L}\mathscr{C} \to \{\perp, \top\},$$

'${}_{X_{\mathcal{P}}}\mathscr{L}\mathscr{C}$' designates the "$X_{\mathcal{P}}$ logistic-control qualifier," and

$$\text{ℊ}(\varkappa_{X_{\mathcal{P}}}) = \begin{cases} \varnothing, \text{ if } f = \perp \\ \varkappa_{X_{\mathcal{P}}}, \text{ if } f = \top \quad \text{and} \end{cases}$$

$$\text{∱}_V\colon W \subset X_{\mathcal{P}} \to Y_{\mathcal{P}} \mid (\text{ℊ}(\varkappa_{X_{\mathcal{P}}}) \neq \varnothing \supset \text{ℊ}(\varkappa_{X_{\mathcal{P}}}) = \varkappa_{X_{\mathcal{P}}} \in W) \wedge \text{∱}_V(\varkappa_{X_{\mathcal{P}}}) = \varkappa_{Y_{\mathcal{P}}} \in Y_{\mathcal{P}}$$

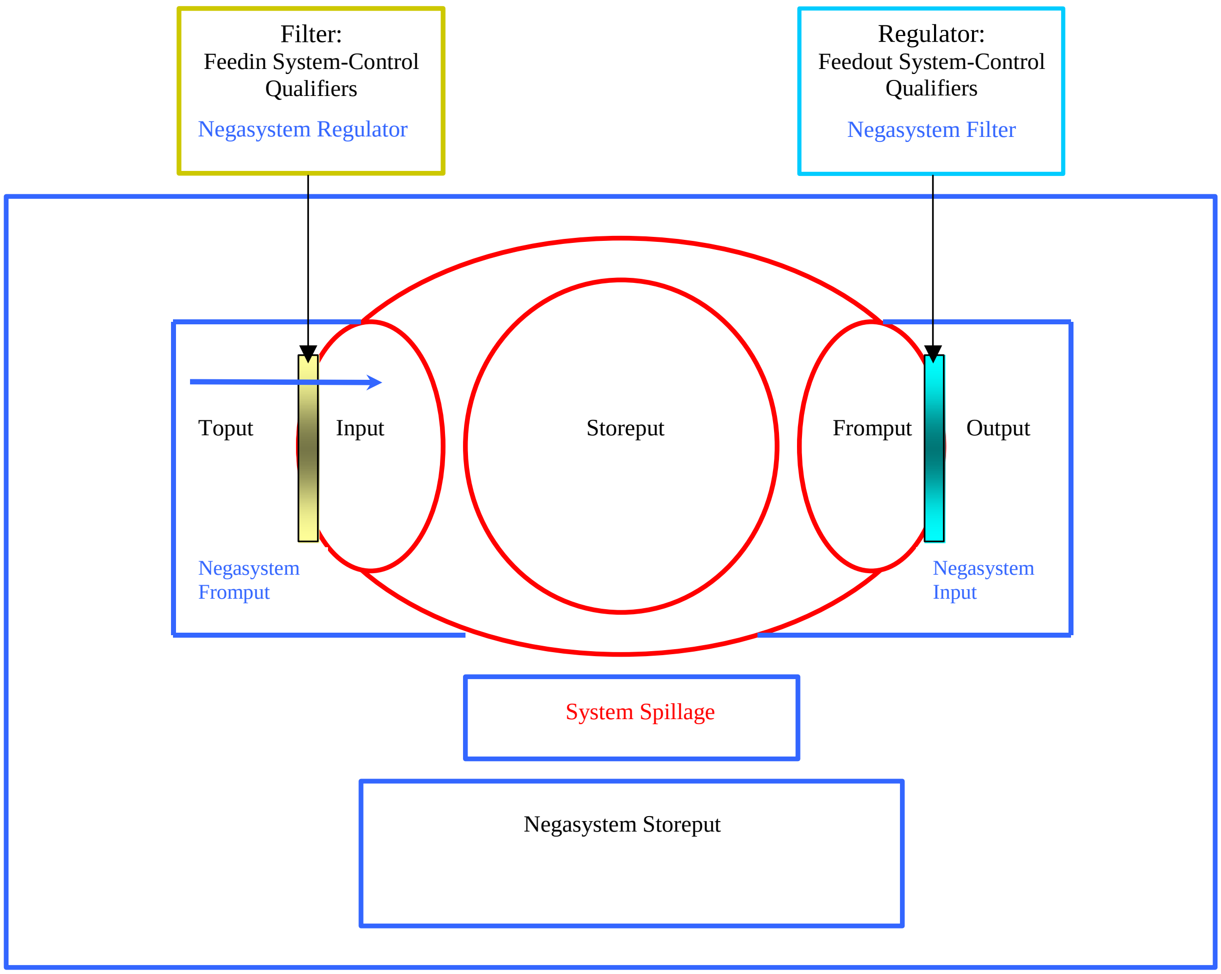
For example: $\text{∱}_E(\mathbb{S}_{\varkappa}) =_{df} \sigma(\mathbb{S}_{\varkappa}) \mid (\sigma\colon O_{\mathcal{P}} \times {}_{O_{\mathcal{P}}}\mathscr{L}\mathscr{C} \to T_{\mathcal{P}})$; that is, $\sigma(\varkappa_{O_{\mathcal{P}}}) = \varkappa_{T_{\mathcal{P}}}$

Feedin, $\mathfrak{fi}(\mathbb{S})$, $=_{df}$ transmission of *toput* to *input*.

$$\mathfrak{fi}(\mathbb{S}_x) =_{df} \sigma(\mathbb{S}_x) \mid (\sigma: T_{\mathcal{P}} \times {}_{T\mathcal{P}}\mathscr{Q}_C \to I_{\mathcal{P}}); \text{ that is, } \sigma(x_{T\mathcal{P}}) = x_{I\mathcal{P}}$$

Feedin is a *system state-transition function*; such that, the state transition is defined from the product of *toput* and the *toput-control qualifiers* to *input*.

