Invariant Temporal Ordering Framework (ITOF) V22/F2: A Fundamental Assignment Law of Systemic Change-Realization under Invariant Ordered Succession

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Abstract

This manuscript presents Version 22/F2 of the Invariant Temporal Ordering Framework (ITOF) as a law of systemic change-realization under invariant ordered succession. In ITOF, T_{ITOF} denotes prior–subsequent ordering among distinguishable realized stages. It expresses the invariant ordering and distinguishability of realized change-stages, but it is not a physical influencing factor. It does not possess the constitutive properties, intensity, range, mode of action, pathway, exchange relation, or threshold relation by which physical factors influence change. It is not matter, energy, force, field, medium, signal, record, measuring device, model parameter, physical system, or causal agency. Time does not produce, transmit, accelerate, delay, arrange, or otherwise cause physical change.

V22/F2 advances beyond the V21/F1 reassignment layer by adding the change-realization layer. Whereas V21/F1 reassigned phenomena commonly attributed to time to their relevant physical, biological, cognitive, observational, measurement, or modeling determinants, V22/F2 specifies where change itself is realized. A selected physical system A changes through its own response operator Resp_A under determinant engagement $\mathrm{Eng}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A})$, where Fact_A denotes relevant physical factors and $\mathrm{InfSys}_{\to A}$ denotes influencing physical systems. The response operator assigns a realized response state ρ_A^{resp}, and realized change ΔX_A is the change-content of that response state. It is therefore assigned to the affected system's constitution, internal organization, kind-specific physical organization, cohesion, response capacity, resistance thresholds, and bounded determinant conditions, not to time.

The manuscript also closes a major ambiguity in change-language: the surrounding environment is not treated as an independent cause. It is only a descriptive aggregation of physical factors, influencing systems, pathways, boundaries, and relational conditions. Environmental language is valid only when decomposed into the actual determinants and response structures through which change is realized. This prevents replacing time with another undefined general cause.

On this basis, V22/F2 develops a unified assignment discipline for stability, failure, resistance, adaptation, recurrence, motion, clocks, records, memory, astronomical observation, spacetime coordinate-language, and dimensional model-language. Stability is treated as maintained change, resistance as response, recurrence as later similarity rather than reversal, motion as a subclass of change, clocks as physical measuring systems, and light-borne observation as record propagation rather than transmission of time. For living systems, mind-capacity and motor capacity, where present, are treated as kind-specific physical properties of the living system. For physical systems more generally, rotational, orbital, translational, or other kinematic profiles may also belong to the system's physical state or organization. Actual motion remains realized change of the moving system; when the moving system A is relevant to a selected affected system B, the motion of A contributes only as a response-relevant influence contribution, $\mathrm{MotInf}_{A\to B}$, within B's determinant situation, not as a transfer of A's realized change into B. Coordinates, parameters, manifolds, and dimensional representations may remain indispensable for modeling and calculation, but they do not convert time into a physical determinant. The result is a controlled ontology in which physical change is realized through system response under determinant engagement, while invariant ordered succession remains the non-causal ordering condition under which realized stages are distinguishable as prior and subsequent.

Keywords: invariant ordered succession; systemic change-realization; physical factors; influencing physical systems; determinant engagement; system response; surrounding environment; clocks; astronomical records; stability; failure; non-observation; spacetime coordinate-language; dimensional modeling; ITOF.

Contents

1. Introduction and Purpose

The Invariant Temporal Ordering Framework, abbreviated ITOF, is a physical-ontological framework for assigning change without treating time as a physical agent. Its central purpose is to separate the ordered expression of change from the physical realization of change. Physical systems pass through distinguishable realized stages. Those stages are necessarily ordered as prior and subsequent. However, the ordering relation is not the physical source of the transition. The source of the transition must be sought in determinant physical factors, influencing physical systems, pathways of engagement, thresholds, capacities, resistance, cohesion, and the affected system's own response.

The framework begins from a simple but strict distinction. Change is something realized in a physical system. Ordered succession is the relation under which realized stages become distinguishable as earlier and later. A physical theory may measure, model, or coordinate stages by clocks and mathematical parameters, but operational success in measurement does not convert time into a physical influencing factor. Time does not possess the constitutive properties, intensity, range, mode of action, pathway, exchange relation, or threshold relation required of physical factors. It is not matter, energy, substance, force, field, medium, or causal source. ITOF therefore rejects a transfer from symbolic time-measurement to temporal agency.

The basic ordered structure is written as

$$T_{\mathrm{ITOF}} = (S_{\mathrm{phys}}, \prec), \tag{1}$$

where S_{phys} is the domain of physically realized stages and $\prec$ is the invariant prior–subsequent ordering relation. Equation (1) is not a causal equation. It does not say that T_{ITOF} produces physical change. It says that realized stages are ordered.

The central law of V22/F2 is written in explicit state-output form as

$$\boxed{\begin{gathered} \rho_A^{\mathrm{resp}} = \mathrm{Resp}_A\Big(\mathrm{Eng}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A}); \Theta_A, \Gamma_A^{\mathrm{coh}}, R_A^{\mathrm{cap}}, Q_A, \mathcal{K}_A\Big)\,, \\ \Delta X_A = \mathrm{ChangeContent}_A(\rho_A^{\mathrm{resp}})\,, \\ T_{\mathrm{ITOF}} \notin \mathrm{Fact}_A \quad \wedge \quad T_{\mathrm{ITOF}} \notin \mathrm{InfSys}_{\to A} \quad \wedge \quad T_{\mathrm{ITOF}} \notin \mathrm{PhysDet}_A\,. \end{gathered}} \tag{2}$$

In this manuscript, the term law denotes a universal assignment law rather than a domain-specific numerical replacement for mechanics, thermodynamics, biology, astronomy, or relativity. It fixes where realized change must be ontologically assigned: not to time as an agency, not to clocks or model coordinates, and not to an undecomposed environment, but to the response of the selected physical system under determinant engagement. Domain sciences remain responsible for their specialized quantitative equations; ITOF supplies the governing assignment discipline under which those equations are interpreted.

Equation (2) gives the explicit introductory statement of the central law. It states that the response operator $\mathrm{Resp}_A(\cdot)$ assigns a realized response state ρ_A^{resp}, and that realized change ΔX_A is the change-content of that response state. Here A is the selected physical system, ΔX_A is the realized change of that system, Fact_A denotes the relevant physical factors, $\mathrm{InfSys}_{\to A}$ denotes influencing physical systems relevant to A, Eng_A denotes determinant engagement,

Resp_A denotes the response operator of the affected system, Θ_A denotes constitution, structural make-up, internal organization, and kind-specific physical organization, Γ_A^{coh} denotes cohesion, R_A^{cap} denotes response capacity or resistance, Q_A denotes thresholds, and $\mathcal{K}_A$ denotes bounded determinant conditions. The right-hand side is not an abstract environment and not time. It is a structured assignment to physical determinants and system response.

ITOF does not ask what time does to a system; it asks which physical determinants engage the selected system, and how the system realizes change under invariant ordered succession.

The purpose of this manuscript is therefore fourfold. First, it fixes the ontological status of time as invariant ordering rather than agency. Second, it defines the determinant architecture by which physical change is assigned. Third, it protects the distinction between direct physical factors, influencing physical systems, surrounding environment, measurement systems, records, models, and observational access. Fourth, it extends the same principle across domains without changing the law: a cell, rock, clock, organism, star, galaxy, signal path, or observer-instrument complex may differ in constitution, internal organization, kind-specific physical organization, response capacity, thresholds, and determinant factors, but the assignment remains the same.

The framework is not a denial of measurement, mathematical modeling, observational practice, or domain science. It is a correction of ontological transfer. A clock may be useful; a signal may carry a record; a model may represent ordered intervals; an observer may reconstruct a remote event; an environment may condition a situation indirectly; and an unobserved change may remain below resolution. Yet none of these operations shows that time itself acted on the system. ITOF therefore preserves the usefulness of measurement and modeling while removing temporal agency from the explanation of physical change.

The same correction applies to surrounding conditions and observational access. A surrounding environment may describe the aggregation of factors, systems, pathways, boundaries, and relational conditions around a selected system, but it cannot replace the determinant assignment itself. Whenever environment is used, it must be decomposed into the physical factors and influencing physical systems through which engagement occurs. Likewise, the absence of observation is not evidence for the absence of change. A change may remain below instrumental, classificatory, or analytical resolution while still belonging to physical realization. These distinctions prevent environment, measurement, and observation from becoming substitute names for the determinants and responses that actually realize change.

1.1 Continuity with V21/F1

V22/F2 continues the Foundation Series structure. V21/F1 formulated the reassignment law for phenomena commonly attributed to time: such phenomena are reassigned to their physical, biological, cognitive, observational, measurement, or modeling determinants rather than to time as cause, organizer, influence, substance, or agency. In compact form, the V21/F1 layer may be written as

$$\mathcal{M}_A(Z)|_{T_{\mathrm{ITOF}}} = \Phi_A^Z(D_A(Z)), \qquad T_{\mathrm{ITOF}} \notin D_A(Z), \tag{3}$$

where Z denotes a time-attributed phenomenon, $\mathcal{M}_A(Z)$ denotes its realized path, outcome, measurement, representation, record, association, or interpretation in system A, and $D_A(Z)$ denotes the determinant subset through which Z is realized, represented, recorded, modeled, remembered, or interpreted.

A technical clarification is also required. Any prior ambiguity concerning whether T_{ITOF} belongs to a production level is resolved in V22/F2 by the explicit exclusion of time from determinant, causal, productive, and organizing roles. The continuity with V21/F1 is therefore preserved as a support-and-notation clarification, not as a conceptual reversal. The V21/F1 reassignment layer remains valid only under the condition that T_{ITOF} is assigned to invariant ordered description and never to physical production.

V22/F2 does not replace or disown this V21/F1 layer. It adds the next formal layer by asking how realized change itself is assigned in a selected affected system. Its answer is systemic change-realization: determinant engagement conditions the situation, but the nature of realized change is assigned to the response of the selected affected system under its constitution, cohesion, resistance, capacity, thresholds, and bounded determinant conditions. Thus V21/F1 controls determinant reassignment, while V22/F2 controls the realization of change itself.

2. Fixed Ontological Core

The foundational commitment of ITOF is that time is not an additional physical constituent of the world and not a physical influencing factor. The term T_{ITOF} denotes the invariant prior–subsequent ordering relation among distinguishable realized stages. It does not denote matter, energy, force, field, medium, signal, clock output, model parameter, physical system, or hidden causal agency. It also does not denote a physical influence that competes with physical factors and influencing physical systems.

Time is not a physical influencing factor: it does not possess the constitutive properties, intensity, range, mode of action, pathway, exchange relation, or threshold relation by which physical factors influence change.

It is therefore not matter, energy, force, field, medium, signal, record, measuring system, physical system, or determinant agency. It denotes invariant prior–subsequent ordering among realized stages, not a physical constituent or influence acting within those stages.

This can be stated as a physical-factor exclusion:

$$T_{\mathrm{ITOF}} \notin \mathrm{Fact}_A \quad \wedge \quad T_{\mathrm{ITOF}} \notin \mathrm{InfSys}_{\to A} \quad \wedge \quad T_{\mathrm{ITOF}} \notin \mathrm{PhysDet}_A \,. \tag{4}$$

Equation (4) is stronger than saying only that time is not a cause. It states that time is not a physical determinant term at all. It lacks the physical constitution, mode, pathway, and threshold relevance required for membership in the determinant architecture of change.

This commitment can be stated negatively as follows:

$$T_{\mathrm{ITOF}} \notin \mathrm{Cause}(\Delta X_A), \tag{5}$$

$$T_{\mathrm{ITOF}} \notin \mathrm{Influence}(\Delta X_A), \tag{6}$$

$$T_{\mathrm{ITOF}} \notin \mathrm{Medium}(\Delta X_A), \tag{7}$$

$$T_{\mathrm{ITOF}} \notin \mathrm{Organizer}(\Delta X_A). \tag{8}$$

Equations (4)–(8) exclude the transfer of physical-factor status, causal power, influence, mediation, or organizing power to time. They do not deny that physical change is ordered. They deny that the ordering relation is itself a physical determinant, physical factor, influencing system, medium, or source of change.

The positive statement is therefore

$$T_{\mathrm{ITOF}} = (S_{\mathrm{phys}}, \prec), \qquad S_A^{(i)}, S_A^{(j)} \in S_{\mathrm{phys}}, \qquad S_A^{(i)} \prec S_A^{(j)}. \tag{9}$$

Equation (9) means that distinguishable realized stages are ordered as prior and subsequent. It does not mean that T_{ITOF} produces the transition from $S_A^{(i)}$ to $S_A^{(j)}$. The transition must be assigned to determinant engagement and system response.

The distinction can be written as

$$S_A^{(i)} \prec S_A^{(j)} \;\not\Rightarrow\; T_{\mathrm{ITOF}} \in \mathrm{Cause}\Big(S_A^{(i)} \to S_A^{(j)}\Big). \tag{10}$$

The relation $\prec$ denotes the invariant prior–subsequent ordering of realized stages. It does not act upon them. A prior stage can condition a subsequent stage through retained physical structure, stored effects, accumulated changes, boundary conditions, or system memory, but such conditioning belongs to the physical system and its determinant structure, not to time as an independent agency.

Accordingly, ITOF separates change-realization from temporal expression:

$$\Delta X_A \neq T_{\mathrm{ITOF}}. \tag{11}$$

A change in a selected physical system A is a realized alteration in that system's state, structure, relation, organization, position, composition, function, stability, or response profile. T_{ITOF} expresses the ordering under which such realized stages are distinguishable as prior and subsequent. It is not identical to the realized change.

This distinction also blocks the common transfer from measurement to ontology. A clock reading, a model parameter, a signal delay, a record, or an observational reconstruction may represent ordered succession or quantify a selected physical process, but none of them establishes time as a physical cause:

$$N_{A_{\mathrm{clock}}},\ \mathcal{M},\ R_\gamma(E_i),\ \mathcal{R}(E_i) \;\not\Rightarrow\; T_{\mathrm{ITOF}} \in \mathrm{Cause}(\Delta X_A). \tag{12}$$

Equation (12) does not reduce the usefulness of clocks, models, signals, or records. It only prevents their operational success from being transferred to time as an ontological agent.

The fixed ontological core of V22/F2 is therefore

$$\begin{aligned}\Delta X_A &\text{ is realized by system response under determinant engagement,}\\ T_{\mathrm{ITOF}} &\text{ denotes the invariant ordering of realized stages without causing them.}\end{aligned} \tag{13}$$

This core governs the rest of the paper. Every later assignment must preserve the same separation: physical factors and influencing physical systems condition change; the affected system realizes change through response; invariant ordered succession expresses prior–subsequent order without becoming a physical cause.

3. Systems, Physical Factors, and Influencing Physical Systems

The law of systemic change-realization requires a clear distinction between the affected system, the physical factors relevant to that system, and the influencing physical systems that may affect it. These terms must not be collapsed into a single general word such as environment, context, or condition. A system realizes change through its own response to determinant engagement. Determinant engagement is formed by relevant physical factors and influencing physical systems, not by time and not by an abstract surrounding background.

A selected physical system is denoted by A. It is a distinguishable physical structure with sufficient material, structural, or functional boundaries to assign states, changes, and responses to it:

$$A \in \mathcal{S}_{\mathrm{phys}}, \qquad A = (\Theta_A, \partial A, \mathcal{I}_A)\,. \tag{14}$$

Here Θ_A denotes the constitution, structural make-up, internal organization, and kind-specific physical organization of A; ∂A denotes the boundary by which the system is selected for analysis; and $\mathcal{I}_A$ denotes the internal relations that allow A to be treated as a system. The term Θ_A is not limited to external shape or mechanical arrangement. It includes the physical organization by which the selected system has its own response space. In living systems, this includes physically realized mind-capacity, perception, evaluation, decision-capacity, and motor capacity, where present. These are not external agencies added to the system; they are physical properties of the living system itself and contribute to its response capacity. Equation (14) does not imply that A is absolutely isolated. It means only that A is distinguishable enough for a state, change, or response to be assigned to it.

The relevant physical factors for A are denoted by

$$\mathrm{Fact}_A = \{F_1, F_2, \dots, F_n\}_A. \tag{15}$$

By this criterion, time is not a physical factor. T_{ITOF} has no material or energetic constitution, no intensity, no range, no mode of physical action, no pathway of exchange, and no threshold relation to A. It therefore cannot be listed among Fact_A, cannot be treated as an influencing physical system in $\mathrm{InfSys}_{\to A}$, and cannot replace the actual physical factors through which determinant engagement is formed.

Influencing physical systems are denoted by

$$\mathrm{InfSys}_{\to A} = \{Y_1, Y_2, \dots, Y_m\}_{\to A}. \tag{16}$$

An influencing physical system Y_j is a physical system whose relation to A is relevant to the determinant situation. Such relevance may arise through contact, coupling, field relation, signal relation, gravitational relation, material exchange, boundary access, mediation, shielding, amplification, or another domain-specific pathway. The same physical system may be selected as an affected system in one analysis and as an influencing physical system in another. A system may influence other systems while itself being affected by physical factors and other influencing systems. The arrow in $\mathrm{InfSys}_{\to A}$ means relevance toward A, not unilateral control over A, and not isolation from the wider determinant network.

The determinant engagement of A is therefore written as

$$\mathrm{Eng}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A}). \tag{17}$$

Equation (17) identifies the relevant engagement between the selected system, physical factors, and influencing physical systems. It does not yet state that change has been realized. Engagement conditions response; response realizes change.