Feedin

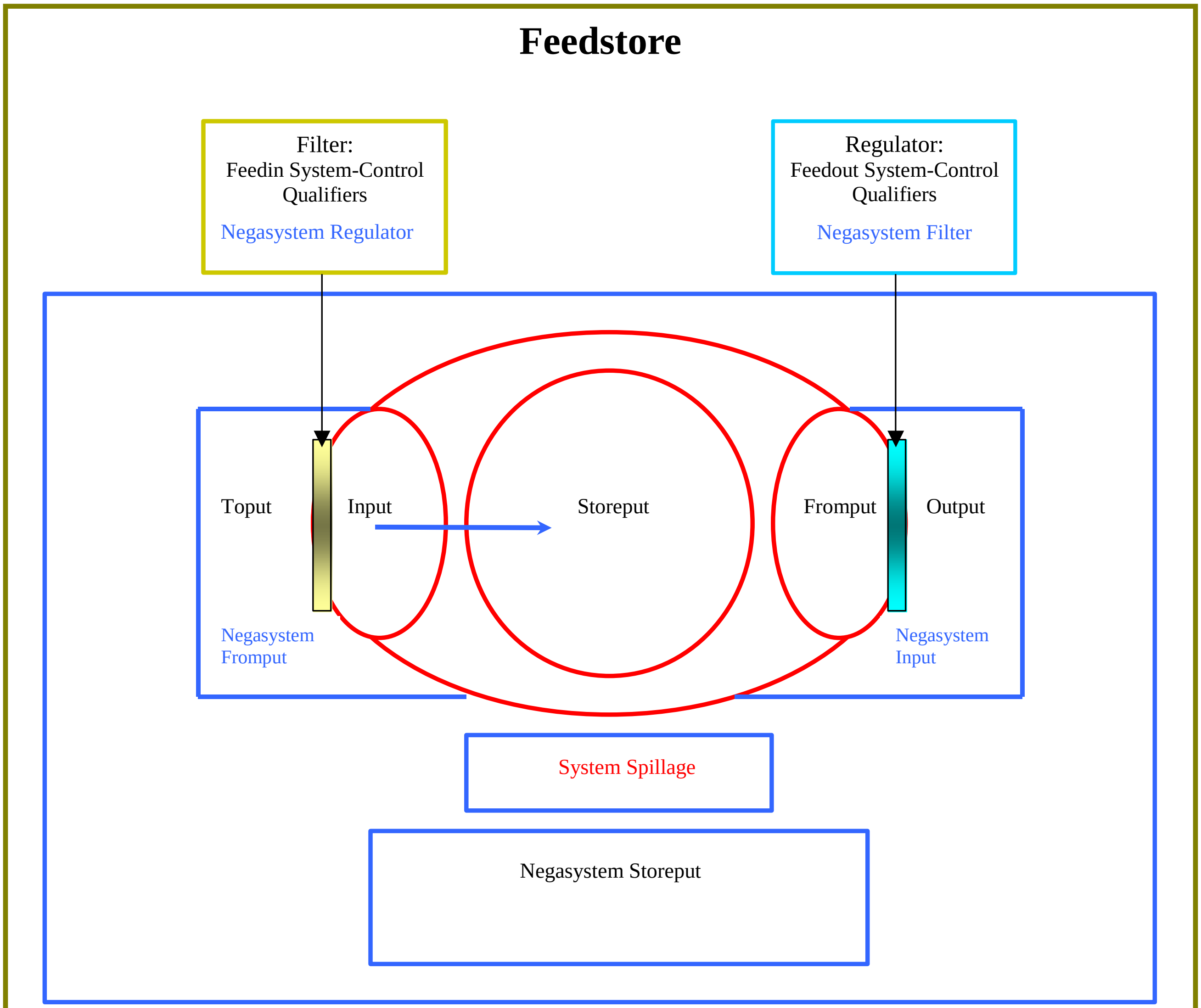


Feedin is shown as it is initiated in *toput* and transmitted to *input*. As seen here, the *filter* may influence *feedin* (see *filtration*).

Feedstore, $\mathfrak{f}S(\mathbb{S}_{x})$**,** $=_{df}$ transmission of in*put* to *storeput*.

$$\mathfrak{f}S(\mathbb{S}_{x}) =_{df} \sigma(\mathbb{S}_{x}) \mid (\sigma : I_{\mathcal{P}} \times {}_{I\mathcal{P}}\mathcal{L}_{\mathcal{C}} \rightarrow S_{\mathcal{P}}); \text{ that is, } \sigma(x_{I\mathcal{P}}) = x_{S\mathcal{P}}$$

Feedstore is a *system state-transition function*; such that, the state transition is defined from the product of *Input* and the *input-control qualifiers* to *storeput*.

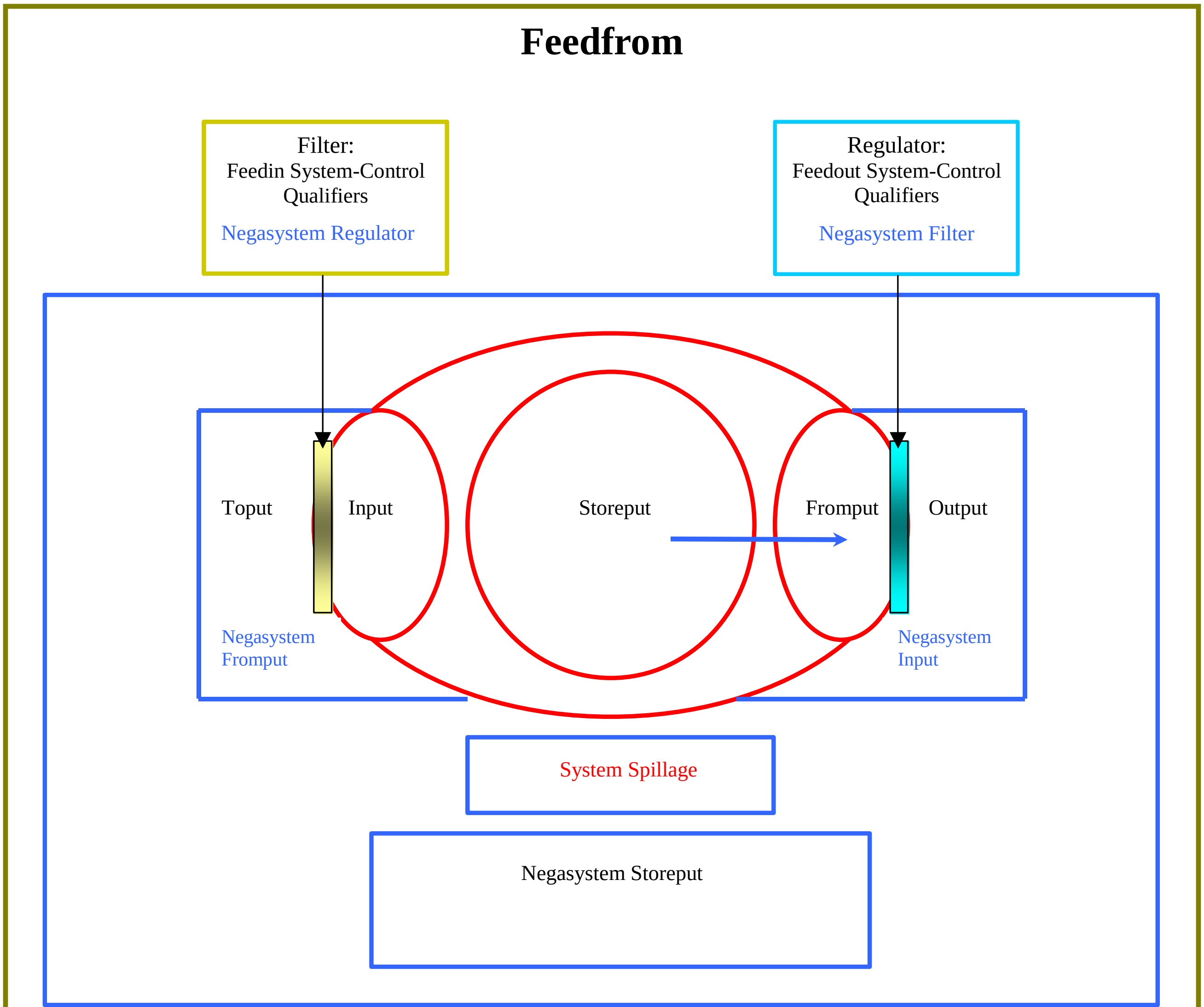


Feedstore is shown as it is initiated in *input* and then transmitted to *storeput*.

Feedfrom, $\mathfrak{f}_F(\mathbb{S}_x)$**,** $=_{df}$ transmission of *storeput* to *fromput*.

$$\mathfrak{f}_F(\mathbb{S}_x) =_{df} \sigma(\mathbb{S}_x) \mid (\sigma : S_{\mathcal{P}} \times {}_{S\mathcal{P}}\mathcal{L}_C \to F_{\mathcal{P}}); \text{ that is, } \sigma(x_{S\mathcal{P}}) = x_{F\mathcal{P}}$$

Feedfrom is a *system state-transition function*; such that, the state transition is defined from the product of *storeput* and the *storeput-control qualifiers* to *fromput*.



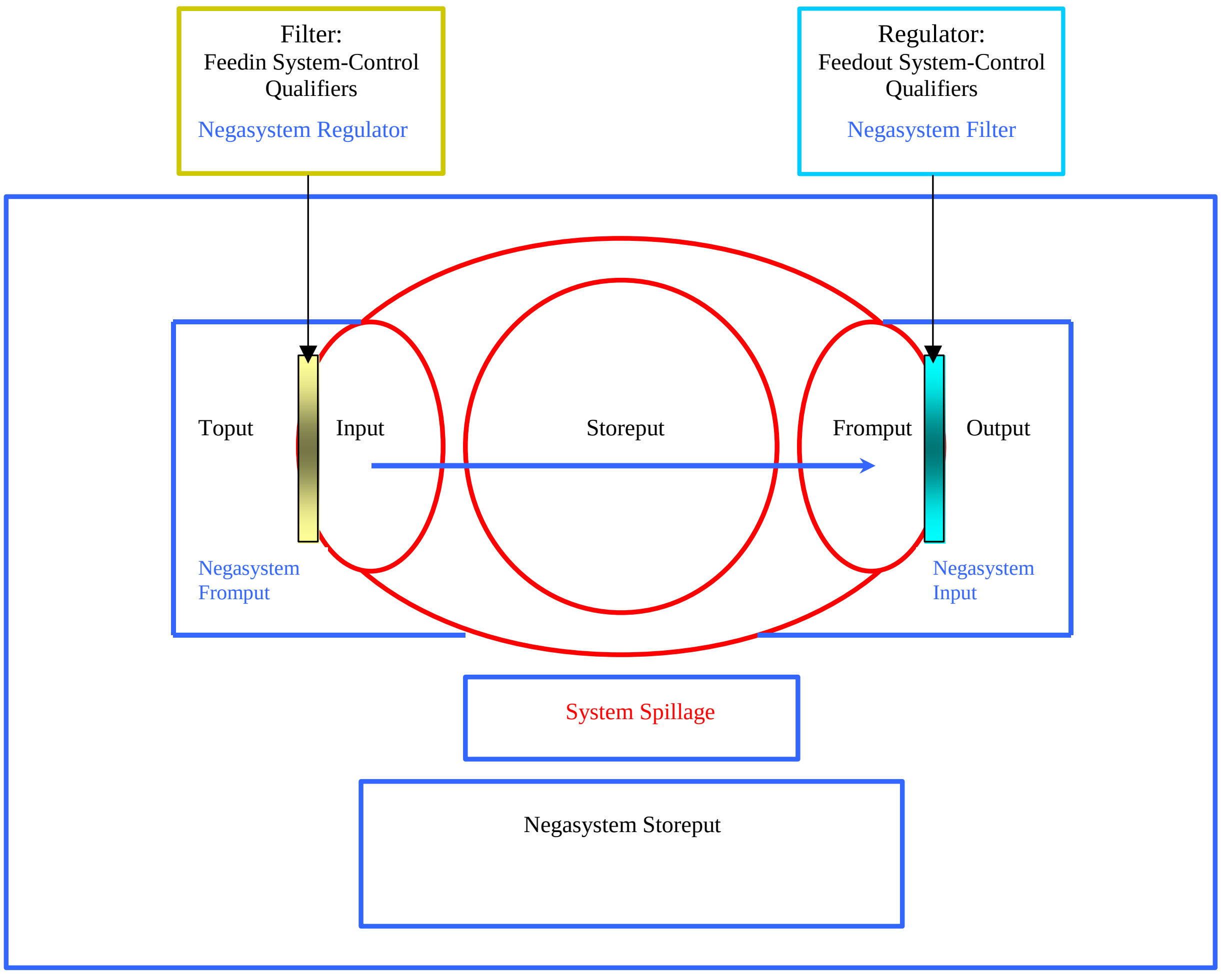
Feedfrom is shown as it is initiated in *storeput* and then transmitted to *fromput*. This is the transmission that moves the *derived production* of the system to *fromput* where it is made ready to be received by the *negasystem* in the *output*; that is, the *negasystem input* (see *derived production output*).