In ordinary physical reality, determinant engagement should not be read as isolated action by one physical factor or one influencing system. Physical factors and influencing physical systems are separated analytically so that the determinant situation can be described, but their effective influence is usually interwoven. A single-factor or single-system attribution is mainly a controlled experimental or analytical approximation, where other conditions are fixed, minimized, screened, or treated as background constraints.

This separation is essential:

$$\mathrm{Eng}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A}) \neq \Delta X_A. \tag{18}$$

The existence of relevant factors or influencing systems is not identical to the realized change of A. A factor may be present without crossing a threshold. An influencing system may be nearby without an effective pathway. A determinant relation may be weak, blocked, delayed, amplified, or transformed. The realized change depends on how A responds under its own constitution, internal organization, kind-specific physical organization, cohesion, response capacity, resistance, and thresholds.

The response state of A is therefore assigned by the response operator, with the operator distinguished from its realized output:

$$\rho_A^{\mathrm{resp}} = \mathrm{Resp}_A\Big(\mathrm{Eng}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A}); \Theta_A, \Gamma_A^{\mathrm{coh}}, R_A^{\mathrm{cap}}, Q_A, \mathcal{K}_A\Big). \tag{19}$$

Here $\mathrm{Resp}_A(\cdot)$ denotes the response operator of the selected system A, while ρ_A^{resp} denotes the realized response state assigned by that operator. This distinction prevents the response operator from being confused with its output. The realized response state is not an additional external cause; it is the system-side result of determinant engagement under the constitution, internal organization, kind-specific physical organization, structural cohesion, response capacity, resistance, thresholds, and bounded determinant conditions of A.

The general assignment relation can now be stated:

$$\begin{aligned} \rho_A^{\mathrm{resp}} &= \mathrm{Resp}_A\Big(\mathrm{Eng}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A}); \Theta_A, \Gamma_A^{\mathrm{coh}}, R_A^{\mathrm{cap}}, Q_A, \mathcal{K}_A\Big)\,, \\ \Delta X_A &= \mathrm{ChangeContent}_A(\rho_A^{\mathrm{resp}})\,. \end{aligned} \tag{20}$$

Equation (20) expresses the basic direction of V22/F2. Determinant engagement is processed through the response operator of the selected system, producing a realized response state from which change-realization is assigned. Physical factors and influencing physical systems condition change, but the affected system's realized response state is the site from which change-realization is assigned.

The relation is not symmetric in meaning. The factors and influencing systems are determinant conditions for A, but the realized change belongs to the response state realized within A:

$$\Delta X_A \not\equiv \mathrm{Fact}_A, \qquad \Delta X_A \not\equiv \mathrm{InfSys}_{\to A}, \qquad \Delta X_A \equiv \mathrm{ChangeContent}_A(\rho_A^{\mathrm{resp}}). \tag{21}$$

This prevents the oversimplified claim that a factor alone is the change. Heat, pressure, radiation, impact, or another physical factor may condition a response, but the change of A is realized as the change-content of A's response state: its altered state, structure, internal organization, kind-specific physical capacities, position, function, stability, or response profile.

The same distinction applies to influencing systems. An influencing system may affect A, but it does not simply transfer its own change into A as completed content:

$$Y_j \in \mathrm{InfSys}_{\to A} \;\not\Rightarrow\; \Delta X_A = \Delta X_{Y_j}\,. \tag{22}$$

The effect on A depends on the relation between Y_j and A, the relevant physical factors involved, the pathways of engagement, and the constitution, internal organization, kind-specific physical organization, and response structure of A. This is why similar influencing systems may produce different outcomes in different affected systems. The surrounding environment may be discussed later as a descriptive surrounding aggregation around a selected system, but it must not replace the direct determinant terms introduced here. The direct terms are

$$A, \qquad \mathrm{Fact}_A, \qquad \mathrm{InfSys}_{\to A}, \qquad \mathrm{Eng}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A}), \qquad \mathrm{Resp}_A\,. \tag{23}$$

These terms are sufficient to state the basic ontology of systemic change-realization. Environment, measurement, record, model, and observation may refine the analysis in specific cases, but none of them replaces the determinant relation between systems, factors, influencing systems, and response.

This framework is not limited to ordinary terrestrial systems. For every selected physical system, at any scale, the same assignment discipline applies:

$$\forall A \in \mathcal{S}_{\mathrm{phys}}, \qquad \Delta X_A \text{ is assigned to the response of } A \text{ under determinant engagement.} \tag{24}$$

Thus a cell, clock, instrument, rock, organism, star, galaxy, signal path, or observer-instrument complex may be selected as A. The relevant factors, influencing systems, system organization, response capacities, and thresholds differ from case to case, but the assignment principle remains the same: change is realized in system response, not in time itself.

4. The Surrounding Environment as Indirect Conditioning

The word environment is often used so broadly that it becomes a substitute for the actual physical determinants of change. ITOF avoids this substitution. The surrounding environment of a selected system is not a single physical factor. It does not possess, by itself, the constitutive properties of the physical factors that influence change. It is not a cause in itself. It is not an independent agency that replaces heat, pressure, fields, radiation, material exchange, gravitational relation, chemical exposure, contact systems, mediating systems, or other determinant terms. It is a descriptive aggregation of relevant physical factors, influencing physical systems, pathways, boundary relations, and locality or placement conditions around the selected system. Its content differs qualitatively from place to place and from case to case according to the actual factors and systems present.

For a selected physical system A, the surrounding environment may be written as

$$\mathrm{Env}_A^{\mathrm{sur}} = \mathrm{Agg}_{\mathrm{sur}}(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A}, \mathcal{P}_A, \mathcal{B}_A, \mathcal{L}_A)\,. \tag{25}$$

Here $\mathcal{P}_A$ denotes relevant pathways, $\mathcal{B}_A$ denotes boundary relations, and $\mathcal{L}_A$ denotes locality or placement conditions in the broad descriptive sense. These terms are not added as a second cause. They describe how physical factors and influencing systems may become relevant to A.

$$\boxed{\begin{array}{c} \mathrm{Env}_A^{\mathrm{sur}} \notin \mathrm{Fact}_A, \qquad \mathrm{Env}_A^{\mathrm{sur}} \notin \mathrm{InfSys}_{\to A}, \\ \mathrm{Env}_A^{\mathrm{sur}} \notin \mathrm{Cause}(\Delta X_A) \quad \text{as an undecomposed environment-term.} \end{array}} \tag{26}$$

This equation does not deny that surrounding conditions matter. It denies that the environment acts as a single independent determinant over and above the actual physical factors and influencing systems through which change is conditioned.

The correct relation is indirect:

$$\mathrm{Env}_A^{\mathrm{sur}} \rightsquigarrow \mathrm{Eng}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A}) \rightsquigarrow \mathrm{Resp}_A \rightsquigarrow \rho_A^{\mathrm{resp}} \rightsquigarrow \mathrm{ChangeContent}_A(\rho_A^{\mathrm{resp}}) \rightsquigarrow \Delta X_A. \tag{27}$$

The symbol $\rightsquigarrow$ indicates conditioning or pathway relevance, not direct causal identity. Equation (27) means that the surrounding environment may describe which physical factors and influencing systems are present around A, how they are arranged, by which pathways they become relevant, under which boundary relations, and with what threshold relevance. It does not mean that the environment itself is a physical factor, nor that it possesses the constitutive properties of such factors. The surrounding environment differs qualitatively from one location or case to another because the actual factors, influencing systems, pathways, and boundary relations differ.

The surrounding environment becomes explanatory only when it is decomposed into the actual physical factors, influencing physical systems, pathways, boundaries, and locality conditions that constitute the selected determinant situation.

This distinction is especially important for cross-domain use. In a laboratory case, the surrounding environment may include temperature gradients, container boundaries, air pressure, nearby instruments, light exposure, vibration, or chemical atmosphere. In a biological case, it may include nutrients, pathogens, pressure, tissue relations, fluid conditions, and regulatory systems. In an astronomical case, it may include gravitational relations, radiation fields, plasma conditions, orbital relations, magnetic fields, or material surroundings. In every case, the environment is not a replacement explanation and not a physical factor in itself. The explanation must be returned to the qualitatively specific content of Fact_A, $\mathrm{InfSys}_{\to A}$, Eng_A, Resp_A, ρ_A^{resp}, and $\mathrm{ChangeContent}_A$.

The environment may therefore be used as a descriptive header only if the determinant decomposition remains explicit:

$$\mathrm{Use}(\mathrm{Env}_A^{\mathrm{sur}}) \Rightarrow \mathrm{Decomp}(\mathrm{Env}_A^{\mathrm{sur}}) \subseteq \mathrm{Fact}_A \cup \mathrm{InfSys}_{\to A} \cup \mathcal{P}_A \cup \mathcal{B}_A \cup \mathcal{L}_A. \tag{28}$$

This prevents the common error of saying that "the environment caused a change" while leaving unspecified which physical factors, systems, pathways, or thresholds were involved.

The same rule applies across the whole universe. There is no separate local law of change-realization and no separate cosmic law of change-realization. What differs from system to system is the determinant content. A rock, a cell, a clock, a star, and a galaxy occupy different surrounding environments, but none receives change from time or from environment as an independent agent. Each realizes change through its own response to determinant engagement.

5. Central Law of Systemic Change-Realization

The central law of V22/F2 states that change in a selected physical system is realized by that system's response under determinant engagement. The law is not a symbolic restatement of common causation. It is an assignment discipline. It tells the analysis where change belongs, where determinants belong, and where time does not belong.

The law is therefore written in explicit state-output form as

$$\boxed{\begin{gathered} \rho_A^{\mathrm{resp}} = \mathrm{Resp}_A\Big(\mathrm{Eng}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A}); \Theta_A, \Gamma_A^{\mathrm{coh}}, R_A^{\mathrm{cap}}, Q_A, \mathcal{K}_A\Big)\,, \\ \Delta X_A = \mathrm{ChangeContent}_A(\rho_A^{\mathrm{resp}})\,, \\ T_{\mathrm{ITOF}} \notin \mathrm{Fact}_A \quad \wedge \quad T_{\mathrm{ITOF}} \notin \mathrm{InfSys}_{\to A} \quad \wedge \quad T_{\mathrm{ITOF}} \notin \mathrm{PhysDet}_A\,. \end{gathered}} \tag{29}$$

In later compact equations throughout V22/F2, the expression $\Delta X_A = \mathrm{Resp}_A(\cdots)$, where it appears, is only compressed assignment notation. The governing form is the explicit state-output relation above: the response operator assigns a realized response state ρ_A^{resp}, and the realized change ΔX_A is the change-content of that response state.

Within the explicit law, realized change ΔX_A is assigned to the change-content of the response state of A under determinant engagement. The semicolon separates determinant engagement from system-side response conditions. This formulation prevents two errors: first, the error of assigning change directly to time; second, the error of treating an external factor as if it were identical to the realized change inside A.

The law has five interpretive components. The first component is the affected system. No change is assigned without identifying what has changed:

$$\Delta X_A \quad \text{requires the selection of} \quad A \in \mathcal{S}_{\text{phys}}. \tag{30}$$

The second component is determinant engagement. Physical factors and influencing physical systems must be made relevant to the selected system:

$$\text{Eng}_A(\text{Fact}_A, \text{InfSys}_{\to A}) \quad \text{is the determinant engagement relative to } A. \tag{31}$$

The third component is system constitution and kind-specific physical organization:

$$\Theta_A \quad \text{constrains the possible response forms of } A. \tag{32}$$

A metal, cell, clock, organism, planet, star, and galaxy cannot be treated as interchangeable receivers of the same determinant engagement. Their response spaces differ because their constitutions, internal organizations, kind-specific physical organizations, and relevant kinematic or dynamical profiles differ. In living systems, mind-capacity, perception, evaluation, decision-capacity, and motor capacity, where present, belong to the physical organization of the living system. In astronomical and other nonliving systems, rotational, orbital, translational, or dynamical profiles may likewise belong to the physical state or organization relevant to response.

The fourth component is system cohesion, response capacity, resistance, and thresholds:

$$\begin{gathered} \Gamma_A^{\text{coh}},\ R_A^{\text{cap}},\ Q_A \\ \text{determine whether engagement is absorbed, resisted, regulated, or redirected,} \\ \text{and whether it is amplified, transformative, or destructive.} \end{gathered} \tag{33}$$

A system may remain stable under weak engagement, adapt under moderate engagement, regulate or redirect an influence under managed engagement, or fail under excessive engagement. The same factor may be harmless for one system, transformative for another, and destructive for a third because the systems differ in constitution, organization, cohesion, capacity, resistance, and thresholds.

The fifth component is bounded determinant conditions:

$$\mathcal{K}_A = \{\text{case-bounded pathways, constraints, limits, and domain conditions}\}_A. \tag{34}$$

The role of $\mathcal{K}_A$ is to specify the determinant situation without replacing the direct determinant terms. It is not a disguised environment and not an abstract cause.

The central law can be written as a sequence of assignment rather than a simple instantaneous equality:

$$(\text{Fact}_A, \text{InfSys}_{\to A}) \xrightarrow{\text{Eng}_A} \text{DetSituation}_A \xrightarrow{\text{Resp}_A} \rho_A^{\text{resp}} \xrightarrow{\text{ChangeContent}_A} \Delta X_A. \tag{35}$$

This sequence is not temporal agency. It is explanatory ordering. It shows how the analysis proceeds from factors and influencing systems to determinant situation, then through the response operator of the selected system to a realized response state, and finally to the change-content assigned as realized change.

The law also implies a non-transfer condition:

$$\mathrm{CausalAssign}(\Delta X_A) \subseteq \mathrm{PhysDet}_A \quad \text{and} \quad T_{\mathrm{ITOF}} \notin \mathrm{PhysDet}_A\,. \tag{36}$$

Here $\mathrm{PhysDet}_A$ is the domain of physical determinants relevant to A, and $\mathrm{CausalAssign}(\Delta X_A)$ denotes the causal assignment of the realized change. Time is not included in that domain because it is not matter, energy, force, field, medium, signal, or physical system, and because it has no constitutive properties, intensity, range, mode of action, pathway, exchange relation, threshold relation, or system-response profile.

The law is universal in assignment but not uniform in content. Universality means that every selected system realizes change through its own response under determinant engagement. It does not mean that every system has the same determinants, the same thresholds, the same response capacities, or the same outcomes. The compressed universal form is therefore

$$\forall A \in \mathcal{S}_{\mathrm{phys}}, \quad \exists\ \mathrm{Eng}_A, \mathrm{Resp}_A \quad \text{such that} \quad \Delta X_A = \mathrm{Resp}_A(\mathrm{Eng}_A; \Theta_A, \Gamma_A^{\mathrm{coh}}, R_A^{\mathrm{cap}}, Q_A, \mathcal{K}_A). \tag{37}$$

Equation (37) is read under the explicit state-output interpretation: Resp_A assigns ρ_A^{resp}, and ΔX_A is the change-content of that response state. This is the law to which all later sections return.

6. Engagement, Response, and Realization

The terms engagement, response, and realization must be kept distinct. Engagement refers to the interwoven determinant relation between relevant physical factors, influencing physical systems, pathways, boundaries, threshold relations, and the selected system. Response refers to how the selected system reacts under its own constitution, internal organization, kind-specific physical organization, cohesion, capacity, resistance, and thresholds. Realization refers to the actual change-content that becomes part of the state, structure, position, function, organization, or stability profile of the selected system.

Engagement is not merely presence and not isolated unilateral action. A factor can be present without being determinant. A system can be near a neighboring physical system without relevant coupling. A field can exist without crossing a threshold. A signal can arrive without causing structural change. In ordinary physical reality, physical factors and influencing physical systems usually act through interwoven determinant relevance; controlled single-factor attribution belongs mainly to experimental or analytical isolation. Thus ITOF writes determinant engagement as a relevance relation:

$$\mathrm{Eng}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A}) \equiv \mathrm{Rel}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A}, \mathcal{P}_A, \mathcal{B}_A, Q_A, \mathcal{K}_A)\,. \tag{38}$$

The operator Rel_A does not mean subjective relevance. It means physical relevance to the selected system under pathways, boundary access, bounded determinant conditions, and thresholds. It also prevents Fact_A and $\mathrm{InfSys}_{\to A}$ from being read as isolated causes acting outside the determinant network.

Response is not passive reception. It is the system-side realization function. A system's constitution, internal organization, kind-specific physical organization, cohesion, capacity, resistance, and thresholds determine whether an engagement is resisted, absorbed, regulated, redirected, amplified, transformed, or destructive:

$$\mathrm{Resp}_A : \mathrm{DetSituation}_A \longrightarrow \Omega_A^{\mathrm{resp}}, \tag{39}$$

where Ω_A^{resp} is the response-state space of A. The response space is not arbitrary; it is constrained by Θ_A, Γ_A^{coh}, R_A^{cap}, Q_A, and $\mathcal{K}_A$. The term Θ_A includes the kind-specific physical organization of the selected system; in living systems, this includes physically realized mind-capacity and motor capacity, where present.

Realization occurs only when the response operator assigns a response state that counts as an alteration of A:

$$\begin{gathered} \rho_A^{\mathrm{resp}} = \mathrm{Resp}_A(\mathrm{DetSituation}_A), \qquad \rho_A^{\mathrm{resp}} \in \Omega_A^{\mathrm{real}} \\ \Rightarrow \Delta X_A = \mathrm{ChangeContent}_A(\rho_A^{\mathrm{resp}})\,. \end{gathered} \tag{40}$$

The set Ω_A^{real} denotes response states that count as realized alterations of A. Some engagements may produce no detectable change, some may produce reversible adjustment, and some may produce structural transformation.