Feedintra, $\text{ʄ}_{N}(\mathbb{S}_{\mathfrak{x}})$**,** $=_{df}$ Transmission of *input* to *fromput*.

$$\text{ʄ}_{N}(\mathbb{S}_{\mathfrak{x}}) =_{df} \sigma(\mathbb{S}_{\mathfrak{x}}) \mid \sigma(\mathfrak{x}) = (\text{ʄ}_{S} \circ \text{ʄ}_{F})(\mathfrak{x});\ \text{that is, } \sigma(\mathfrak{x}_{I\mathcal{P}}) = \mathfrak{x}_{F\mathcal{P}}$$

Feedintra is a *system state-transition function*; such that, it is a composition of *feedfrom* and *feedstore*.

Feedintra



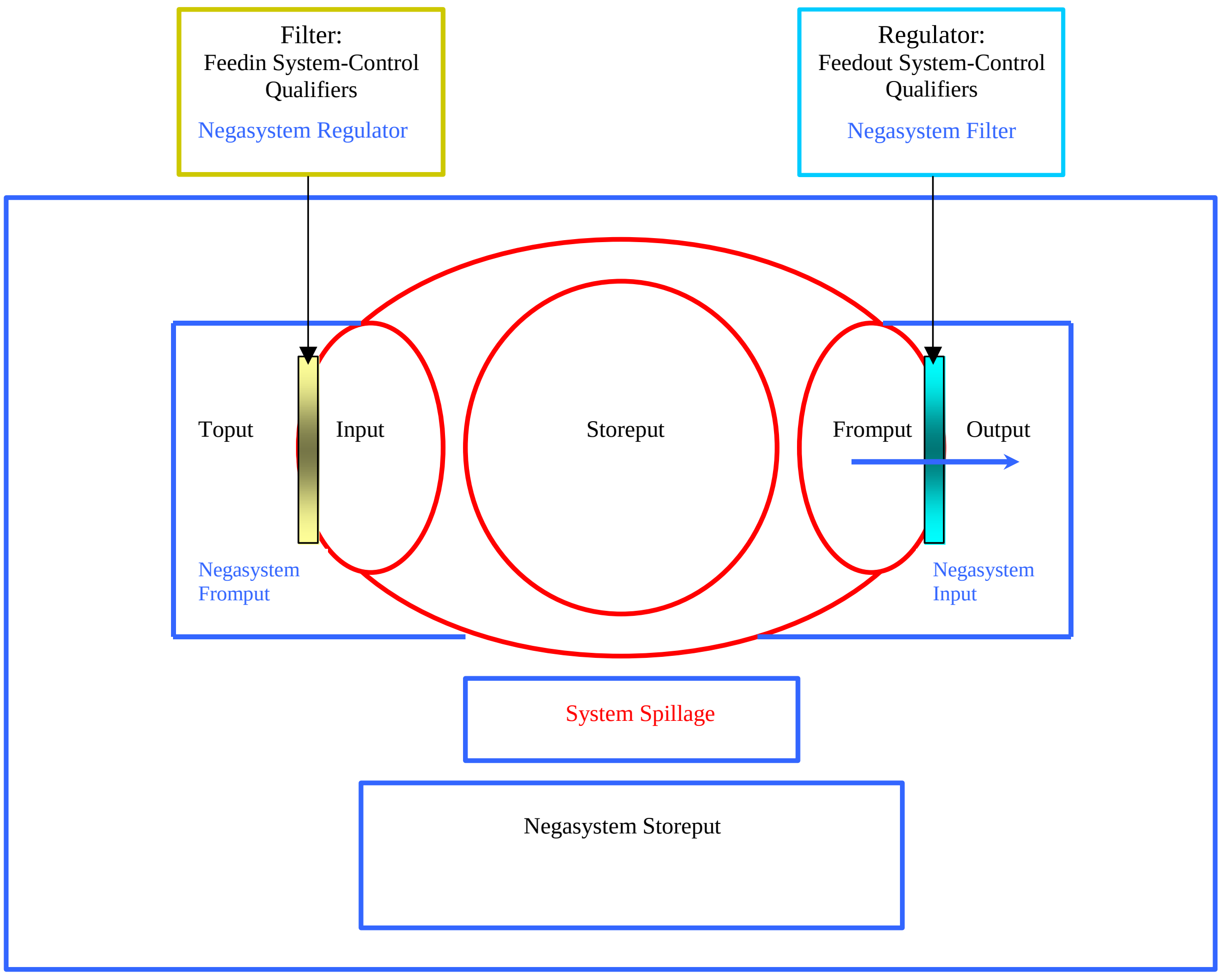
Feedin is shown as it is initiated in *toput* and transmitted to *input*. As seen here, *storeput* may influence the transmission to *fromput* by processes that produce *derived-production* (see *derived-production output*).

Feedout, $f_O(\mathbb{S}_\varkappa)$**,** $=_{df}$ Transmission of system *fromput* to negasystem *output*.

$$f_O(\mathbb{S}_\varkappa) =_{df} \sigma(\mathbb{S}_\varkappa) \mid (\sigma : F_{\mathcal{P}} \times {}_{F\mathcal{P}}\mathcal{L}_{C} \to O_{\mathcal{P}})\text{; that is, } \sigma(\varkappa_{F\mathcal{P}}) = \varkappa_{O\mathcal{P}}$$

Feedout is a *system state-transition function*; such that, the state transition is defined from the product of *fromput* and the *fromput-control qualifiers* to *output*.