The stages of explanation can be arranged as follows:

$$\begin{gathered} \underbrace{\mathrm{Eng}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A})}_{\text{determinant engagement}} \longrightarrow \underbrace{\mathrm{Resp}_A}_{\text{response operator}} \longrightarrow \underbrace{\rho_A^{\mathrm{resp}}}_{\text{realized response state}} \\ \longrightarrow \underbrace{\Delta X_A}_{\text{realized change-content}}\,. \end{gathered} \tag{41}$$

This chain is explanatory, not an assertion that time pushes the process forward. It shows how the ontology of assignment is structured from determinant engagement, through system response, to response state, and then to realized change-content.

A useful distinction follows. A system may undergo response without major transformation:

$$\rho_A^{\mathrm{resp}} \neq 0 \quad \wedge \quad \|\Delta X_A\| \leq Q_A^{\mathrm{class}} \Rightarrow \mathrm{MaintainedClass}(A). \tag{42}$$

Here Q_A^{class} is a classification threshold. If the change remains within that threshold, the system may continue to be classified as the same system type. A stable star, a functioning clock, or a living organism under normal regulatory adjustment may all exhibit continuing response without crossing class-failure thresholds.

A system may also fail when engagement exceeds capacity or destroys cohesion:

$$\|\,\mathrm{Eng}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A})\| > R_A^{\mathrm{cap}} \quad \vee \quad \Gamma_A^{\mathrm{coh}} < Q_A^{\mathrm{fail}} \Rightarrow \mathrm{Failure}(A). \tag{43}$$

This relation does not say that time causes failure. Failure is assigned to determinant engagement exceeding the system's capacity, threshold, or cohesion.

The distinction between engagement and response also explains why similar external conditions do not produce identical outcomes. Let A and B be two systems exposed to an apparently similar determinant situation:

$$\mathrm{Eng}_A \sim \mathrm{Eng}_B \quad \wedge \quad \Theta_A \neq \Theta_B \Rightarrow \mathrm{Resp}_A \not\equiv \mathrm{Resp}_B\,. \tag{44}$$

This equation expresses the system-dependence of change-realization. Here $\Theta_A \neq \Theta_B$ includes differences in constitution, internal organization, and kind-specific physical organization. The same heat, pressure, force, radiation, or signal condition may produce one response in a stone, another in a cell, another in a clock, another in a living organism with mind-capacity or motor capacity, and another in a stellar plasma.

7. Invariant Ordered Succession

Invariant ordered succession is the condition under which realized physical stages can be distinguished as prior and subsequent. It is not a separate stream moving through systems and not a cosmic substance in which systems are immersed. The symbol of ordering is a relation among stages, not a hidden engine of stages. This is why ITOF can affirm the necessity of ordered succession while denying temporal agency.

A physical stage without ordering cannot be described as prior or subsequent relative to another stage. Yet ordering by itself does not explain why the state changed. The explanation of transition must refer to determinant engagement and response. ITOF therefore separates two necessities: ordered distinguishability and determinant realization.

The relation is invariant in the sense that once two realized stages are assigned as prior and subsequent within the same physical history, the later stage does not become the earlier stage. Recurrence, similarity, restoration, or cyclicity does not erase order. A repeated-looking state is not numerically the same stage in ordered succession.

This principle prevents confusion between similarity and reversal. A pendulum may return to a similar position, a clock hand may return to the same dial mark, a biological rhythm may recur, and a star may preserve a stable observational profile. These cases do not demonstrate that time reverses or that stages become identical. They demonstrate that systems can realize similar states at later positions in ordered succession.

8. Universality without Uniformity

The central law is universal in form but not uniform in content. Universality means that every selected physical system realizes change through response under determinant engagement. It does not mean that all systems respond in the same manner, possess the same thresholds, or interact with the same physical factors.

A universal principle must be capable of applying to a laboratory object, a living cell, a clock, a planet, a star, and a galaxy without pretending that these systems are materially or structurally equivalent. ITOF accomplishes this by separating the formal assignment from the determinant content. The formal assignment remains stable; the physical content changes with the selected system.

This distinction is especially important for cosmic examples. The same principle applies to terrestrial and astronomical systems, but the determinants differ. The change-realization of a star is not a local mode opposed to a cosmic mode. It is a system-specific realization under stellar determinants within invariant ordered succession.

ITOF therefore avoids two opposite errors. It does not reduce all systems to a single mechanical template, and it does not multiply time into separate private times for different regions. The principle of ordered succession is invariant, while change-realization is system-dependent everywhere.

9. Recurrence, Similarity, and Non-Retrograde Order

Many physical systems show recurrence. A clock hand returns to a dial mark, a planet repeats a visible orbital configuration, a chemical cycle repeats a phase, and a biological rhythm recurs. These cases are sometimes mistakenly treated as if a system returned to the same stage. ITOF distinguishes recurrence from identity.

Similarity is a relation between states or descriptions. Identity in ordered succession is stronger. A later state may resemble an earlier state without being the same stage. The distinguishing condition is that the later state carries a different position in prior–subsequent order and is embedded in a different accumulated physical history.

The non-retrograde rule states that physical succession does not erase the prior assignment of stages. A later state can be similar, functionally equivalent, or restored, but it cannot become the earlier stage as the same ordered occurrence. This rule holds independently of clock notation and observer convention.

The rule also blocks a common confusion in cyclic processes. Cyclic form does not imply temporal circularity. It means that the response profile of the system contains repeated or quasi-repeated patterns under determinant engagement. The order of realized stages remains prior–subsequent.

10. Motion as a Subclass of Change

Motion must be separated from change without being excluded from change. Motion is one realization mode of change, not the universal form of all change. A system can change structurally, chemically, energetically, biologically, informationally, or functionally without changing spatial position. Conversely, when a system changes position, configuration, or locomotor state, that motion is a realized change of the selected system.

The subclass relation is

$$\mathrm{Motion}_A \subseteq \mathrm{Change}_A, \qquad \exists\, \Delta X_A \in \mathrm{Change}_A \quad \text{such that} \quad \Delta X_A \notin \mathrm{Motion}_A\,. \tag{45}$$

Thus every motion is change, but not every change is motion.

A further distinction is required between motion-capacity, actual motion, and motion as determinant contribution. In living systems, motor capacity, where present, is a kind-specific physical property of the living system. It belongs to the constitution, internal organization, and response capacity of the living system. In nonliving systems, motion-capacity should not be confused with biological motor capacity; however, rotational, orbital, translational, vibrational, or other kinematic profiles may belong to the system's physical state, dynamical organization, or response-relevant conditions.

Actual motion is different from capacity or profile-description. When motion is actualized or maintained as part of the state of a selected system A, it is assigned as realized motion-change of that system. In living systems, motor capacity is not itself actual motion; it is a physically realized response-capacity grounded in the constitution and organization of the living system:

$$\begin{gathered} \mathrm{MotorCapacity}_A \quad \text{is grounded in} \quad \Theta_A, \\ \mathrm{MotorCapacity}_A \quad \text{contributes to} \quad R_A^{\mathrm{cap}} \qquad (A \in \mathcal{S}_{\mathrm{living}} \text{ where applicable}). \end{gathered} \tag{46}$$

$$\Delta X_A^{\mathrm{mot}} = \mathrm{MotionContent}_A(\rho_A^{\mathrm{resp}}), \qquad \Delta X_A^{\mathrm{mot}} \text{ belongs to the realized change-content of } A. \tag{47}$$

Equations (46) and (47) separate capacity from realization. A living system may possess motor capacity without actualizing motion at a given stage. A planet, star, or galaxy may also possess a rotational, orbital, or dynamical profile without that profile being a biological motor capacity. When motion is actualized, maintained, altered, or selected as the relevant change-content, it is assigned as motion-content within the realized change of the selected moving system, not as time acting on that system.

Actual motion may also become relevant to determinant engagement across systems. Let A be a moving or dynamically profiled physical system, and let B be the selected affected system for the analysis. If A is relevant to B as an influencing physical system, then the realized motion of A may contribute to the determinant situation of B only as a response-relevant influence contribution:

$$A \in \mathrm{InfSys}_{\to B} \quad \wedge \quad \mathrm{Rel}_B(\Delta X_A^{\mathrm{mot}}) \Rightarrow \mathrm{MotInf}_{A\to B} \in \mathrm{DetSituation}_B\,. \tag{48}$$

where $\mathrm{MotInf}_{A\to B}$ denotes the response-relevant influence contribution of A's motion relative to B, not a transfer of A's realized change into B.

Here B denotes the selected affected system whose determinant situation is being analyzed. It is introduced when the analysis concerns cross-system relevance: the motion of A may contribute to the determinant situation of B, but it is not copied into B as completed change. This preserves the distinction between motor capacity, actual motion of A, and motion as determinant contribution relevant to B. The realized change of B must still be assigned through B's own response operator, realized response state, and change-content.

11. Stability as Maintained Change

Stability is often described as the absence of change. ITOF rejects this as too crude. A stable physical system may be undergoing continuous microphysical, regulatory, structural, energetic, or relational change while maintaining its classification, function, or observational profile. Stability is therefore maintained change within thresholds, not absolute changelessness.

This view applies to mechanical, biological, and astronomical systems. A functioning clock maintains operational regularity through internal physical processes. A living organism maintains viability through metabolism, repair, and regulation. A stable star maintains an apparent profile through hydrostatic and energetic balances. None of these systems is changeless.

The concept of maintained change allows ITOF to avoid both extremes: it does not deny change in stable systems, and it does not treat every microscopic alteration as system failure. The decisive issue is whether the realized change remains within thresholds of classification, function, or structural integrity.

Stability can therefore be analyzed using the same central law. Determinant engagement continues; response continues; realized change continues; but the change remains within a maintained range.

12. Resistance, Capacity, and Adaptation

Systems do not merely receive influences. They resist, buffer, absorb, redirect, amplify, repair, adapt, or transform under determinant engagement. Resistance and capacity are therefore central to any correct theory of change-realization. Without them, every determinant relation would be treated as if it produced the same outcome in every system.

Response capacity is not infinite. It is bounded by constitution, cohesion, structure, energy availability, material limits, regulatory ability, and threshold conditions. Once determinant engagement exceeds capacity, the response may shift from maintained change to damage, failure, or transformation.

Adaptation is a special response class in which the system changes in order to preserve, restore, or modify functional viability or structural continuity. Adaptation does not eliminate change. It is a form of change guided by system organization and determinant conditions.

The same external factor may fall below threshold, trigger resistance, provoke adaptation, or cause failure depending on the affected system. This is why ITOF treats change-realization as system-specific rather than factor-only.

13. Failure and Transformation

Failure is not mere change. It is a threshold-crossing change in which a system can no longer maintain the relevant organization, function, classification, or structural coherence that defined it as that system for the analysis. Failure may result in fragmentation, collapse, transformation into a successor system, or loss of function.

The failure of a clock does not mean that time failed. It means that the clock, as a physical measuring system, lost the capacity to maintain the selected regular process or symbolic output. The failure of a biological organ does not mean that ordered succession failed. It means that determinant engagement and system response crossed viability thresholds. The collapse of a star does not mean that cosmic time changed character. It means that stellar determinants crossed stability thresholds.

Failure belongs to the affected system and its thresholds. It is not an ontological property of time. ITOF therefore analyzes failure by examining the determinant engagement, cohesion collapse, capacity limits, and transformation pathway of the selected system.

Transformation after failure may generate new systems. These successor systems occupy subsequent stages in ordered succession. They are not temporal products; they are physical outcomes of determinant engagement and response.

14. Living and Nonliving Response Classes

The law applies to living and nonliving systems without giving living systems an exemption from determinant engagement. The difference lies in response architecture. Nonliving systems respond according to material constitution, structure, cohesion, thresholds, fields, forces, chemical composition, energy exchange, and boundary conditions. Living systems include physically realized regulatory, adaptive, sensory, cognitive, and motor capacities where present.

This difference can be stated without creating two laws:

$$\begin{gathered}\rho_A^{\mathrm{resp}} = \mathrm{Resp}_A(\mathrm{Eng}_A; \Theta_A, \Gamma_A^{\mathrm{coh}}, R_A^{\mathrm{cap}}, Q_A, \mathcal{K}_A), \qquad A \in \mathcal{S}_{\mathrm{phys}}, \\ \Delta X_A = \mathrm{ChangeContent}_A(\rho_A^{\mathrm{resp}}).\end{gathered} \tag{49}$$

The same assignment form applies. What differs is the content of Θ_A, R_A^{cap}, Q_A, and $\mathcal{K}_A$, not the non-causal status of time.

For nonliving systems, Θ_A may include material composition, geometry, phase, bonding structure, rigidity, elasticity, conductivity, temperature state, pressure state, rotational state, orbital state, translational state, dynamical profile, or other domain-specific physical organization. For living systems, Θ_A may also include physically realized mind-capacity, perception, evaluation, decision-capacity, regulatory organization, and motor capacity, where present. These properties are not external agencies added to the system. They are physical properties of the living system itself and help determine its response state.

The living response class may therefore be written as

$$A \in \mathcal{S}_{\mathrm{living}} \Rightarrow \Theta_A \supset \{\text{regulatory, sensory, cognitive, and motor organization where present}\}_A. \tag{50}$$

This does not mean that every living system has the same degree of mind-capacity, awareness, decision-capacity, or motor capacity. It means only that such capacities, where present, are treated as physical properties of the living system and not as extra-temporal or non-physical causes. Motor capacity should also be distinguished from actual motion: motor capacity is a physical property of the living system, whereas actual motion is realized change when that capacity is actualized.

The nonliving response class is correspondingly

$$\begin{gathered}A \in \mathcal{S}_{\mathrm{nonliving}} \Rightarrow \Theta_A \supset \{\text{material, structural, energetic, chemical,} \\ \text{and field-relevant organization}\}_A.\end{gathered} \tag{51}$$

Thus the law remains unified: differences between living and nonliving systems are differences in system constitution and response capacity, not differences in the status of time.

15. Clocks as Symbolic Physical Measuring Systems

A clock is a physical system designed or selected to produce a regular process and convert that process into symbolic numerical output. It does not measure time as a substance. It measures or counts a chosen physical process and maps that process onto a conventional scale for coordination, comparison, scheduling, navigation, and calculation.

The central error in ordinary language is to say that a clock measures time as if time were the object directly contacted by the instrument. A thermometer interacts with thermal conditions. A pressure gauge responds to pressure. A voltmeter responds to electrical potential difference. A clock responds through its own internal physical process. When the clock fails, time has not failed; the clock system has failed.

Clock readings are therefore operational records of selected regularity. They are indispensable in practice, but their usefulness does not convert time into a physical cause or measured substance. ITOF preserves the practical value of clocks while assigning their behavior to physical system change.

Different clocks may drift, degrade, desynchronize, or fail under heat, pressure, acceleration, shock, electromagnetic disturbance, manufacturing tolerance, or material aging. These effects belong to the physical clock system and its determinant engagement. They do not reveal damage, acceleration, or deformation of time itself.

16. Measurement, Models, and Ontological Transfer

Measurement is a relation between a measuring system, a selected process, a representation scheme, and an interpreted output. A model is a structured representation that organizes variables, assumptions, and relations. Neither measurement nor modeling by itself establishes the ontology of the measured or represented quantity.

ITOF blocks a specific invalid transfer: because a mathematical symbol or clock coordinate is useful in equations, it does not follow that time is a physical agent. Operational indispensability is not ontological agency. A coordinate can organize description without causing the described process.

This point does not weaken science. It strengthens assignment discipline. It allows models to remain useful while preventing their representational components from being mistaken for physical substances or causes. The same distinction applies to maps, coordinates, records, and simulation parameters.

A measurement record may be accurate, reproducible, and indispensable without being the source of the phenomenon measured. The record of change is not the cause of change. The clock coordinate of change is not the cause of change. The model parameter of change is not the physical influence that acted on the system.

17. Records, Memory, and Preservation of Effects

A record is a physical or symbolic preservation of an effect, trace, representation, inscription, signal, memory state, measurement output, or encoded relation. It is not the original event itself. Records allow later access, reconstruction, interpretation, or comparison, but they do not reverse ordered succession and they do not retrieve the original change as the same occurrence.

Memory follows the same rule. A memory state is a present physical or functional state that represents, encodes, or is causally connected to a prior event. It is not the prior event itself. Remembering does not make the past event present as the same physical occurrence; it activates or accesses a later record-state.

This distinction protects the ontology of ordered succession. A record may survive after the original event has passed. A signal may carry information about a remote event. A written inscription may preserve a measurement. None of these cases changes the order of original realization and later access.

Records are therefore physical systems or states subject to their own determinant engagement. A record can degrade, be corrupted, be transmitted, be copied, or be erased. These changes belong to the record system, not to the original event and not to time itself.

18. Light-Borne Records and Astronomical Observation

Astronomical observation requires a careful distinction between source event, light-borne record, propagation path, and observer record. Light does not carry time as a substance. It carries physical information or records generated by source events and received later by an observer-instrument system.

Let $S_\star$ be a distant star and $A_\oplus$ an Earth-based observer-instrument system. A source event E_i realized in the star produces a light-borne record $R_\gamma(E_i)$, which propagates and becomes an observation O_i. The chain is physical, not temporal agency.