Feedout



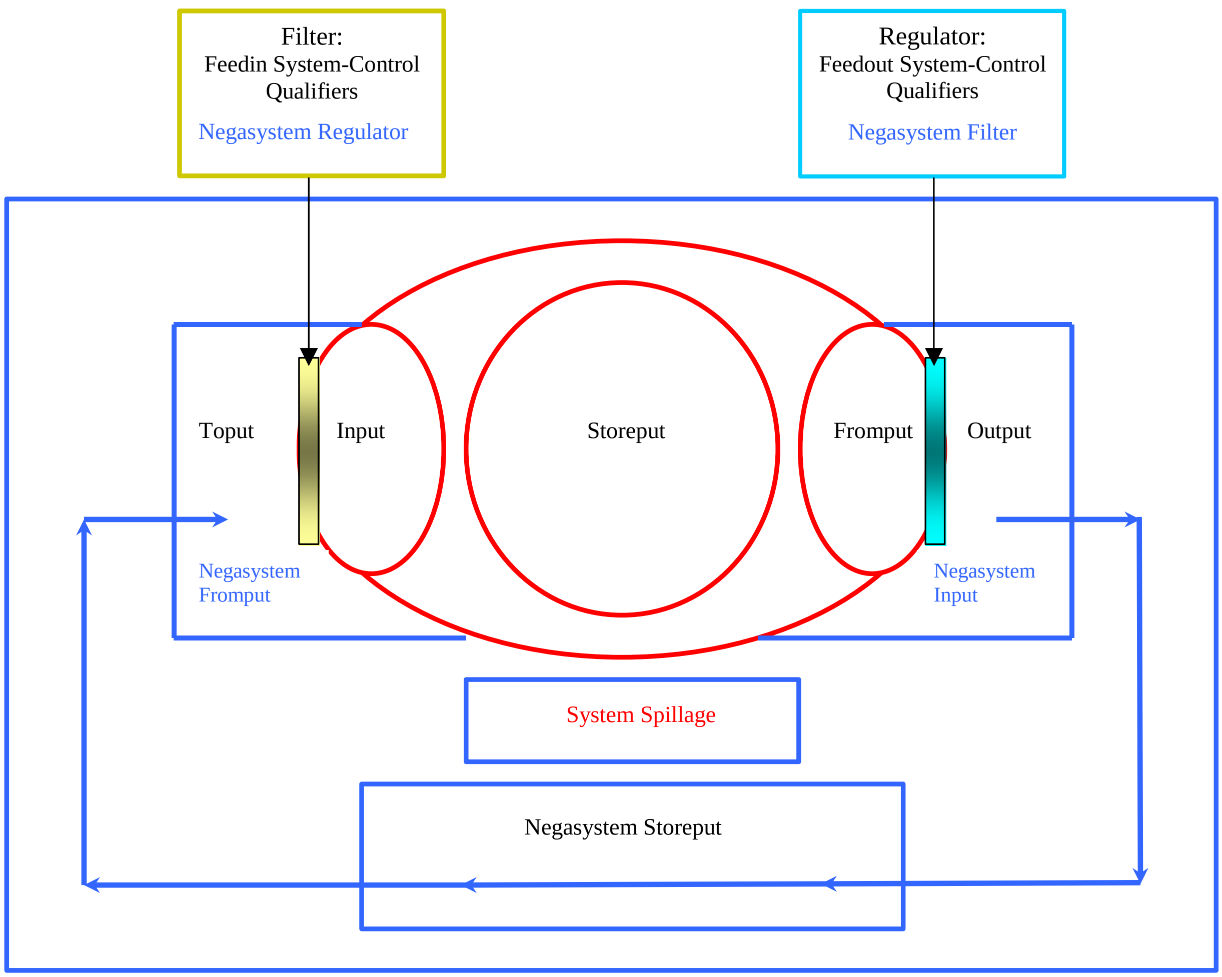
Feedout is shown as it is initiated in *fromput* and transmitted to *output*. As seen here, the *regulator* may influence *feedout* (see *regulation*).

Feedenviron, $\mathfrak{f}_{E}(\mathbb{S}_{\varkappa})$, $=_{df}$ transmission of *output* (*negasystem input*) to *toput* (*negasystem fromput*).

$$\mathfrak{f}_{E}(\mathbb{S}_{\varkappa}) =_{df} \sigma(\mathbb{S}_{\varkappa}) \mid (\sigma : O_{\mathcal{P}} \times {}_{O\mathcal{P}}\mathcal{L}_{C} \rightarrow T_{\mathcal{P}}); \text{ that is, } \sigma(\varkappa_{O\mathcal{P}}) = \varkappa_{T\mathcal{P}}$$

Feedenviron is a *system state-transition function*; such that, the state transition is defined from the product of *output* and the *output-control qualifiers* to *toput*.

Feedenviron



Feedenviron is shown as it is initiated in *output*, transmitted through the *negasystem* (*system environment*), and to *toput*. As seen here, *feedenviron* may be influenced by its transmission through the *negasystem* as a result of *negasystem derived production output* as it passes through the *negasystem storeput*.

Feedback, $\mathfrak{f}_B(\mathbb{S}_x)$**,** $=_{df}$ transmission of *fromput* through a negasystem to *input*.

$$\mathfrak{f}_B(\mathbb{S}_x) =_{df} \sigma(\mathbb{S}_x) \mid \sigma(x) = (\mathfrak{f}_I \circ \mathfrak{f}_E \circ \mathfrak{f}_O)(x)$$

Feedback is the result of a system state-transition function; such that it is a composition of feedout, feedenviron and feedin.

Positive and **negative feedback** definitions are as follows:

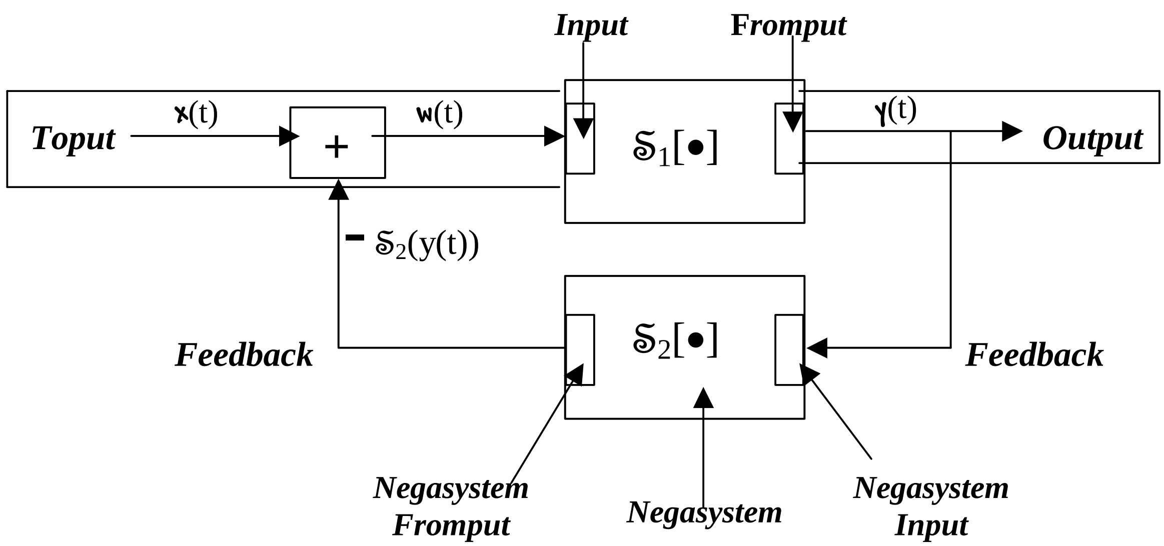
$$\mathfrak{f}^{+}_{B} =_{df} \mathcal{A}(\mathfrak{f}_O)_{t(1)} \prec \mathcal{A}(\mathfrak{f}_I)_{t(2)} \qquad \overline{\mathfrak{f}}_{B} =_{df} \mathcal{A}(\mathfrak{f}_O)_{t(1)} \succ \mathcal{A}(\mathfrak{f}_I)_{t(2)}$$

APT&C (Analysis of Patterns in Time and Configuration), $\mathcal{A}$, analyses measure *positive* and *negative feedback*. APT&C analyses determine measures of *system state*, and a comparison of these measures before and after feedback determines positive or negative feedback.