The propagation offset between source realization and observation affects access, not the underlying ordered relation of source stages. If two source events are separated by a source interval and their records propagate through effectively equal offsets, the observer receives them separated by the same interval. If the offsets differ because of path or medium effects, the observed interval includes the offset difference.

Thus astronomical delay is a record-propagation issue. It does not imply multiple private times for the star and Earth. The star changes according to its determinant engagement and response. Earth receives records according to propagation conditions. Ordered succession remains a relation among realized and received stages.

Light transports records of realized source events; it does not transport time, multiply time, or alter the ordered source succession.

19. Spatial Separation, Distance Units, and Non-Temporal Propagation

The distinction between spatial separation, distance, propagation, and time is necessary for avoiding a common ontological transfer. A remote source and an observer are not separated by time as a physical substance or medium. They are separated by spatial or path relations, and records or signals propagate across those relations under physical conditions.

Spatial separation is the positional non-coincidence or spatial/path distinction between two selected locations or physical systems under a specified frame, geometry, or path. Distance is the measurable magnitude assigned to that separation. If A and B denote two selected locations or physical systems, then

$$\mathrm{Sep}(A, B) \neq T_{\mathrm{ITOF}}, \qquad D(A, B) = \mathrm{Measure}(\mathrm{Sep}(A, B)), \qquad D(A, B) \neq T_{\mathrm{ITOF}}. \tag{52}$$

Thus, separation is the fact of non-coincidence or path-distinction, while distance is the assigned measurable magnitude of that separation. The unit used to express distance does not determine the ontology of the distance itself. Meters, kilometers, astronomical units, and light-years are units of expression for distance. A light-year is a distance unit derived from light propagation; it is not evidence that time is a physical substance, medium, distance, carrier, or causal agent:

$$\mathrm{ly} \in \mathrm{Unit}(D) \quad \wedge \quad \mathrm{ly} \not\Rightarrow D = T_{\mathrm{ITOF}}. \tag{53}$$

When a light-record emitted by a source A becomes available to an observer or detector B, what occurs is physical propagation of a record across a spatial/path separation:

$$R_\gamma(A) \to B \quad \text{across} \quad D^{\mathrm{path}}_{A\to B}. \tag{54}$$

Here $R_\gamma(A)$ denotes the light-borne physical record associated with a source-state or source-event of A, and $D^{\mathrm{path}}_{A\to B}$ denotes the relevant path-distance under the selected propagation model.

Under an appropriate propagation model, the path-distance, light-propagation speed, and propagation offset may be related as

$$D^{\mathrm{path}}_{A\to B} = c_\gamma \, \Pi_{A\to B}. \tag{55}$$

This relation does not identify distance with time, and it does not make time a physical medium of propagation. It only relates path-distance, light-propagation speed, and propagation offset within the selected model.

Accordingly,

$$R_\gamma(A) \text{ carries a physical record, not time}, \qquad \Pi_{A\to B} \neq T_{\mathrm{ITOF}}, \qquad D^{\mathrm{path}}_{A\to B} \neq T_{\mathrm{ITOF}}. \tag{56}$$

This also prevents an overextension of geometric or relativistic language. ITOF does not reject the mathematical use of temporal coordinates in physical models. It rejects the ontological transfer by which a coordinate, index, or measurement parameter is treated as a physical determinant, medium, carrier, or independent causal factor. Therefore, any theory or interpretation that treats time as an independent physical factor within spatial geometry, light propagation, or change-realization commits an assignment error from the standpoint of ITOF. By contrast, using a temporal coordinate, index, or measurement parameter for calculation does not by itself establish such an error.

The correct assignment is therefore:

$$T_{\mathrm{ITOF}} \notin \mathrm{Det}(D(A, B)), \qquad T_{\mathrm{ITOF}} \notin \mathrm{Det}(R_\gamma(A) \to B), \qquad T_{\mathrm{ITOF}} \notin \mathrm{Cause}(R_\gamma(A) \to B). \tag{57}$$

Observing a distant star is not receiving time from the star, and it is not observing time as a transported entity. It is the reception of a light-record emitted from a prior source-state and made observationally available after propagation across spatial/path separation. The prior–subsequent ordering of emission, propagation, and reception is describable by T_{ITOF}, but that ordering is not a physical carrier, medium, determinant, or cause of the light propagation.

20. Stable Star Example

A stable star provides a useful test case because it is remote, dynamic, and observationally accessed through light-borne records. A star may appear stable over long observational intervals while undergoing continuous internal change. It is not changeless. Its stability is maintained change within stellar thresholds.

The star's determinant engagement includes gravitational compression, radiation transport, plasma conditions, nuclear reaction rates, magnetic structures, mass distribution, surrounding matter, and interactions with other systems. Its response is stellar, not human, not clock-like, and not reducible to a single factor.

When an observer receives a first record showing a stable stage and later receives another record showing a changed stage, the difference between arrivals belongs to source-event separation and propagation-offset difference, not to a different kind of stellar time. The light did not alter time. It carried records through physical propagation.

The stable star example therefore blocks the idea that remote systems possess private ontological times. The source realizes its own change under stellar determinant engagement, and Earth realizes observational access through received records. The difference lies in source realization, record propagation, and observer recording, not in multiple times.

21. Relativistic and Measurement-Language Boundary

ITOF does not need to deny the practical accuracy of relativistic measurement schemes in order to reject temporal agency. The issue is not whether clocks under different physical conditions can produce different readings. They can. The issue is whether those readings prove that time itself is a physical substance or cause. ITOF answers no.

A clock in motion, gravity, heat, radiation, pressure, acceleration, or other physical conditions is a physical system under determinant engagement. Its reading may differ from another clock's reading. That difference must first be assigned to the clock system, the measurement protocol, the physical conditions, and the model used to compare outputs.

This boundary is important because it preserves empirical practice while preventing ontological overreach. A successful equation may use a time coordinate. A coordinate can be necessary for calculation without being a physical influence. A clock can be necessary for measurement without measuring time as a material object.

ITOF therefore distinguishes relativistic clock behavior from temporal causation. The framework is not a replacement for all operational models. It is an ontological assignment framework for change-realization. It asks what physically changes, under which determinants, and why the change should not be assigned to time itself.

22. Spacetime and Dimensional Model-Language Boundary

ITOF also requires a controlled boundary for spacetime and dimensional language. A spacetime coordinate system may be indispensable for modeling events, comparing measurements, or representing relations among observations. This usefulness does not convert time into matter, energy, force, field, medium, signal, physical factor, influencing system, or causal agency. A coordinate participates in representation. It does not act as a physical determinant.

The distinction can be written as

$$\mathrm{Coord}_{\mathrm{model}}(x, y, z, t) \not\Rightarrow t \in \mathrm{Cause}(\Delta X_A). \tag{58}$$

Equation (58) does not reject coordinate modeling. It rejects the transfer from coordinate usefulness to ontological agency.

The same rule applies to higher-dimensional or extra-dimensional model language. A model may use additional dimensions, parameters, manifolds, configuration spaces, or mathematical embeddings to represent relations among physical quantities. Such representation does not by itself establish that time is a physical substance or that an added dimension is an independent causal system.

This boundary can be stated as

$$\mathrm{DimModel}(\mathcal{D}_n) \not\Rightarrow T_{\mathrm{ITOF}} \in \mathrm{PhysDet}_A\,. \tag{59}$$

Here $\mathrm{DimModel}(\mathcal{D}_n)$ denotes a model using an n-dimensional representational structure. The equation means that dimensional representation must not be confused with determinant assignment.

A valid dimensional model must therefore be interpreted through the same discipline used elsewhere in ITOF:

$$\mathrm{ValidModelUse} \Rightarrow [\mathrm{ModelCoord} \neq \mathrm{PhysicalCause}]\,. \tag{60}$$

The physical explanation remains assigned to selected systems, physical factors, influencing physical systems, determinant engagement, thresholds, and response. Spacetime or dimensional language may organize a model, but it does not replace the law of systemic change-realization.

A coordinate can order, locate, compare, or calculate; it does not by itself cause the physical change it represents.

23. Classification of Change-Realization

Change-realization can be classified by the kind of alteration assigned to the selected system. The classification is not meant to be exhaustive in every specialized science. It is a disciplined map to prevent confusion between forms of change and sources of change.

State change includes alteration in measurable or descriptive state variables. Structural change includes alteration in arrangement, composition, cohesion, or organization. Positional change includes motion or spatial relation alteration. Functional change includes alteration in operation, role, performance, regulation, or output. Stability change includes movement within or beyond maintenance thresholds. Failure change includes threshold crossing that disrupts system integrity or function.

These categories may overlap. A star's change may be structural, energetic, functional, and observational at once. A clock failure may be mechanical, electronic, functional, and symbolic. A living system's response may be chemical, structural, regulatory, and adaptive. The classification is therefore used as a guide, not a rigid separation of reality into isolated compartments.

The important point is that each category remains assigned to system response under determinant engagement. No category requires time to become a cause.

24. Domain-Use Discipline

ITOF can be applied across domains only if its terms are used with discipline. The selected system must be explicit. The relevant physical factors must be named or decomposed. Influencing physical systems must be distinguished from factors. The surrounding environment must not replace determinant decomposition. Measurement systems must not be confused with the phenomenon measured. Records must not be confused with original events.

The first domain rule is selection: identify A. Without a selected system, the phrase change occurred is too vague for ontological assignment. The second rule is determinant decomposition: identify Fact_A, $\mathrm{InfSys}_{\to oA}$, pathways, boundaries, and thresholds. The third rule is response assignment: identify how A realizes the change.

The fourth rule is non-transfer: do not transfer the behavior of clocks, records, observer instruments, or models to time itself. The fifth rule is threshold discipline: distinguish maintained change, adaptive change, class change, and failure. The sixth rule is scale neutrality: do not create separate laws for local and cosmic change-realization.

These rules allow the same framework to remain precise in simple and complex cases. They also prevent ITOF from becoming a loose metaphor. The framework is strong only when its assignments remain explicit.

25. System Selection and Boundary Closure

Every application of ITOF begins by selecting the physical system whose change is being assigned. Without system selection, the phrase change occurs remains underdetermined. A statement may mention heat, pressure, radiation, motion, observation, or measurement, but unless the affected system is identified, the location of realized change remains ambiguous. The selected system is not necessarily isolated. It is selected for analysis because its state, structure, organization, function, position, or response profile can be distinguished sufficiently for assignment.

The selection rule is

$$\text{Select}(A) \Rightarrow [A \in \mathcal{S}_{\text{phys}} \wedge \partial A \text{ is specified} \wedge \Omega_A \text{ is admissible}] . \tag{61}$$

Here Ω_A denotes the admissible state or outcome space for the selected system. The boundary ∂A does not need to be absolute. It must be sufficient to say what belongs to the system for the purpose of the analysis and what belongs to factors, influencing systems, surroundings, instruments, or records.

Boundary closure is not isolation. A living cell has a membrane and relations to nutrients, pressures, signals, and other cells. A clock has internal components and relations to gravity, temperature, power supply, and user interpretation. A star has no rigid container, yet it can be selected through mass, gravitational coherence, plasma structure, radiation output, and stellar classification. ITOF therefore treats boundaries as analytical selection constraints grounded in physical distinguishability.

Once a boundary is specified, the framework can prevent category mistakes. A factor acting on A is not automatically part of A. An influencing system relevant to A is not automatically the changed system. A measuring instrument recording A is not identical to A. The selection boundary lets the analysis say whether the change belongs to the object measured, the measuring system, the surrounding medium, the propagating signal, or the observer-instrument complex.

The boundary discipline can be written as

$$\Delta X_A \neq \Delta X_B \quad \text{unless} \quad A = B \text{ under the selected boundary.} \tag{62}$$

This does not deny coupling between systems. It denies unexamined transfer of change assignment across selected boundaries. When an influencing system is relevant to the selected system A, the change in A must still be assigned through A's response operator, realized response state, and change-content; it is not merely copied from the change of the influencing system.

System selection also controls levels of description. A molecule, a tissue, a person, a clock, a laboratory apparatus, a star, or a galaxy can each be selected as A, but the determinants and thresholds change with level. A lower-level description may explain internal mechanisms; a higher-level description may explain functional or classificatory outcomes. ITOF allows both, provided the selected system is explicit.

26. Determinant Completeness and Relevance Filtering

A determinant account must be complete enough for the purpose of the analysis. Completeness does not mean listing every physical fact in the universe. It means listing the relevant physical factors, influencing systems, pathways, boundary relations, and thresholds without hiding them behind general words. The determinant set is therefore filtered by relevance to the selected system.

The relevance-filtered determinant set is

$$\text{Det}_A^{\text{rel}} = \{D \in \text{PhysDet} : \text{Rel}_A(D) = 1\} . \tag{63}$$

This definition permits a large physical world without requiring every possible factor to be included in every explanation. The question is whether the factor or influencing system has an effective pathway, intensity, range, coupling, threshold relation, or boundary access relevant to A.

The determinant set decomposes as

$$\mathrm{Det}_A^{\mathrm{rel}} \subseteq \mathrm{Fact}_A \cup \mathrm{InfSys}_{\to A} \cup \mathcal{P}_A \cup \mathcal{B}_A \cup \mathcal{K}_A. \tag{64}$$

This decomposition prevents the explanation from becoming a single vague cause. A sentence such as the surroundings caused the change must be decomposed into which physical factors, which influencing systems, which pathways, which boundaries, and which thresholds were involved.

Relevance is also system-specific. A magnetic field may be determinant for one device and negligible for another. A temperature change may be harmless for a stone, disruptive for a biological cell, and fatal for a delicate instrument. A gravitational relation may be negligible in a laboratory chemical reaction but dominant in stellar structure. The determinant account must therefore be relative to A, not to a generic universe.

The relevance rule is

$$D \in \mathrm{Det}_A^{\mathrm{rel}} \not\Rightarrow D \in \mathrm{Det}_B^{\mathrm{rel}}\,. \tag{65}$$

This rule is one reason why ITOF emphasizes system response. Determinants are not merely external items. Their determinant status depends on how they relate to the selected system's constitution, thresholds, and pathways.

Completeness must also include absence where absence is determinant. Shielding, lack of oxygen, missing support, deprivation of energy, interruption of signal, or removal of pressure can all be determinant conditions. These are not time acting. They are changes in the determinant situation relative to the selected system.

For threshold comparisons, the effective engagement magnitude may be written as

$$\eta_A = \|\mathrm{Eng}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A})\|_{\mathrm{rel}}\,, \tag{66}$$

where η_A denotes the relevance-weighted effective magnitude of determinant engagement relative to the selected system A. It is not a universal scalar independent of domain modeling; it is the threshold-comparable measure supplied by the relevant domain analysis.

27. Threshold Architecture of Change

Thresholds determine whether determinant engagement remains below detectable response, produces maintained adjustment, crosses a classification boundary, generates adaptation, or causes failure. Without thresholds, the framework would treat all determinant engagement as equivalent. With thresholds, change-realization becomes structured.

The threshold family for a selected system may be written as

$$Q_A = \left\{ Q_A^{\mathrm{detect}}, Q_A^{\mathrm{maint}}, Q_A^{\mathrm{adapt}}, Q_A^{\mathrm{class}}, Q_A^{\mathrm{fail}} \right\}. \tag{67}$$

These thresholds are not universal constants in the abstract. They are system-relative and domain-relative. A threshold for a clock differs from a threshold for a cell; a threshold for a star differs from a threshold for a rock.

A sub-threshold engagement may be written as

$$\|\,\mathrm{Eng}_A\,\| < Q_A^{\mathrm{detect}} \Rightarrow \Delta X_A \text{ is not detected or not assigned at the selected resolution.} \tag{68}$$

This does not imply absolute absence of microchange. It means that under the selected analytical resolution, no relevant realized change is assigned.

Maintained change is

$$Q_A^{\mathrm{detect}} \leq \|\,\mathrm{Eng}_A\,\| \leq Q_A^{\mathrm{maint}} \Rightarrow \Delta X_A^{\mathrm{maint}}. \tag{69}$$

Adaptive change is

$$Q_A^{\mathrm{maint}} < \|\,\mathrm{Eng}_A\,\| \leq Q_A^{\mathrm{adapt}} \Rightarrow \Delta X_A^{\mathrm{adapt}}. \tag{70}$$

Failure occurs when engagement or cohesion collapse crosses failure threshold:

$$\|\,\mathrm{Eng}_A\,\| > Q_A^{\mathrm{fail}} \quad \vee \quad \Gamma_A^{\mathrm{coh}} < Q_A^{\mathrm{coh,min}} \Rightarrow \mathrm{Failure}_A\,. \tag{71}$$

Threshold architecture explains why gradual change can become sudden failure. The determinant engagement may accumulate, cohesion may weaken, resistance may be exhausted, and then a small additional engagement may cross a decisive threshold. The suddenness of failure does not imply that time caused the event. It means that the response conditions reached a critical relation.

28. Non-Identity of Natural Systems

For system-level ITOF assignments, no two selected natural physical systems should be assumed perfectly identical in all determinant-relevant respects unless the domain model explicitly justifies that idealization. Systems may be similar, manufactured to tolerance, classified under the same type, or treated as equivalent for practical purposes, but perfect identity of all constitutive, relational, historical, and threshold conditions is not available in ordinary physical reality. ITOF therefore treats similarity as limited and operational, not absolute.

This principle does not deny mathematical idealization, practical equivalence classes, or domain-specific indistinguishability assumptions. It only denies that practical similarity automatically licenses ontological identity of constitution, history, threshold, and response.

For two selected systems A and B, practical similarity may be written as

$$A \sim_\epsilon B \quad \Longleftrightarrow \quad \mathrm{Diff}(A,B) \leq \epsilon \text{ under the selected criteria.} \tag{72}$$

This does not imply exact identity:

$$A \sim_\epsilon B \not\Rightarrow A \equiv B. \tag{73}$$

The tolerance ϵ belongs to the measurement or classification scheme. It is not an ontological erasure of all physical differences.

This matters for change-realization because small differences in constitution, internal organization, kind-specific physical organization, boundary condition, accumulated history, response capacity, or threshold may produce different responses under apparently similar determinant engagement. Manufactured clocks may run similarly but drift differently. Biological systems of the same class may respond differently to the same stress because their physical organization and capacities are not identical. Stars of similar classification may evolve differently under different mass, composition, rotation, or environmental relations.

The response difference principle is

$$A \sim_\epsilon B \wedge \left(\Theta_A, \Gamma_A^{\mathrm{coh}}, R_A^{\mathrm{cap}}, Q_A\right) \neq \left(\Theta_B, \Gamma_B^{\mathrm{coh}}, R_B^{\mathrm{cap}}, Q_B\right) \nRightarrow \mathrm{Resp}_A \equiv \mathrm{Resp}_B \,. \tag{74}$$

This principle prevents the mistaken expectation that the same named factor or similar classification must guarantee the same realized response in every instance.

The non-identity principle also reinforces recurrence. A later state of the same system may resemble an earlier state, and two systems may resemble each other, but ordered and constitutive identity are not automatically restored. Similarity is useful; exact identity must not be assumed without warrant.

29. Instrumental Systems and Measurement Response

An instrument is a physical system designed or selected to respond to a physical condition and produce a readable, recordable, or interpretable output. A thermometer, voltmeter, pressure gauge, clock, telescope detector, photographic plate, or digital sensor is not outside the ontology of change-realization. Each is a physical system with constitution, thresholds, response capacity, and failure modes.

If I is an instrument, its output can be written as

$$N_I = \mathrm{Out}_I(\mathrm{Resp}_I(\mathrm{Eng}_I(\mathrm{Fact}_I, \mathrm{InfSys}_{\to I}); \Theta_I, Q_I, \mathcal{K}_I)) \,. \tag{75}$$

The output N_I may be numerical, visual, symbolic, digital, or analog. It is the output of the instrument's response, not the phenomenon itself.

Instrumental reliability requires that the response of the instrument be calibrated to a target relation:

$$\mathrm{Calib}(I) \Rightarrow N_I \approx \mathrm{Rep}(X_A) \text{ within tolerance.} \tag{76}$$

This equation states the purpose of measurement. It does not erase the distinction between I and A. The instrument's output represents or estimates something about A, but the output remains a physical or symbolic state of I.

Instrument failure occurs when the instrument no longer maintains the required relation between target condition and output:

$$\mathrm{Failure}_I \Rightarrow N_I \not\approx \mathrm{Rep}(X_A) \text{ within the required tolerance.} \tag{77}$$

This does not imply that the measured phenomenon failed. In the special case of clocks, it does not imply that time failed. It means that the clock system no longer maintains the required regular process or symbolic mapping.

The instrument section is essential because many confusions about time arise from treating the measuring instrument as if it revealed time directly. ITOF insists that the clock, like any instrument, must be analyzed as a physical system. Its readings are useful outputs of physical response, not direct contact with a temporal substance.

30. Observer-Instrument Complexes

Observation is not a disembodied act. In physical analysis, observation is realized through an observer-instrument complex, whether human, mechanical, electronic, optical, computational, or distributed. The observer-instrument complex is itself a physical system or set of systems. It receives signals, records effects, processes outputs, and produces representations.

Let A_O denote an observer-instrument complex. Its observation of an event E_i can be decomposed as

$$\mathrm{Obs}_{A_O}(E_i) = \mathrm{Out}_{A_O}\Big(\mathrm{Resp}_{A_O}(\mathrm{Eng}_{A_O}(R(E_i), \mathrm{InfSys}_{\to A_O}); \Theta_{A_O}, Q_{A_O}, \mathcal{K}_{A_O})\Big). \tag{78}$$

This formulation makes clear that observation is a later system response to a record or signal. It does not collapse the observation into the source event.

The source event and the observation event are distinct:

$$E_i \neq O_i \quad \text{and} \quad \Delta X_S^{(i)} \neq \Delta X_{A_O}^{(i)}. \tag{79}$$

The first change belongs to the source system. The second belongs to the observer-instrument complex. They may be causally connected by a record path, but they are not the same realized change.

This distinction is important for astronomical cases, historical records, memory, and measurement. A later record can give reliable information about a prior event, but reliability of access does not make the record identical to the event. Nor does the delay between event and observation establish temporal agency. It establishes a record-propagation and observer-response relation.

The observer-instrument complex also has thresholds and failure modes. A detector may saturate, a telescope may distort, a memory may corrupt, a sensor may drift, and a model may misinterpret. These failures belong to the observer-instrument system and its processing chain. They do not alter the original event and do not indicate failure of time.

31. Propagation, Delay, and Access

Propagation is the physical transmission of a signal, record, influence, or disturbance through a path or medium. Delay is the offset between source realization and later access, reception, or effect within a receiving determinant situation. Access is the ability of a receiving system to record, respond to, or reconstruct the propagated content. These three concepts must not be confused with time as a physical substance.

The propagation relation can be written as

$$E_i \xrightarrow{\mathcal{P}_{\text{prop}}} R(E_i) \xrightarrow{\mathcal{P}_{\text{rec}}} O_i. \tag{80}$$

The first arrow denotes generation and propagation of a record or signal. The second denotes reception and recording. Each arrow refers to physical processes, not temporal agency.

Delay is represented by an offset:

$$\Pi_i = \text{Offset}(E_i, O_i; \mathcal{P}_{\text{prop}}, \mathcal{P}_{\text{rec}}). \tag{81}$$

The offset may depend on distance, medium, path curvature, scattering, absorption, instrument response, processing latency, or other physical conditions. These are determinant terms. They should not be renamed as time acting on the event.

Access can be reliable or distorted:

$$\text{Access}(O_i, E_i) \in \{\text{Reliable}, \text{Noisy}, \text{Delayed}, \text{Distorted}, \text{Lost}\}. \tag{82}$$

A distorted observation does not mean distorted time. It means the record path, reception system, or reconstruction model introduced distortion.

This section generalizes the astronomical argument. The same logic applies to sound, seismic waves, electromagnetic signals, neural signals, written records, sensor networks, and computational data. Propagation governs access to events; it does not create the physical realization of those events as time-caused processes.

32. Scale-Neutral Ontology

ITOF is scale-neutral in its governing assignment. It applies to microscopic, biological, mechanical, planetary, stellar, galactic, and cosmological systems without changing the ontological role of time. Scale changes the determinant content, not the fundamental distinction between ordered succession and physical realization.

The scale-neutral form may be written in compressed assignment notation as

$$\forall A \in \mathcal{S}^{\lambda}_{\text{phys}}, \quad \Delta X_A = \text{Resp}_A(\text{Eng}_A; \Theta_A, \Gamma^{\text{coh}}_A, R^{\text{cap}}_A, Q_A, \mathcal{K}_A), \tag{83}$$

where λ denotes the scale of selection. The value of λ may change the appropriate variables, response capacities, thresholds, and kind-specific physical organization of the selected system, but it does not introduce time as a cause. As elsewhere, the equation is read under the explicit state-output interpretation: response operator, realized response state, and realized change-content.

At microscopic scales, determinant engagement may involve quantum, molecular, electromagnetic, thermal, or chemical factors. At biological scales, it may involve metabolism, signaling, regulation, pressure, nutrients, toxins, pathogens, and tissue relations. At astronomical scales, it may involve gravity, radiation, plasma, mass distribution, orbital relations, fields, and surrounding matter. The determinant content changes; the law remains.

Scale-neutrality also prevents the mistake of saying that change-realization is local while ordered succession is cosmic, as if there were two different principles. Change-realization occurs wherever physical systems realize change. The same formal discipline applies at every scale. Ordered succession is invariant; realization is system-specific everywhere.

This makes ITOF suitable for cross-domain reasoning without turning into a loose analogy. A star is not a clock, a clock is not a cell, a cell is not a galaxy, and a galaxy is not a laboratory instrument. Yet each can be selected as a physical system and analyzed through determinant engagement and response.

33. Mathematical Status of ITOF Operators

The operators in ITOF are assignment operators, not claims that a single numerical function has already been specified for every domain. The notation Resp_A, Eng_A, Fact_A, and $\mathrm{InfSys}_{\to A}$ gives the formal structure of the explanation. Domain sciences may then supply specific equations, empirical values, and models.

The response operator has the general type

$$\mathrm{Resp}_A : \mathcal{D}_A \to \Omega_A^{\mathrm{resp}}, \tag{84}$$

where $\mathcal{D}_A$ is the determinant situation space for A, and Ω_A^{resp} is the response-state space of A. A realized response state is written as $\rho_A^{\mathrm{resp}} \in \Omega_A^{\mathrm{resp}}$, and realized change is assigned as $\Delta X_A = \mathrm{ChangeContent}_A(\rho_A^{\mathrm{resp}})$. This type statement prevents Resp_A from being read as a mysterious force. It is a formal operator notation for system-specific response mapping.

The engagement operator has the general type

$$\mathrm{Eng}_A : \mathrm{Fact}_A \times \mathrm{InfSys}_{\to A} \times \mathcal{P}_A \times \mathcal{B}_A \to \mathcal{D}_A. \tag{85}$$

This means that determinant engagement forms the determinant situation from factors, influencing systems, pathways, and boundary relations. The product notation in $\mathrm{Fact}_A \times \mathrm{InfSys}_{\to A} \times \mathcal{P}_A \times \mathcal{B}_A$ is an analytic domain statement, not a claim that factors and systems act as isolated independent causes. In ordinary physical cases, their relevance is interwoven within the selected determinant situation.

The time structure has a different mathematical type:

$$T_{\mathrm{ITOF}} = (S_{\mathrm{phys}}, \prec) \quad \text{with} \quad \prec \subseteq S_{\mathrm{phys}} \times S_{\mathrm{phys}}. \tag{86}$$

It is a relation over stages, not a response function and not an engagement function. This type difference is why time cannot be inserted into Fact_A or $\mathrm{InfSys}_{\to A}$ without category error.

Mathematical clarity therefore supports the ontological argument. A coordinate, ordering relation, response map, determinant set, and record function are different kinds of objects. Treating them as interchangeable is not precision; it is category collapse.

34. Methodological Closure

A completed ITOF analysis should end with a closed assignment statement. The statement should identify the selected system, determinant engagement, response conditions, realized change, and the role of ordered succession. It should also identify what is not being claimed. This prevents drift back into ambiguous language.

A closed assignment statement has the form

$$\mathrm{Close}_{\mathrm{ITOF}}(A) = [A, \mathrm{Det}_A, \mathrm{Eng}_A, \mathrm{Resp}_A, \rho_A^{\mathrm{resp}}, \mathrm{ChangeContent}_A, \Delta X_A, T_{\mathrm{ITOF}}]\,. \tag{87}$$

with the constraint

$$T_{\mathrm{ITOF}} \notin \mathrm{Det}_A\,. \tag{88}$$

This closure makes explicit that time belongs to ordered succession, not to determinant engagement.

Methodological closure also requires that measurement terms be assigned correctly. If the evidence comes from a clock, the clock is an instrument system. If the evidence comes from light, light is a record carrier. If the evidence comes from memory, memory is a present record-state. If the evidence comes from a model, the model is representational. None of these becomes the physical cause of the original change.

The closure rule is especially useful in disputed cases. When an explanation claims that time changed, slowed, accelerated, stretched, or acted, the ITOF method asks: which physical system changed? Which physical factors and influencing systems were involved? Which measurement system produced the reading? Which model interprets it? Which record carried the evidence? Once these questions are answered, temporal agency is no longer needed.

The final methodological position is therefore disciplined rather than merely negative. ITOF does not only say time is not a cause. It provides the alternative assignment structure required to explain change without temporal agency.

35. Material Systems: Heat, Pressure, and Structural Response

A material system illustrates the basic law without the complications of life, memory, or astronomical propagation. Let A_m be a selected material body. Its change under heat, pressure, impact, chemical exposure, or radiation must be assigned to the response of that body under determinant engagement. The factor alone is not the realized change, and time is not the acting cause.

A simple material assignment has the form

$$\Delta X_{A_m} = \mathrm{Resp}_{A_m}\Big(\mathrm{Eng}_{A_m}(\mathrm{Fact}_{A_m}, \mathrm{InfSys}_{\to A_m}); \Theta_{A_m}, \Gamma_{A_m}^{\mathrm{coh}}, R_{A_m}^{\mathrm{cap}}, Q_{A_m}, \mathcal{K}_{A_m}\Big)\,. \tag{89}$$

The terms may represent thermal expansion, deformation, cracking, melting, chemical alteration, phase transition, fatigue, or structural failure. The law does not dictate the specialized material equation. It dictates the assignment of realization.

If heat is relevant, heat belongs to Fact_{A_m}. If another body presses, strikes, shields, or supports A_m, that body belongs to $\mathrm{InfSys}_{\to A_m}$. If the material is enclosed, exposed, insulated, or constrained, those relations belong to pathways and boundary conditions. If the material remains within elastic range, the change is maintained or reversible. If it crosses yield or fracture threshold, the change becomes plastic, damaging, or failing.

The threshold distinction can be written as

$$\| \mathrm{Eng}_{A_m} \| \le Q^{\mathrm{elastic}}_{A_m} \Rightarrow \Delta X^{\mathrm{maint}}_{A_m}, \qquad \| \mathrm{Eng}_{A_m} \| > Q^{\mathrm{fracture}}_{A_m} \Rightarrow \mathrm{Failure}_{A_m}. \tag{90}$$

This equation does not replace engineering mechanics. It clarifies that the difference between maintained response and failure belongs to physical thresholds, not to time.

A material example also clarifies environment. Saying that the environment damaged the material is incomplete. The explanation must identify humidity, temperature, corrosive chemicals, pressure, radiation, vibration, contact systems, or other relevant determinants. The surrounding environment is a header for decomposition, not a cause that acts as one factor.

Material systems therefore show the simplest use of ITOF: selected system, determinant factors, influencing systems, boundary relations, thresholds, response, realized change, ordered succession. No temporal agency is required.

36. Biological Systems: Regulation, Viability, and Adaptive Response

A biological system is not exempt from determinant engagement. It is a physical system with a special response architecture. Its realized response depends on biological constitution, internal organization, cohesion, viability thresholds, regulatory capacity, sensory access, and adaptive capacities where present.

Let A be a biological system. Its response may be represented as

$$\begin{gathered} \rho^{\mathrm{resp,bio}}_A = \mathrm{Resp}^{\mathrm{bio}}_A\Big(\mathrm{Eng}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A}); \Theta_A, \Gamma^{\mathrm{coh}}_A, R^{\mathrm{cap}}_A, Q_A, \mathcal{K}_A\Big), \\ \Delta X^{\mathrm{bio}}_A = \mathrm{ChangeContent}_A\Big(\rho^{\mathrm{resp,bio}}_A\Big). \end{gathered} \tag{91}$$

Here Θ_A includes the living system's physical organization. Where realized, mind-capacity, perception, evaluation, decision-capacity, regulatory control, and motor capacity belong to that organization. These capacities vary in degree across living systems. They are not independent agencies outside the living system; they are physically realized properties of the living system and part of the way the system responds.

A biological system may respond to determinant engagement by regulation, adaptation, resistance, avoidance, repair, learning, motion, or failure. These are response modes, not effects of time:

$$\rho^{\mathrm{resp,bio}}_A \in \{\text{regulation, adaptation, resistance, avoidance, repair, learning, motion, failure}\}_A. \tag{92}$$

Motor capacity and actual motion must not be confused. Motor capacity belongs to the living system's constitution and response capacity. Actual motion is realized change when that capacity is actualized. If the moving living system is relevant as an influencing physical system for a selected affected system, its actual motion may contribute to that affected system's determinant situation only as a response-relevant influence contribution, $\mathrm{MotInf}_{A\to B}$, not as a transfer of the moving system's realized change into the affected system. The affected system's realized change, however, must still be assigned through its own response operator and response state.

Viability can be written as a threshold condition:

$$\mathrm{Viable}(A) \Leftrightarrow \left[\Gamma_A^{\mathrm{coh}} \geq Q_A^{\mathrm{viab}} \wedge R_A^{\mathrm{cap}} \geq Q_A^{\mathrm{reg}}\right]. \tag{93}$$

A living system remains viable when its cohesion and regulatory or response capacity remain above the relevant thresholds. It may still be changing continuously while remaining viable. Stability in a living system is therefore maintained change, not absence of change.

37. Mechanical and Engineered Systems

Mechanical and engineered systems are useful because they are deliberately constructed to produce predictable response patterns. A bridge, engine, sensor, clock, circuit, or machine has a designed structure and operational range. Its behavior can often be modeled with high precision, but that precision does not remove the need for determinant assignment.

Let A_e be an engineered system. Its operational response is

$$\Delta X_{A_e}^{\mathrm{op}} = \mathrm{Resp}_{A_e}^{\mathrm{design}}\Big(\mathrm{Eng}_{A_e}(\mathrm{Fact}_{A_e}, \mathrm{InfSys}_{\to A_e}); \Theta_{A_e}^{\mathrm{design}}, \Gamma_{A_e}^{\mathrm{coh}}, R_{A_e}^{\mathrm{cap}}, Q_{A_e}^{\mathrm{tol}}, \mathcal{K}_{A_e}\Big). \tag{94}$$

The threshold $Q_{A_e}^{\mathrm{tol}}$ represents design tolerance. It is a practical threshold, not perfect identity. Manufactured systems may be similar within tolerance while still differing physically.