Feedback was initially conceived as a process by which information is produced by a system that is then reintroduced into the system in a manner that helps the system self-regulate. *Feedback* in the physical sciences has been used to control various types of systems—temperature, fuel flow, electrical surges, float valves for water/liquid levels, and biological regulators. These types of feedback are quite basic; that is, they are measures provided to a system that induces the system to adjust its relation-set so as to re-establish its *set point*; that is, the initial desired system parameters.

If *feedback* produces no change, then it is a *Feedback Identity System*. If there were substantial modification of the *fromput* so that the *feedback* is not recognizable, then we would have a *Feedback Zero-Neutralized System*. Any modification of the initial *feedout* is the result of the negasystem's *derived production output*. For most, if not all, social systems, any initial *feedout* will be modified in some way, resulting in a *derived production input* that is distinctly different from the *fromput*. To understand this process, consider the *feedback diagram* shown below.

Feedback Diagram



Feedback is transmitted from *fromput* through *output* where it may be modified by the *negasystem* (system environment), $\mathbb{S}_2$, before being transmitted to *toput*, where it may modify other *toput* components, and then be transmitted into the system as *input*. The system, $\mathbb{S}_1$, responds to the feedback-modified-input by adjusting its system state parameters accordingly to maintain the initial *set point*.

Consider, for example, an *Identity Feedback System* characterized by an airplane autopilot. The *set point* is 270 knots, 10,000-foot altitude, and a heading of 175°. The airplane instrumentation provides the actual airspeed, altitude and heading as output.

In the above diagram, for autopilot control we have the following: $\mathbf{x}(t) = (270, 10{,}000, 175°)$,
$\mathbf{y}(t) = \mathbb{S}_1(\mathbf{w}(t)) = (270, 10{,}000, 175°)$ — the airplane instrumentation readings,
$\mathbf{w}(t) = \mathbf{x}(t) - \mathbb{S}_2(y(t)) = (270, 10{,}000, 175°) - (270, 10{,}000, 175°) = (0, 0, 0)$; therefore,
$\mathbf{x}(t) - \mathbf{w}(t) = (270, 10{,}000, 175°)$. For an *Identity Feedback System*, where *output* equals *input*, no system adjustment is required.

However, if there is a change in *output* for any of these parameters, then we might have:
$\mathbf{y}(t) = \mathbb{S}_1(\mathbf{w}(t)) = (268, 9{,}500, 177°)$,
$\mathbf{w}(t) = \mathbf{x}(t) - \mathbb{S}_2(\mathbf{y}(t)) = (270, 10{,}000, 175°) - (268, 9{,}500, 177°) = (2, 500, -2)$;
therefore, $\mathbf{x}(t) - \mathbf{w}(t) = (268, 9{,}500, 177°)$. In this case, $\mathbb{S}_1(\mathbf{w}(t))$ must compensate for the 2 knots to bring it back up to 270 knots, the 500 feet to bring it back to 10,000 feet, and the -2°

to bring it back to 175° which is the *set point*; that is, the controlling parameters.

In physical applications similar to that shown above, the *feedback* is the *output* determined by the system instrumentation and there are no additional modifications except that which may be required due to problems relating to the transmission of the data.

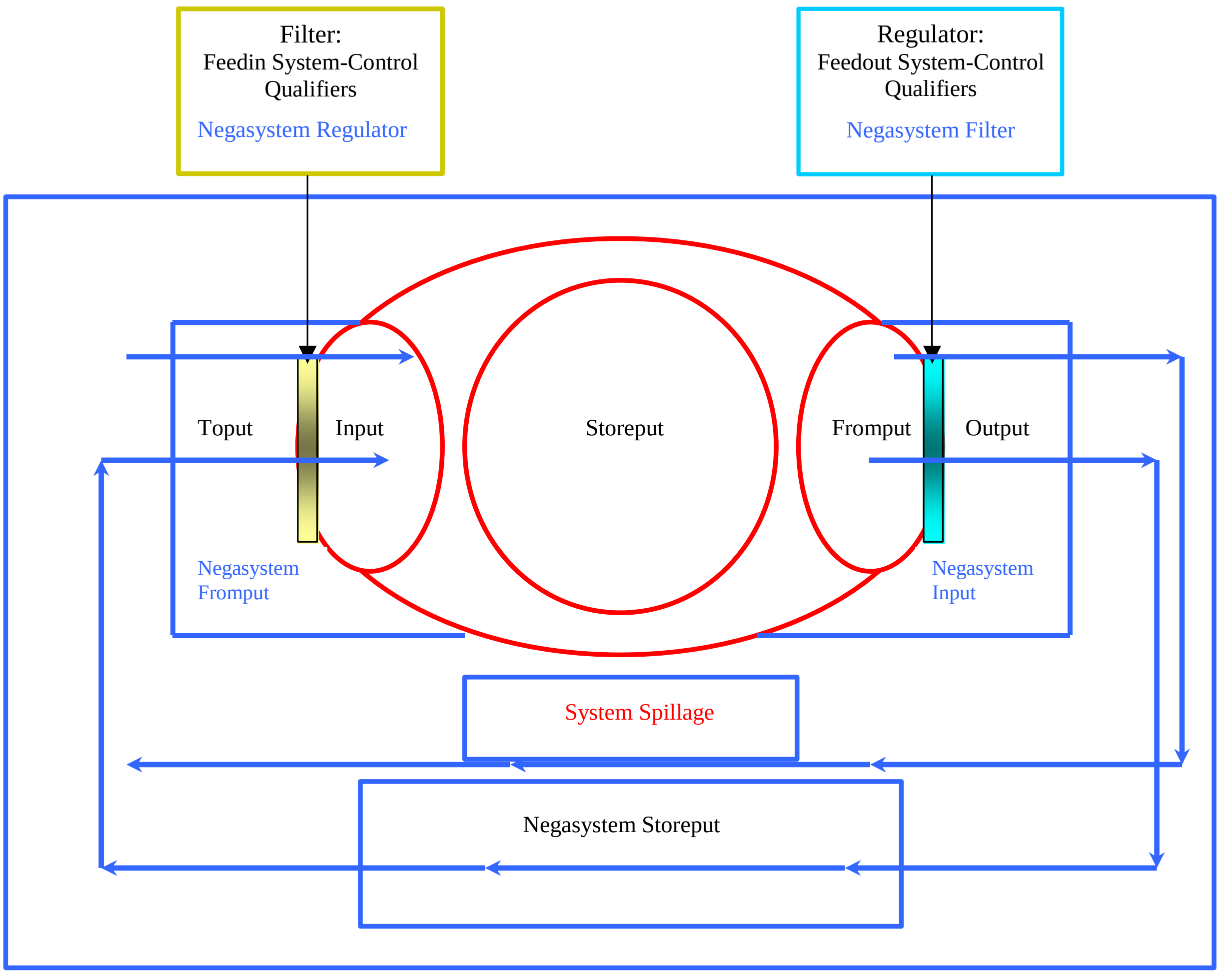
This is not the case when considering the intentional systems of the social sciences. For these intentional systems there may be substantial modification of the *output* before it is transmitted to the *toput* of the system. For example, the problems encountered by the founder of Cybernetics, the science of *feedback*, Norbert Weiner, is a classic example of disinformation that caused his own personal implosion that terminated what should have been a much more recognized scientific development. His own wife undermined his professional relations with his colleagues by providing him with the disinformation that his daughter had slept with those colleagues. He believed her and cut off all communications with them, thus destroying the very collaborations that had been promoting his scientific discoveries. In this case, the *output* from the system, which was benign, was grossly distorted and reintroduced into the "Norbert Weiner System" as *toput* that was internalized as *input*. With this internalization, the "Norbert Weiner System" responded to that disinformation as though it were true and acted on it, producing an *output* that destroyed the collaborative system that he had with his colleagues. In this case, the purported *feedback* could not actually be traced to the *output*, since the compatibility of the *output* and *toput* would essentially be zero. This is an example of a *Feedback Zero-Neutralized System*. If this type of feedback had been provided to the autopilot in the previous example, the airplane would have "adjusted" by climbing rapidly to 20,000-feet, while turning almost 180° in the opposite direction while attempting to obtain 536 knots, possibly outside the range of the engine. Under these conditions, the airplane as a system would be destroyed—as was the "Norbert Weiner System."