Failure of an engineered system occurs when the response leaves the design range:

$$\Delta X_{A_e} \notin \Omega_{A_e}^{\mathrm{design}} \Rightarrow \mathrm{Failure}_{A_e} \ \text{ or } \ \mathrm{OutOfSpec}_{A_e}. \tag{95}$$

This applies directly to clocks. A clock is an engineered or selected regular-process system. It may remain within tolerance, drift outside tolerance, or fail. The output difference belongs to the clock and its physical process, not to damage or deformation of time.

Engineered systems also clarify the distinction between function and structure. A small structural change may not alter function if the system remains within tolerance. A small functional deviation may indicate a hidden structural problem. ITOF can represent both by selecting the relevant ΔX_A: structural, functional, positional, output, or stability change.

The engineered case therefore supports the general law while showing the role of design thresholds and measurement tolerance. It also makes clear why practical equivalence should not be confused with perfect ontological identity.

38. Chemical and Transformational Change

Chemical change illustrates transformation of composition and relation. A selected system may change because bonds form, break, rearrange, react, catalyze, dissolve, precipitate, oxidize, reduce, or polymerize. These changes are physical and chemical realizations, not temporal products.

For a chemical system A_c, determinant engagement may include reactants, catalysts, temperature, pressure, solvent, concentration, radiation, container boundary, and contact with other systems. The response is chemical transformation within a reaction space:

$$\Delta X_{A_c}^{\mathrm{chem}} = \mathrm{Resp}_{A_c}^{\mathrm{chem}}\Big(\mathrm{Eng}_{A_c}(\mathrm{Fact}_{A_c}, \mathrm{InfSys}_{\to A_c}); \Theta_{A_c}^{\mathrm{comp}}, Q_{A_c}^{\mathrm{react}}, \mathcal{K}_{A_c}\Big)\,. \tag{96}$$

The chemical composition $\Theta_{A_c}^{\mathrm{comp}}$ constrains which transformations are possible.

The same determinant factor may produce no reaction, slow reaction, reversible change, irreversible transformation, or explosive failure depending on thresholds and pathways. A catalyst may alter reaction pathway without being consumed in the same way as a reactant. A container may constrain pressure and temperature. A solvent may mediate contact. The explanation must therefore decompose determinant engagement rather than say merely that time allowed reaction.

Reaction duration is a measurement or model relation over process stages. It is useful for kinetics, comparison, and prediction. But duration does not cause the chemical transformation. The chemical transformation is realized by interacting substances and conditions under physical laws and response pathways. Time coordinates order and quantify stages; they do not replace the determinant chemistry.

This section shows why ITOF does not conflict with specialized sciences. Chemistry can keep its equations, rates, and mechanisms. ITOF adds a higher-level ontological discipline: do not assign the transformation to time when the determinant content lies in chemical factors, systems, pathways, and thresholds.

39. Thermodynamic and Energetic Descriptions

Thermodynamic and energetic descriptions often use time-indexed variables, rates, and process paths. ITOF does not reject these tools. It clarifies that energy transfer, heat flow, work, entropy change, phase transition, and equilibration are physical processes assigned to systems under determinant engagement, not actions of time.

For a thermodynamic system A_{th}, energetic change may be written generically as

$$\Delta X_{A_{th}}^{\mathrm{energy}} = \mathrm{Resp}_{A_{th}}^{\mathrm{therm}}\Big(\mathrm{Eng}_{A_{th}}(\mathrm{Fact}_{A_{th}}, \mathrm{InfSys}_{\to A_{th}}); \Theta_{A_{th}}, Q_{A_{th}}^{\mathrm{phase}}, \mathcal{K}_{A_{th}}^{\mathrm{boundary}}\Big)\,. \tag{97}$$

Boundary conditions are especially important here because open, closed, and isolated idealizations change the determinant analysis.

A system may approach equilibrium, depart from equilibrium, exchange heat, perform work, undergo phase change, or dissipate gradients. These descriptions are not temporal agency. They are physical changes indexed and measured through ordered stages. A time parameter may appear in a rate equation, but the rate equation represents how physical variables change; it does not make time the heat source, pressure source, or work agent.

The energy-transfer rule can be expressed as

$$\mathrm{EnergyTransfer}_{A\leftrightarrow B} \Rightarrow \left[\Delta X_A \wedge \Delta X_B \wedge \mathrm{Eng}_{A,B}(\mathrm{Fact}, \mathrm{InfSys})\right], \tag{98}$$

where the transfer relation belongs to interacting systems and relevant factors. The relation is ordered and measurable, but not caused by the ordering relation itself.

Thermodynamic examples therefore reinforce the framework's compatibility with quantitative science. ITOF does not remove equations of heat, work, or entropy. It prevents the symbolic parameter used to order process stages from being confused with the physical determinants of those stages.

40. Information, Representation, and Symbolic Outputs

Information and representation require special care because they often appear abstract. In ITOF, an information-bearing state is still realized in a physical substrate or symbolic system. A mark on paper, a digital bit, a neural memory, a sensor output, a spectral line record, or a clock reading is a physical or symbolic representation grounded in a physical change.

A representation can be written as

$$\mathrm{Rep}_R(E_i) = \mathrm{Encode}_R(\mathrm{Resp}_R(\mathrm{Eng}_R(E_i, \mathrm{InfSys}_{\to R}); \Theta_R, Q_R, \mathcal{K}_R)). \tag{99}$$

The record system R responds to an event, signal, or input and encodes a representation. The representation is not the original event.

Symbolic outputs are especially important for clocks. The number displayed by a clock is an encoded symbolic output of a physical process. It represents counted regularity under a convention. The number can be copied, transmitted, displayed, or misread. None of these operations makes the number identical to time.

The no-identity relation is

$$\mathrm{Rep}_R(E_i) \neq E_i, \qquad N_{A_{\mathrm{clock}}} \neq T_{\mathrm{ITOF}}. \tag{100}$$

This relation does not deny that representations can be accurate. It denies that accuracy collapses representation into original occurrence.

Information systems also have failure modes. Data may corrupt, memory may degrade, sensors may saturate, and symbolic conventions may be misapplied. These failures are changes in representation systems. They do not alter the original event and do not imply that time changed.

41. Causal Language and Safe Translation

Ordinary language often says that time changes things, heals, destroys, reveals, delays, ages, or causes. ITOF treats such statements as shorthand requiring translation. The safe translation returns the claim to physical factors, influencing systems, processes, thresholds, and system response.

The translation rule is

$$\text{Phrase(time caused } \Delta X_A) \Rightarrow \text{Translate}\begin{bmatrix} \text{Eng}_A(\text{Fact}_A, \text{InfSys}_{\to A}) \to \text{Resp}_A \to \rho_A^{\text{resp}} \\ \to \text{ChangeContent}_A \to \Delta X_A \end{bmatrix}. \quad (101)$$

This does not forbid ordinary speech in informal contexts. It forbids using ordinary speech as ontology.

For example, the phrase time aged the material should be translated into accumulated physical processes such as oxidation, stress, fatigue, radiation exposure, thermal cycles, chemical change, or biological degradation. The phrase time healed the wound should be translated into biological repair, immune response, tissue regeneration, and regulatory processes. The phrase time delayed the signal should be translated into propagation path, speed, medium, and processing offset.

The safe translation discipline protects ITOF from unnecessary conflict with everyday language while preserving precision in theory. Everyday phrases can remain as metaphors, but the formal framework must not promote them into causal assignments.

The formal exclusion remains

$$\text{Metaphor}(T_{\text{ITOF}}, \Delta X_A) \nRightarrow T_{\text{ITOF}} \in \text{Cause}(\Delta X_A). \quad (102)$$

The theory must be governed by assignment, not metaphor.

42. Version-Closure Principles for V22/F2

The present V22/F2 version is closed by a set of editorial and conceptual rules. First, time must never be reintroduced as an acting entity after being excluded. Second, environment must never replace direct determinant terms. Third, clocks must always be treated as physical measuring systems. Fourth, light must always be treated as a record carrier, not a carrier of time. Fifth, stability must be treated as maintained change rather than absence of change.

The closure constraint is

$$\begin{aligned} \text{Valid}_{\text{V22/F2}} \Rightarrow \Big[& T_{\text{ITOF}} \notin \text{Fact}_A \quad \wedge \quad T_{\text{ITOF}} \notin \text{InfSys}_{\to A} \quad \wedge \quad T_{\text{ITOF}} \notin \text{Cause}(\Delta X_A) \\ & \wedge\ \text{Env}_A^{\text{sur}} \notin \text{Cause}_{\text{indep}}(\Delta X_A) \\ & \wedge\ \Delta X_A = \text{ChangeContent}_A(\rho_A^{\text{resp}}) \Big]. \end{aligned} \quad (103)$$

Any section that violates this constraint must be revised.

The version also requires non-defensive treatment of relativity and measurement-language. The framework can acknowledge successful measurement schemes without adopting their ordinary-language ontology. It can accept clock differences without saying that time itself is a material system under stress. It can accept signal delay without multiplying ontological times.

The final editorial rule is that equations should clarify assignments rather than decorate the text. A governing equation is useful only when it prevents a conceptual transfer, defines a system relation, or establishes a response condition. Equations that merely repeat prose without controlling assignment should be removed or moved to an appendix.

This closure ensures that V22/F2 remains a coherent foundation rather than an accumulation of disconnected claims.

43. Practical Diagnostic Procedure

ITOF can be used diagnostically. When a proposed explanation is unclear, the analyst should not begin by debating the word time. The analyst should ask a sequence of physical-assignment questions. What is the selected system? What changed in that system? Which factors were physically relevant? Which influencing systems participated? Which pathways allowed engagement? Which thresholds were crossed or preserved? Which instrument produced the evidence? Which record carried the information? Which model interpreted the record?

The diagnostic procedure can be written as

$$\begin{aligned} \mathrm{Diag}_{\mathrm{ITOF}}(C) = (A, \mathrm{Fact}_A, \mathrm{InfSys}_{\to A}, \mathcal{P}_A, \mathcal{B}_A, Q_A), \\ (\,\mathrm{Eng}_A, \mathrm{Resp}_A, \rho_A^{\mathrm{resp}}, \mathrm{ChangeContent}_A, \Delta X_A, \mathrm{Evidence}\,). \end{aligned} \tag{104}$$

where C is the claim being analyzed. A claim is incomplete if one or more terms in the tuple is hidden by ordinary language, especially if the response state or change-content is replaced by the word time.

A common example is the claim that time degraded a material. The diagnostic reconstruction asks whether degradation was caused by oxidation, humidity, heat cycles, radiation, pressure, fatigue, chemical exposure, microbial action, or another physical determinant. Another example is the claim that time changed a clock. The reconstruction asks which physical conditions affected the clock process and how the clock system responded.

The diagnostic method is not merely philosophical. It improves scientific and technical descriptions by forcing determinant decomposition. It also prevents overgeneralization. Instead of saying that a system changed because enough time passed, the analyst must state which processes continued, accumulated, intensified, or crossed thresholds during the ordered succession of stages.

The diagnostic rule is

$$\mathrm{Claim}(T_{\mathrm{ITOF}} \to \Delta X_A) \Rightarrow \mathrm{Request}\,(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A}, \mathrm{Eng}_A, \mathrm{Resp}_A, Q_A)\,. \tag{105}$$

If the requested terms cannot be provided, the claim remains ontologically incomplete.

44. Cumulative Change and Accumulated Physical History

Some changes occur through accumulation. Wear, fatigue, aging of materials, biological development, memory formation, stellar evolution, and geological transformation may all involve many small realized changes that accumulate into a larger outcome. ITOF treats accumulation as repeated or continuous system response under determinant engagement, not as time acting by duration alone.

Let $\Delta X_A^{(k)}$ be a sequence of realized changes. The accumulated change is

$$\Delta X_A^{\text{acc}} = \text{Agg}\left(\Delta X_A^{(1)}, \Delta X_A^{(2)}, \ldots, \Delta X_A^{(n)}\right), \qquad S_A^{(1)} \prec S_A^{(2)} \prec \cdots \prec S_A^{(n)}. \tag{106}$$

The ordered sequence is necessary for accumulation to be described, but the physical content of accumulation lies in the repeated or continuous changes themselves.

A duration may correlate with accumulated change because determinant processes continue across ordered stages. However, the duration is not the determinant. The determinant is the continued engagement and response:

$$\text{Duration}(S_A^{(1)}, S_A^{(n)}) \not\Rightarrow \Delta X_A^{\text{acc}} \quad \text{without} \quad \sum_{k=1}^{n} \text{ChangeContent}_A\left(\rho_A^{\text{resp},k}\right). \tag{107}$$

where each $\rho_A^{\text{resp},k}$ is assigned by the response operator under the determinant engagement relevant to stage k. This equation blocks the phrase enough time caused it. The correct statement is that physical processes continued or accumulated through ordered stages.

Cumulative history also affects later response. A system that has undergone fatigue, stress, learning, damage, adaptation, or prior heating may respond differently to the next determinant engagement. The prior history is not time acting; it is retained physical alteration of the system.

The history-dependence relation is

$$\mathcal{H}_A^{(i)} = \text{Agg}\left(\Delta X_A^{(1)}, \ldots, \Delta X_A^{(i)}\right) \Rightarrow \rho_A^{\text{resp},\,i+1} = \text{Resp}_A(\text{Eng}_A^{(i+1)}; \Theta_A, \mathcal{H}_A^{(i)}, Q_A, \mathcal{K}_A). \tag{108}$$

This gives physical meaning to accumulated history without assigning agency to time. Prior physical history changes the later response state of the system; it is not time acting on the system.

45. Reversibility, Restoration, and Irreversibility

A system may be restored to a similar state after change. This does not mean that ordered succession has reversed or that the earlier stage has returned as the same occurrence. Restoration is a later physical change that produces similarity to a prior state. ITOF therefore distinguishes reversible process models, practical restoration, and ontological identity.

Practical restoration can be written as

$$S_A^{(i)} \prec S_A^{(j)} \prec S_A^{(k)} \quad \wedge \quad S_A^{(k)} \sim_\epsilon S_A^{(i)} \quad \Rightarrow \quad S_A^{(k)} \not\equiv_\prec S_A^{(i)}. \tag{109}$$

The later stage may be similar within tolerance, but it is still later.

Reversibility in a model means that variables can be mathematically mapped from one state description to another under specified conditions. It does not mean that the historical occurrence has been erased. A reversible equation may be valid for prediction or reconstruction while ordered succession remains non-retrograde.

Irreversibility occurs when system changes cannot be restored within relevant thresholds or when restoration would require a new process that does not recreate the same prior occurrence. Damage, death, fracture, burned material, lost information, and stellar collapse may all involve irreversible changes relative to the selected system and thresholds.

The irreversibility relation is

$$\mathrm{Irrev}_A \equiv \neg\exists S_A^{(k)} \left[S_A^{(k)} \sim_\epsilon S_A^{(i)} \text{ within required functional and structural thresholds} \right]. \tag{110}$$

Even if a later system resembles the earlier one superficially, exact ordered identity is not restored. This distinction is important for avoiding confusion between mathematical reversibility, practical repair, and ontological order.

46. Continuity and Discrete Stage Description

ITOF uses stages because change must be distinguishable, but it does not require that all physical processes be fundamentally discrete in the same way. A process may be modeled continuously, discretely, statistically, or through event thresholds. The framework only requires that distinguishable prior and subsequent stages be assignable for analysis.

For a continuous model, a state path can be written as

$$X_A : \Lambda \to \Omega_A, \qquad \lambda_1 \prec \lambda_2 \Rightarrow X_A(\lambda_1) \prec X_A(\lambda_2) \text{ as ordered descriptions.} \tag{111}$$

The parameter λ may be a model coordinate or index. It should not be mistaken for a physical cause.

For a discrete model, stages are written as

$$S_A^{(1)}, S_A^{(2)}, \ldots, S_A^{(n)}, \qquad S_A^{(i)} \prec S_A^{(i+1)}. \tag{112}$$

The discrete description is useful when thresholds, events, records, or measurements identify distinguishable stages.

The choice between continuous and discrete representation belongs to the model and the phenomenon. ITOF does not impose a single mathematical format. It imposes an ontological distinction: whatever the model format, realized change must be assigned to physical determinants and system response, while ordering remains ordering.

This also prevents a common observational mistake. A change that is not detected, not resolved, or not separately recorded is not thereby absent. It may remain below instrumental threshold, below classification threshold, or below the scale selected for analysis. The absence of observational access is therefore not identical to the absence of physical change.

$$\mathrm{NotObserved}(\Delta X_A) \not\Rightarrow \Delta X_A = 0. \tag{113}$$

Equation (113) does not say that every undetected change is known in detail. It says only that non-observation cannot be used as an ontological proof of changelessness.

This distinction is especially important in measurement. A continuous curve on a graph may represent changes in temperature, pressure, position, luminosity, or voltage. The curve is not the cause of those changes, and the horizontal coordinate is not the physical influence. The graph represents ordered values; the system realizes change.

47. Relation to Prediction and Explanation

Prediction and explanation are related but distinct. A model may predict future readings using variables and parameters, including time coordinates. Explanation in ITOF asks what physically realizes the predicted change. A successful prediction does not automatically settle the ontological assignment.

Predictive form may be written as

$$\widehat{X}_A^{(j)} = \mathcal{M}\left(X_A^{(i)}, \tau, \alpha\right), \tag{114}$$

where $\mathcal{M}$ is a model, τ is an interval or ordering parameter, and α denotes model parameters. The explanatory ITOF form is different:

$$\begin{aligned} \rho_A^{\mathrm{resp},\, i\to j} &= \mathrm{Resp}_A\left(\mathrm{Eng}_A^{(i\to j)}; \Theta_A, \Gamma_A^{\mathrm{coh}}, R_A^{\mathrm{cap}}, Q_A, \mathcal{K}_A\right), \\ \Delta X_A^{(i\to j)} &= \mathrm{ChangeContent}_A\left(\rho_A^{\mathrm{resp},\, i\to j}\right). \end{aligned} \tag{115}$$

The predictive model may be accurate while the explanatory assignment still requires determinant decomposition, response-state assignment, and change-content assignment.

This difference matters because many scientific equations use time as a parameter. ITOF does not deny the predictive role of such parameters. It denies that parameter use is evidence that time is a physical cause. A weather model, orbital model, decay model, or clock comparison can use time-indexing while the physical determinants remain pressure, radiation, gravity, interactions, material processes, or system response.

Explanation therefore requires more than temporal correlation. If a property changes after an interval, the interval alone is not the cause. The analysis must identify the processes that continued, accumulated, interacted, or crossed thresholds during that ordered succession.

48. Minimal and Expanded Forms of the Law

The central law can be written in compressed or explicit form depending on the required detail. The minimal compressed form is

$$\Delta X_A = \mathrm{Resp}_A(\mathrm{Eng}_A). \tag{116}$$

This form is useful only as a reminder. It is too compressed for serious application because it hides constitution, internal organization, kind-specific physical organization, cohesion, capacity, thresholds, determinant conditions, and the state-output distinction.

The standard explicit form is

$$\begin{gathered}\rho_A^{\mathrm{resp}} = \mathrm{Resp}_A\left(\mathrm{Eng}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A}); \Theta_A, \Gamma_A^{\mathrm{coh}}, R_A^{\mathrm{cap}}, Q_A, \mathcal{K}_A\right), \\ \Delta X_A = \mathrm{ChangeContent}_A(\rho_A^{\mathrm{resp}}) \,. \end{gathered} \tag{117}$$

This is the preferred form for V22/F2 when the assignment structure must be made explicit.

A domain-specific expanded form may add terms appropriate to the selected system:

$$\begin{gathered}\rho_A^{\mathrm{resp},\mathcal{D}} = \mathrm{Resp}_A^{\mathcal{D}}\left(\mathrm{Eng}_A^{\mathcal{D}}(\mathrm{Fact}_A^{\mathcal{D}}, \mathrm{InfSys}_{\to A}^{\mathcal{D}}); \Theta_A^{\mathcal{D}}, \Gamma_A^{\mathrm{coh},\mathcal{D}}, R_A^{\mathrm{cap},\mathcal{D}}, Q_A^{\mathcal{D}}, \mathcal{K}_A^{\mathcal{D}}\right), \\ \Delta X_A^{\mathcal{D}} = \mathrm{ChangeContent}_A^{\mathcal{D}}\left(\rho_A^{\mathrm{resp},\mathcal{D}}\right). \end{gathered} \tag{118}$$

The superscript $\mathcal{D}$ indicates a domain such as biological, mechanical, astronomical, chemical, or instrumental analysis. In a biological domain, physically realized mind-capacity, motor capacity, and related capacities, where present, belong to $\Theta_A^{\mathcal{D}}$, not as external agencies but as part of the living system's physical organization.

The expansion rule is conservative. Add a term only when it clarifies determinant assignment. Do not add terms that reintroduce environment as a vague cause, time as an agent, or model parameters as physical influences. The purpose of expansion is precision, not ornamentation.

49. Common Error Patterns and Corrections

The most common error is to replace determinant explanation with a temporal phrase. A statement such as time caused the change may be rhetorically familiar, but within ITOF it is not an explanation. Time is not a physical influencing factor: it has no matter, energy, constitutive character, intensity, range, mode of action, pathway, exchange relation, or threshold relation by which it could influence change. The temporal phrase therefore omits the selected system, physical factors, influencing systems, pathways, thresholds, and response. The correction is not merely to delete the word time. The correction is to reconstruct the physical assignment.

The correction pattern is

$$\begin{gathered}\mathrm{Err}_1 : T_{\mathrm{ITOF}} \to \Delta X_A \\ \rightsquigarrow \\ \mathrm{Corr}_1 : \mathrm{Eng}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A}) \to \mathrm{Resp}_A \to \rho_A^{\mathrm{resp}} \to \mathrm{ChangeContent}_A \to \Delta X_A. \end{gathered} \tag{119}$$

A second error is environmental substitution. The phrase "the environment caused the change" may be acceptable only as an informal preliminary description, but it is incomplete as an ITOF assignment. It must be decomposed into the actual physical factors, influencing physical systems, pathways, boundaries, and locality conditions relevant to the selected system. The environment itself is not a physical factor possessing determinant properties of its own.

The correction pattern is

$$\begin{gathered}\mathrm{Err}_2 : \mathrm{Env}_A^{\mathrm{sur}} \to \Delta X_A \\ \rightsquigarrow \\ \mathrm{Corr}_2 : \mathrm{Decompose}(\mathrm{Env}_A^{\mathrm{sur}}) \to \mathrm{Eng}_A \to \mathrm{Resp}_A \to \rho_A^{\mathrm{resp}} \to \mathrm{ChangeContent}_A \to \Delta X_A.\end{gathered} \tag{120}$$

A third error is measurement transfer. A clock reading, graph coordinate, or model variable may be treated as if it were the physical source of the process. The correction is to identify the measuring system and the measured process separately.

The correction pattern is

$$\mathrm{Err}_3 : N_I \equiv X_A \quad \rightsquigarrow \quad \mathrm{Corr}_3 : N_I = \mathrm{Out}_I(\mathrm{Resp}_I) \text{ representing } X_A \text{ within tolerance.} \tag{121}$$

A fourth error is record-event collapse. A record may be confused with the original event. The correction is to separate source realization, record preservation, propagation, reception, and interpretation.

The correction pattern is

$$\mathrm{Err}_4 : \mathrm{Record}(E_i) = E_i \quad \rightsquigarrow \quad \mathrm{Corr}_4 : E_i \to \mathrm{Record}(E_i) \to O_i, \quad \mathrm{Record}(E_i) \neq E_i. \tag{122}$$

These corrections are included to make the framework operational. They also prevent the present version from returning to ambiguities that prior formulations may have allowed.

50. Controlled Use of the Word Time

The word time can still appear in the manuscript, but its meaning must be controlled. In formal ITOF usage, time means invariant ordered succession, written $T_{\mathrm{ITOF}} = (S_{\mathrm{phys}}, \prec)$. It does not mean a substance, a field, a force, a flow, a container, an invisible agent, or the internal process of a clock.

The controlled-use rule is

$$\begin{aligned}\mathrm{Use}(\mathrm{time}) \Rightarrow \big[&\text{meaning is } T_{\mathrm{ITOF}} = (S_{\mathrm{phys}}, \prec) \\ &\vee \ \text{meaning is operational and instrument-bound}\big].\end{aligned} \tag{123}$$

If the word appears in an operational context, the text must specify that it refers to clock coordinates, model parameters, or conventional measurement schemes, not to ontological agency.

The manuscript should avoid phrases that personify time. It should not say that time acts, produces, carries, heals, destroys, controls, arranges, pushes, pulls, stretches, stores, remembers, or transmits. If such phrases are quoted or discussed, they must be translated into determinant physical language.

The preferred expression is ordered succession of realized stages. This expression is longer than the word time, but it prevents conceptual transfer. When brevity is needed, T_{ITOF} can be used, provided the non-agency rule remains active.

The controlled-use rule is not merely editorial. It is necessary because the entire framework depends on preventing the re-entry of temporal agency through ordinary language. Once time is allowed to act metaphorically inside formal claims, the distinction between ordering and realization collapses.

51. Why the Framework Is Not Merely Semantic

A possible objection is that ITOF only changes language. This objection fails because the framework changes assignment structure. It does not merely replace one word with another; it requires the analyst to identify selected systems, determinant factors, influencing systems, pathways, thresholds, response capacities, measuring systems, records, and models.

A semantic replacement would be

$$\text{time caused change} \quad \mapsto \quad \text{ordered succession caused change.} \tag{124}$$

ITOF does not make this replacement. It explicitly rejects it. The correct transformation is

$$\begin{gathered}\text{time caused change} \quad \mapsto \quad \text{physical determinants engaged a selected system,} \\ \text{whose response realized change under ordered succession.}\end{gathered} \tag{125}$$

This is a structural change in explanation.

The framework is also not merely semantic because it yields different diagnostic questions. It asks whether the system changed or the instrument changed. It asks whether a record is being confused with an event. It asks whether a propagation offset is being confused with multiple times. It asks whether stability is being confused with changelessness. These questions alter analysis, not just vocabulary.

The framework also constrains equations. A valid equation must keep response, engagement, and ordering in their proper mathematical roles. It must not insert T_{ITOF} into the determinant set as if it were heat, pressure, radiation, force, or field. This is a formal constraint, not a stylistic preference.

Therefore ITOF is an ontological assignment framework. Its language matters because language carries assignments, but the theory is not reducible to wording. Its main contribution is the disciplined relocation of change-realization from temporal agency to physical determinant response.

52. Extended Domain Illustration: Clocks under Physical Stress

Consider a clock exposed to heat, impact, pressure, electromagnetic disturbance, power instability, or gravitational condition. The ordinary phrase the clock measured a different time hides the actual physical assignment. The clock is a selected physical system. Its internal regular process is affected by determinant engagement. Its output is a symbolic representation generated by the clock response. The change belongs first to the clock system and its process.

Let C be a clock and P_C its selected regular process. The clock output is

$$N_C = \mathrm{Sym}\left(\mathrm{Count}(P_C)\right). \tag{126}$$

If a physical stress changes the clock process, the process change is

$$\Delta P_C = \mathrm{Resp}_C\left(\mathrm{Eng}_C(\mathrm{Fact}_C, \mathrm{InfSys}_{\to C}); \Theta_C, \Gamma_C^{\mathrm{coh}}, R_C^{\mathrm{cap}}, Q_C, \mathcal{K}_C\right). \tag{127}$$

The output difference then follows from the altered process or altered symbolic conversion:

$$\Delta N_C = \mathrm{Out}_C(\Delta P_C, \Delta\,\mathrm{Sym}_C). \tag{128}$$

None of these equations requires time to be damaged, slowed, accelerated, or deformed. The changed entity is the clock system, the process, the conversion, the output, or the comparison protocol.

This matters because clocks are often granted an exceptional ontological status. ITOF denies that exceptional status. A clock is an instrument, not a privileged window into a time-substance. It is more like a thermometer, voltmeter, or pressure gauge than like a metaphysical detector of time. It is useful because its selected process is regular under specified conditions and conventionally mapped to numbers.

When two clocks disagree, the immediate inference should not be that two times exist. The first inference should be that two physical clock systems, pathways, histories, or conditions differ. The comparison relation is

$$\Delta N_{C_1C_2} = N_{C_1} - N_{C_2} \Rightarrow \mathrm{Compare}\left(P_{C_1}, P_{C_2}, \Theta_{C_1}, \Theta_{C_2}, \mathrm{Fact}_{C_1}, \mathrm{Fact}_{C_2}, \mathcal{K}_{C_1C_2}\right). \tag{129}$$

This comparison may be scientifically important, but the measured difference remains a relation among physical measuring systems and models.

53. Extended Domain Illustration: Memory and Historical Reconstruction

Memory is often described as access to the past. ITOF translates this into physical record terms. A memory state is a present system state causally or representationally connected to a prior event. It can preserve information, but it does not bring the original event back as the same occurrence. The memory system itself changes when a memory is formed, stored, altered, retrieved, or lost.

Let $M_A(E_i)$ denote a memory or stored record in system A associated with event E_i. Then

$$\begin{gathered}\rho_A^{\mathrm{resp}}(E_i) = \mathrm{Resp}_A(\mathrm{Eng}_A(E_i, \mathrm{InfSys}_{\to A}); \Theta_A, Q_A, \mathcal{K}_A),\\ M_A(E_i) = \mathrm{Store}_A\left(\rho_A^{\mathrm{resp}}(E_i)\right).\end{gathered} \tag{130}$$

The memory is a stored effect or representation. The identity exclusion is

$$M_A(E_i) \neq E_i. \tag{131}$$

Retrieval is a later response:

$$\text{Retrieve}_A(M_A(E_i)) = \text{ChangeContent}_A[\text{Resp}_A\left(\text{Eng}_A(M_A(E_i), \text{InfSys}_{\to A}); \Theta_A, Q_A, \mathcal{K}_A\right)]. \tag{132}$$

Retrieval may be accurate, partial, distorted, reconstructed, or failed. These outcomes belong to the response state of the memory system and its retrieval conditions.

Historical reconstruction follows the same pattern. A fossil, document, data archive, instrument log, astronomical spectrum, or human recollection is a record. The record can support knowledge of prior events, but it remains a subsequent physical or symbolic state. The original event remains prior in ordered succession.

This distinction protects ITOF from a subtle error. If memory appears to make a prior event present in thought, one might suppose that time has been crossed or reversed. ITOF denies this. What occurs is a present response of a memory system to a stored record. Ordered succession remains unchanged.

54. Extended Domain Illustration: Stellar Evolution without Temporal Agency

Stellar evolution is often described over long intervals, but long interval description must not be confused with temporal agency. A star evolves because its internal determinants, mass distribution, nuclear processes, radiation transport, gravitational balance, composition, rotation, magnetic fields, and surrounding relations produce changing response regimes. The interval orders and measures the process; it does not cause the stellar transformation.

Let $S_\star^{(k)}$ be stellar stages. The ordered sequence is

$$S_\star^{(1)} \prec S_\star^{(2)} \prec \cdots \prec S_\star^{(n)}. \tag{133}$$

The physical transition between stages is assigned through the stellar response state:

$$\begin{gathered} \rho_{S_\star}^{\text{resp},k} = \text{Resp}_{S_\star}^{(k)}\left(\text{Eng}_{S_\star}^{(k)}(\text{Fact}_{S_\star}^{(k)}, \text{InfSys}_{\to S_\star}^{(k)}); \Theta_{S_\star}^{(k)}, \Gamma_{S_\star}^{\text{coh},k}, R_{S_\star}^{\text{cap},k}, Q_{S_\star}^{(k)}, \mathcal{K}_{S_\star}^{(k)}\right), \\ S_\star^{(k)} \to S_\star^{(k+1)} \Leftarrow \text{ChangeContent}_{S_\star}\left(\rho_{S_\star}^{\text{resp},k}\right). \end{gathered} \tag{134}$$

This equation states that each transition belongs to stellar determinants, the stellar response state, and the change-content of that response state, not to the mere fact that an interval has elapsed.

A stable stellar phase is maintained response. A transition to instability occurs when thresholds change or are crossed. A collapse, flare, mass loss, spectral change, or luminosity change is not a time-event in the sense of temporal agency. It is stellar change realized under physical determinants.

Observation of stellar evolution adds record propagation. A later observer may receive records from earlier stellar stages. The difference between source realization and observed access may be large, but the large delay does not create a second ontology of time. It creates a record-access relation.

The final stellar rule is

$$\text{StellarEvolution}(S_\star) \Rightarrow \text{Ordered}\left(S_\star^{(1)}, \ldots, S_\star^{(n)}\right) \wedge \bigwedge_{k=1}^{n-1} \text{PhysTrans}(S_\star^{(k)} \to S_\star^{(k+1)}). \tag{135}$$

The first part is ordering; the second part is physical transition. ITOF keeps them distinct.

55. Extended Domain Illustration: Social and Human-Scale Uses

Human-scale language frequently uses time as shorthand for complex physical, biological, psychological, and social processes. People say that time healed, time changed a person, time destroyed a building, time revealed the truth, or time solved a problem. ITOF does not treat these phrases as formal ontology. It translates them into physical, biological, informational, institutional, or behavioral processes.

For a person or organism A_h, a long-term change may involve biological aging, memory formation, learning, injury, repair, habit formation, social influence, environmental exposure, nutrition, disease, stress, and many other determinants. The interval during which these processes occur is not the cause. The continuing processes and responses are the cause.

The human-scale translation is

$$\text{HumanPhrase}(\text{time changed } A_h) \rightsquigarrow \text{Processes}_{A_h}^{\text{bio,psy,soc}} \to \text{Resp}_{A_h} \to \rho_{A_h}^{\text{resp}} \to \Delta X_{A_h}. \tag{136}$$

Here the biological, psychological, and social processes are determinant and response conditions of the selected human-scale system; they do not convert time into an acting agency.

This equation does not reduce human life to a simple mechanical model. It only enforces the distinction between ordered succession and determinant change.

Similarly, a building does not decay because time attacks it. It decays through weathering, load, corrosion, humidity, material fatigue, biological growth, thermal cycles, maintenance absence, and other determinants. A society does not change because time acts on it. It changes through decisions, institutions, technologies, conflicts, resources, environments, communications, and human systems.

This section is included because the framework may otherwise be misread as denying ordinary experience. ITOF does not deny that many changes are noticed across intervals. It denies that the interval itself is the physical agent. Human language can remain expressive, but formal explanation must return to determinants.