From the applications in the physical sciences considered above, it is seen that we have essentially ignored the impact of the *negasystem* (environment) on the system *output*. The reason is that the *negasystem* has had minimal impact on the *toput* that resulted from the *feedback*. This is not the case with *Intentional Systems*. In these cases the *negasystem* must be treated as a system with all of the possible affect relations that may be established. This is especially the case when considering the *negasystem* property for *derived production output*. *Derived-production output* is defined as follows:

Derived-production output, ${}_{\mathrm{DP}}\ell_{\mathrm{T}}$, $=_{\mathrm{df}}$ Feedthrough with a high dissimilarity of toput and output in which output is significantly more complex.

The greater complexity of *intentional system feedback* is shown in the diagram below.

Feedback



Feedback is shown as it is initiated in *fromput*, transmitted to *output*, then through the *negasystem* (*system environment*), to the system *toput*, and finally transmitted to *input*. As seen here, *feedback* may be influenced by its transmission through the *negasystem*. While many representations of *feedback* show only the loop exiting the system, curving around in the environment, and then re-entering the system, for ***ATIS***-type systems; that is, those concerned with *intentional systems* and especially social systems, the *environment* will practically always have a substantial influence on the *feedback*. For that reason, the partitions of the *negasystem* are shown as the *feedback* is transmitted through each partition. From this transmission, it is seen that the *regulator* may influence *feedback*, as also will the *negasystem derived production output* as it passes through the *negasystem storeput*, and then by the *filter* as it re-enters the system (see *regulation* and *filtration*).

In the case of *feedback* with respect to the system, $\mathfrak{S}_1$, the *output* is the *input* for the negasystem, $\mathfrak{S}_2$. For *Intentional Systems*, this *input* can undergo significant changes as a result of $\mathfrak{S}_2$ action. $\mathfrak{S}_2$ action can produce *derived-production output* that is significantly different from the *input*. When it does so, that is the *feedback* that is transmitted to $\mathfrak{S}_1$ for *input*; that is, $\mathfrak{S}_2$ produces *derived-production input* for $\mathfrak{S}_1$.

For example, the empirical evidence confirms that human activity is insignificant in terms of any contribution to the phenomena of *global warming*. However, the *Intentional System* represented by the Atmospheric Scientists has a goal of raising money for atmospheric research. Hence, the *feedback* to the *General Public System* is that there is a problem with human activity relating to global warming that needs to be funded so the Atmospheric Scientists can continue to obtain research income. In this case, the *negasystem* has created *derived production output* that is substantially different and more complex than the research results that were used to produce the *output*. (It should be noted that any manipulation, revision, construction, etc. of *input* will result in an *output* that is more complex by the very nature of such activity.)

Another example is the initiation of the Viet-Nam War. The *Gulf of Tonkin Incident* never occurred, and yet it was used as the basis to initiate the war. Again, there was *derived-production output* created to achieve a goal of an *Intentional System*, the American Government, which was significantly different from the *output* of the *Viet-Nam System* from which the input to the *American General Public System* was derived.

For school systems, one must always be alert for *derived-production output* being submitted as *toput* for a system. Frequently, these come in the form of promoting various “agendas.” Such agendas may relate to efforts to preclude the closing of a school, the hiring of new teachers who may embellish their résumés, the claims made by new instructional programs or the promotion of text books, the financial needs of a school system demanding increased taxes, etc. Students may graduate who wish to support or harm the efforts of the school system. Such efforts are compromised by whatever *derived production output* these students wish to present to support the goals of their own *Intentional Systems*. Are they trying to redefine science so that mathematics is no longer a filter for students to take physics? Are they trying to redefine science so that intelligent design can “compete” with evolution? Whatever the goal is of an *Intentional System*, one must be careful to critically analyze the *derived-production output* of such systems.

To a great extent, and more so than in the physical sciences, the *derived-production output* of the *negasystem* of *Intentional Systems* is responsible for the *positive* and *negative feedback* obtained by the *Intentional System*.

Feedthrough, $\mathfrak{f}_{T}(\mathbb{S}_{\mathfrak{x}})$**,** $=_{df}$ transmission of negasystem *toput* through a system to negasystem *output*.

$$\mathfrak{f}_{T}(\mathbb{S}_{\mathfrak{x}}) =_{df} \sigma(\mathbb{S}_{\mathfrak{x}}) \mid \sigma(\mathfrak{x}) = (\mathfrak{f}_{O} \circ \mathfrak{f}_{N} \circ \mathfrak{f}_{I})(\mathfrak{x});\ \text{that is, } \sigma(\mathfrak{x}_{T\mathcal{P}}) = \mathfrak{x}_{O\mathcal{P}}$$

Feedthrough is defined as a *system state-transition function*; such that it is a composition of *feedin*, *feedintra* and *feedout*.

Positive and **negative feedthrough** definitions are as follows:

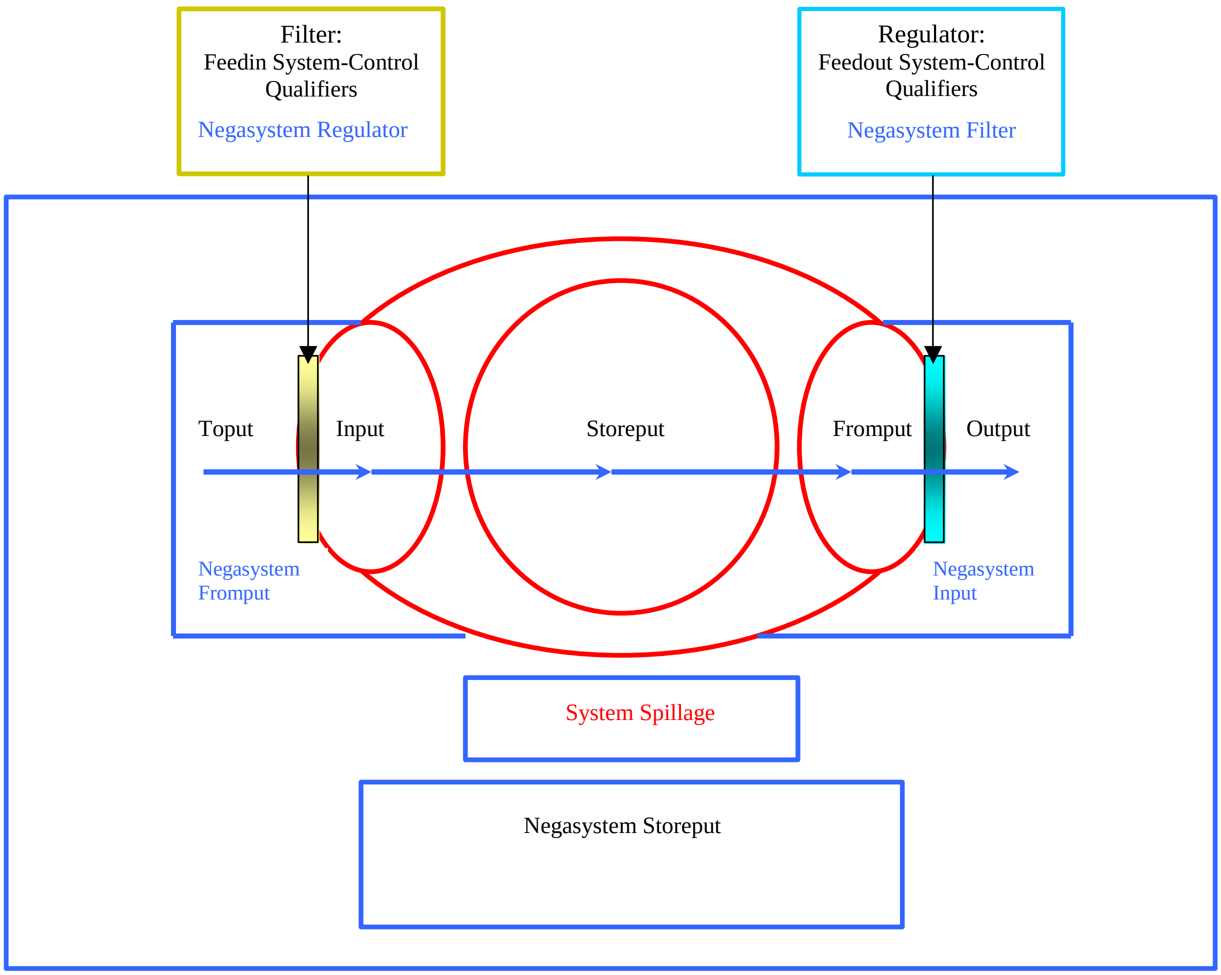
$$\mathfrak{f}^{+}_{T} =_{df} \mathcal{A}(\mathfrak{f}_{I})_{t(1)} \prec \mathcal{A}(\mathfrak{f}_{O})_{t(2)} \qquad \mathfrak{f}^{-}_{T} =_{df} \mathcal{A}(\mathfrak{f}_{I})_{t(1)} \succ \mathcal{A}(\mathfrak{f}_{O})_{t(2)}$$

APT&C (Analysis of Patterns in Time and Configuration), $\mathcal{A}$, analyses measure *positive* and *negative feedthrough*. These analyses determine measures of *system state* and a comparison of these measures before and after feedthrough determines positive or negative feedthrough.

Feedthrough is *feedback* with respect to the *negasystem*. As such, the report provided for *feedback* also applies for *feedthrough*. For *feedthrough*, however, there are products on the market that are called 'feedthroughs'. One such *feedthrough* is shown below. As the name indicates, the object is to "feedthrough" something from one side to the other, through the connecting "system." As with *feedback*, if there is no change as a result of the *feedthrough*, then it is a *Feedthrough Identity System*. If, there were substantial modification of the *input* so that the *feedthrough* is not recognizable, then we have a *Feedthrough Zero-Neutralized System*. Any modification of the initial *feedin* is the result of the system's *derived production output*. For most, if not all, social systems, any initial *feedthrough* will be modified in some way, resulting in a *derived production output* that is distinctly different from the *toput*. As a result, *feedthrough* will be modified so that there is a reduced commonality of *toput* and *output*.

The FC-VFT vacuum feedthroughs are designed for use of fiber optics in vacuum chambers, such as for plasma monitoring. The vacuum feedthrough consists of an M12 housing with Viton® O-ring and 2 SMA fiber optic interconnects to allow easily coupling to fiber optic cables and probes. The vacuum feedthrough can be delivered for all fiber diameters, such as 50 μm up to 1000 μm for UV/VIS as well as for VIS/NIR. (This is a product of Avantes, Inc., Boulder, Colorado.)

Feedthrough



Feedthrough is shown as it is initiated in *toput*, transmitted to *input*, then to *storeput*, then to *fromput*, and then transmitted to *output*. As seen here, both the *filter* and *regulator* may influence *feedthrough*, as well as the *production process* of *storeput* (see *filtration*, *regulation*, and *derived production output*).