56. Extended Examples of Assignment Closure

The following examples illustrate how the central law should close an explanation. They are not empirical case studies and do not replace domain-specific science. They are assignment examples designed to show how the same framework treats different systems without changing the ontological role of time.

For a heated metal rod, the selected system is the rod. The relevant factors may include heat input, ambient temperature, contact relation, material composition, and boundary constraint. The influencing systems may include a flame, heater, container, support, or surrounding medium. The change may be expansion, deformation, phase transition, or failure. The ITOF closure is that the rod realizes change through material response under determinant engagement. The ordered succession of stages allows before and after to be distinguished, but it does not heat the rod.

For a biological wound, the selected system may be tissue, organ, or organism depending on the analysis. The relevant factors include injury, blood flow, immune response, cellular repair, infection risk, nutrients, pressure, temperature, and treatment systems. The change may be inflammation, repair, scarring, infection, or failure. The statement time healed the wound is therefore translated into regulatory and repair processes under ordered succession. Time did not heal; the living system responded.

For a clock exposed to high temperature, the selected system is the clock or a clock component. The relevant factors include thermal stress, material expansion, oscillator behavior, power stability, friction, and electronic or mechanical tolerances. The change may be drift, malfunction, or failure. The clock reading changes because the clock system changes or because its process-output relation changes. Time is not the object damaged.

For a remote supernova observation, the selected source system is the stellar system and the selected observer system is the telescope-detector-recording complex. The source event is realized in the star. The light-borne record propagates. The observer-instrument complex records the arriving signal. The observational delay belongs to propagation offset. It does not imply that the star possessed a separate private time or that light carried time.

For a digital archive, the selected system is the storage medium or information system. The relevant factors include charge states, magnetic states, material degradation, software operations, copying, power, radiation, and error correction. The archive preserves records, but a stored record is not the original event. Corruption of the archive is change in the archive system, not change in the recorded historical event.

For each case, the closure has the same form:

$$\begin{aligned}\mathrm{ExampleClosure}(A) \Rightarrow \big[&\mathrm{Select}(A), \mathrm{Decompose}(\mathrm{Det}_A), \mathrm{Assign}(\mathrm{Resp}_A), \mathrm{Assign}(\rho_A^{\mathrm{resp}}), \\ &\mathrm{Assign}(\mathrm{ChangeContent}_A), \mathrm{Exclude}(T_{\mathrm{ITOF}} \in \mathrm{Cause})\big].\end{aligned} \tag{137}$$

This form is the practical use of the framework.

57. Preservation of Scientific Measurement without Temporal Ontology

A central advantage of ITOF is that it does not require the rejection of scientific measurement. It permits clocks, coordinates, rates, intervals, models, graphs, and predictions. It rejects only the ontological transfer from measurement success to temporal agency. Scientific practice remains intact, but the explanatory assignment becomes more precise.

A rate equation may use a time parameter. A clock comparison may use interval readings. An astronomical model may use light-travel delay. A chemical kinetic model may express change per unit time. None of these practices is denied. The correction is that the parameter orders or measures the process; it is not the physical determinant that produces the process.

The preservation rule is

$$\mathrm{ValidMeasurement}(M) \not\Rightarrow \mathrm{TemporalAgency}(T_{\mathrm{ITOF}}). \tag{138}$$

The rule protects both sides. It protects measurement from being dismissed and protects ontology from being inflated by measurement language.

This distinction is especially important when discussing established physical theories. ITOF does not need to deny that a theory can accurately compare clock readings under different physical conditions. It asks what physical systems are being compared, what processes generate their readings, what determinants affect those processes, and what model interprets the comparison. This converts a metaphysical claim into a physical assignment.

The result is a disciplined compatibility. Operational theories may keep their tools. ITOF supplies the rule that prevents those tools from being treated as evidence that time is matter, energy, force, field, medium, physical factor, influencing system, or causal agency.

58. Internal Consistency Requirements

The framework must remain internally consistent from abstract to appendix. The first consistency requirement is that T_{ITOF} must always mean invariant ordered succession. It must not later become a cause, field, medium, storage device, flow, or hidden physical condition. If a section uses time-language operationally, it must explicitly bind that usage to clocks, coordinates, or model parameters.

The second requirement is determinant explicitness. Whenever a change is explained, the physical factors and influencing physical systems must be recoverable from the text. If the explanation uses environment, context, circumstance, or condition, those terms must be decomposed or clearly marked as descriptive aggregations.

The third requirement is response ownership. The realized change must belong to the selected system's response. If an external factor is mentioned, the text must not treat that factor as identical to the change. Heat is not the expansion; pressure is not the deformation; radiation is not the biological damage; light is not the observation; a clock reading is not time.

The fourth requirement is threshold clarity. Stability, adaptation, class preservation, and failure must be distinguished by thresholds. Without thresholds, the framework cannot explain how systems can change while remaining stable or how small accumulated changes can eventually become failure.

The fifth requirement is record separation. Original event, record, propagation, observation, memory, and interpretation must remain distinct. This is essential for astronomical and historical cases. A later record can represent a prior event without becoming that event.

The consistency requirements can be summarized as

$$\begin{aligned}\text{Consistent}_{\text{ITOF}} \Rightarrow \big[T_{\text{ITOF}} \equiv (S_{\text{phys}}, \prec),\\ \text{DetExplicit}, \text{ResponseOwned},\\ \text{ThresholdClear}, \text{RecordSeparated}\,\big].\end{aligned} \tag{139}$$

Any statement or manuscript passage that violates these requirements should be revised before publication.

59. Research Program and Limits

ITOF V22/F2 is a foundational assignment framework. It does not attempt to replace all domain equations in mechanics, thermodynamics, biology, astronomy, chemistry, information theory, or relativity. Its role is to clarify what kind of entity time is not, what kind of relation ordered succession is, and how physical change should be assigned to systems under determinant engagement.

The research program opened by the framework is to apply the central law carefully across domains. In materials, it asks how thresholds distinguish maintained change from damage. In biology, it asks how regulatory response modifies determinant engagement. In clock physics, it asks how physical conditions alter measuring systems. In astronomy, it asks how source events, records, propagation, and observation should be separated. In modeling, it asks how coordinates and parameters should be interpreted without ontological inflation.

The limits are equally important. ITOF should not be used as a shortcut for empirical work. It does not calculate a star's luminosity, a chemical reaction rate, a biological repair time, or a clock drift magnitude without domain-specific models. It provides the ontological placement of those models. It says where change belongs and where time does not belong.

This limit is a strength. A framework that tries to replace every domain model becomes vague or false. A framework that fixes assignment can remain precise while allowing specialized sciences to supply quantitative content.

The correct relation to domain science is

$$\text{DomainModel}_{\mathcal{D}} + \text{ITOF Assignment} \Rightarrow \text{Physically Interpreted Explanation}_{\mathcal{D}}\,. \tag{140}$$

This relation gives ITOF its proper scope.

60. Formal Governing Equations

The governing equations are collected here in the main body because the framework depends on a small number of assignments. Each equation is intended to control a particular error. The equations do not replace empirical domain models. They state the ontological discipline under which such models should be interpreted.

The ordered succession equation is

$$T_{\mathrm{ITOF}} = (S_{\mathrm{phys}}, \prec). \tag{141}$$

It defines time in ITOF as invariant prior–subsequent ordering among realized stages, not as an acting object.

The non-agency and non-factor equation is

$$\begin{aligned}
&T_{\mathrm{ITOF}} \notin \mathrm{Fact}_A, \\
&T_{\mathrm{ITOF}} \notin \mathrm{InfSys}_{\to A}, \\
&T_{\mathrm{ITOF}} \notin \mathrm{PhysDet}_A, \\
&T_{\mathrm{ITOF}} \notin \mathrm{Cause}(\Delta X_A), \\
&T_{\mathrm{ITOF}} \notin \mathrm{Influence}(\Delta X_A), \\
&T_{\mathrm{ITOF}} \notin \mathrm{Medium}(\Delta X_A), \\
&T_{\mathrm{ITOF}} \notin \mathrm{Organizer}(\Delta X_A), \\
&T_{\mathrm{ITOF}} \notin \mathrm{Signal}(\Delta X_A), \\
&T_{\mathrm{ITOF}} \notin \mathrm{Record}(\Delta X_A).
\end{aligned} \tag{142}$$

This compressed equation summarizes the exclusion of time from physical-factor status, influencing-system status, determinant status, and temporal agency. Time is not matter, energy, force, field, medium, signal, record, or physical determinant.

The physical-factor criterion can also be written as

$$\begin{gathered}
F_i \in \mathrm{Fact}_A \Rightarrow \left[\begin{array}{l} F_i \text{ has physical constitution, mode of action,} \\ \text{pathway relevance, and threshold relation to } A \end{array} \right], \\
T_{\mathrm{ITOF}} \notin \mathrm{Fact}_A\,.
\end{gathered} \tag{143}$$

Equation (143) prevents time from being reintroduced as an unnamed physical factor. T_{ITOF} denotes the prior–subsequent ordering relation and may be used in operational language for indexing or measuring ordered stages, but it does not order, arrange, or physically organize those stages as an active agency. The determinant-decomposition equation is

$$\mathrm{PhysDet}_A^{\mathrm{rel}} = (\mathrm{Fact}_A, \mathrm{InfSys}_{\to A}, \mathcal{P}_A, \mathcal{B}_A, Q_A, \mathcal{K}_A)\,. \tag{144}$$

This means that physical-determinant analysis must be decomposed into physical factors, influencing physical systems, pathways, boundary relations, thresholds, and bounded determinant conditions.

The central law in explicit state-output form is

$$\begin{gathered}
\rho_A^{\mathrm{resp}} = \mathrm{Resp}_A\Big(\mathrm{Eng}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A}); \Theta_A, \Gamma_A^{\mathrm{coh}}, R_A^{\mathrm{cap}}, Q_A, \mathcal{K}_A\Big)\,, \\
\Delta X_A = \mathrm{ChangeContent}_A(\rho_A^{\mathrm{resp}})\,.
\end{gathered} \tag{145}$$

This equation assigns realized change to the change-content of the selected system's realized response state under determinant engagement.

The environment-decomposition rule is

$$\begin{gathered}\mathrm{Env}_A^{\mathrm{sur}} = \mathrm{Agg}_{\mathrm{sur}}(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A}, \mathcal{P}_A, \mathcal{B}_A, \mathcal{L}_A)\,, \\ \mathrm{Env}_A^{\mathrm{sur}} \notin \mathrm{Cause}(\Delta X_A) \quad \text{as a physical factor in itself.}\end{gathered} \tag{146}$$

This prevents environment from becoming a vague substitute for direct determinant terms and preserves its status as a descriptive aggregation whose qualitative content varies according to the actual factors, systems, pathways, and boundary relations present in the selected case. The recurrence rule is

$$S_A^{(i)} \prec S_A^{(j)} \wedge S_A^{(j)} \sim S_A^{(i)} \Rightarrow S_A^{(j)} \not\equiv_{\prec} S_A^{(i)}. \tag{147}$$

Similarity does not erase ordered difference.

The motion-subclass rule is

$$\mathrm{Motion}_A \equiv \Delta_{\mathrm{pos}}(A), \qquad \Delta_{\mathrm{pos}}(A) \neq 0 \Rightarrow \Delta X_A \neq 0, \qquad \Delta X_A \neq 0 \not\Rightarrow \Delta_{\mathrm{pos}}(A) \neq 0. \tag{148}$$

Motion is change, but not all change is motion. In living systems, motor capacity, where present, is a kind-specific physical property of the system. In nonliving systems, rotational, orbital, translational, or other kinematic profiles may belong to the physical state or dynamical organization of the system. Actual motion is realized change of the moving system. When a moving system is relevant as an influencing physical system for a selected affected system, its motion may contribute to that affected system's determinant situation; the affected system's realized change must still be assigned through its own response.

The stability rule is

$$\mathrm{Stab}_A \equiv \left[\|\Delta X_A^{\mathrm{maint}}\| \le Q_A^{\mathrm{class}} \wedge \mathrm{FailureRisk}_A < Q_A^{\mathrm{fail}}\right]. \tag{149}$$

Stability means maintained change within classification and failure thresholds.

The clock rule is

$$\boxed{\begin{aligned} N_{A_{\mathrm{clock}}} &= \mathrm{Sym}(\mathrm{Count}(P_{A_{\mathrm{clock}}})) \\ \not\Rightarrow \quad N_{A_{\mathrm{clock}}} &= T_{\mathrm{ITOF}} \end{aligned}} \tag{150}$$

A clock reading is a symbolic count of a selected physical process, not time itself.

The record rule is

$$\mathrm{Record}(E_i) = \mathcal{R}(E_i; \Theta_R, \mathrm{Eng}_R(\mathrm{Fact}_R, \mathrm{InfSys}_{\to R}), \mathcal{P}_{\mathrm{rec}}) \quad \wedge \quad \mathrm{Record}(E_i) \neq E_i. \tag{151}$$

A record preserves an effect or representation; it is not the original event.

The astronomical propagation rule is expressed at the level of source-index and observation-index values:

$$\iota_{\mathrm{obs}}(O_j) - \iota_{\mathrm{obs}}(O_i) = [\iota_{\mathrm{src}}(E_j) - \iota_{\mathrm{src}}(E_i)] + (\Pi_j - \Pi_i). \tag{152}$$

For equal propagation offsets, the observed index-separation equals the source index-separation:

$$\Pi_j = \Pi_i \Rightarrow \iota_{\mathrm{obs}}(O_j) - \iota_{\mathrm{obs}}(O_i) = \iota_{\mathrm{src}}(E_j) - \iota_{\mathrm{src}}(E_i). \tag{153}$$

Propagation affects observational access, not ontological ordering.

The light-speed closure is

$$c_\gamma \in \mathrm{Det}(\Pi_i) \quad \wedge \quad c_\gamma \notin \mathrm{Det}(T_{\mathrm{ITOF}}) \quad \wedge \quad c_\gamma \notin \mathrm{Cause}(E_i \prec E_j). \tag{154}$$

Light speed may determine how a physical record propagates and when it becomes accessible, but it does not determine, transport, modify, or produce the prior–subsequent ordering of the source events themselves.

61. Astronomical Source-Record Formalism

Let $S_\star$ be a distant stellar system and let $A_\oplus$ be an Earth-based observer-instrument system. A source event E_i is realized in $S_\star$ by the same general law:

$$\Delta X_{S_\star}^{(i)} = \mathrm{Resp}_{S_\star}\Big(\mathrm{Eng}_{S_\star}(\mathrm{Fact}_{S_\star}, \mathrm{InfSys}_{\to S_\star}); \Theta_{S_\star}, \Gamma_{S_\star}^{\mathrm{coh}}, R_{S_\star}^{\mathrm{cap}}, Q_{S_\star}, \mathcal{K}_{S_\star}\Big). \tag{155}$$

The event is not produced by the time required for its light to arrive at Earth. It is realized in the stellar system under stellar determinants.

The light-borne record relation is

$$E_i \longrightarrow R_\gamma(E_i) \longrightarrow O_i. \tag{156}$$

Here $R_\gamma(E_i)$ denotes the propagating physical record associated with the source event, and O_i denotes the observation or instrument record produced at Earth. The chain does not say that light carries time. It says that light carries a physical record generated by the source event.

Light does not carry time, and light speed does not modify time; both belong to record propagation, while T_{ITOF} remains invariant prior–subsequent ordering between realized stages.

The speed of light belongs to the propagation conditions of the record, not to the constitution, production, or modification of time. It may affect the propagation offset by which a record becomes accessible to an observer, but it does not affect T_{ITOF} as invariant prior–subsequent ordering. Light does not create the succession between a pre-change state and a post-change state; it only carries a physical record from a realized source event to an observer-instrument system.

This distinction may be written as

$$\boxed{c_\gamma \in \mathrm{Det}(\Pi_i) \quad \wedge \quad c_\gamma \notin \mathrm{Det}(T_{\mathrm{ITOF}}) \quad \wedge \quad c_\gamma \notin \mathrm{Cause}(E_i \prec E_j)} \tag{157}$$

where c_γ denotes the light-propagation speed relevant to the record path, and Π_i denotes the propagation offset of the record associated with E_i. Equation (157) means that light speed may condition propagation offset and observational access, but it does not determine, modify, transport, produce, stretch, slow, accelerate, or carry invariant prior–subsequent ordering.

Introduce a propagation offset Π_i for the record of E_i at the level of observational indexing:

$$\iota_{\text{obs}}(O_i) = \iota_{\text{src}}(E_i) + \Pi_i. \tag{158}$$

This is not an ontological addition of time to the event. It is a representation of the delay between source realization and observational access.

For two source events E_i and E_j, the observed index-separation is

$$\boxed{\iota_{\text{obs}}(O_j) - \iota_{\text{obs}}(O_i) = [\iota_{\text{src}}(E_j) - \iota_{\text{src}}(E_i)] + (\Pi_j - \Pi_i)} \tag{159}$$

If propagation offsets are effectively equal, then

$$\Pi_j \approx \Pi_i \Rightarrow \iota_{\text{obs}}(O_j) - \iota_{\text{obs}}(O_i) \approx \iota_{\text{src}}(E_j) - \iota_{\text{src}}(E_i). \tag{160}$$

This is the precise form of the star-record argument. Once the first light-borne record has arrived, later records from the same stable propagation regime preserve the source separation up to changes in propagation offset.

If the path or medium changes, then $\Pi_j - \Pi_i$ may not be zero. In that case the observed index-separation includes propagation irregularity:

$$\Pi_j \neq \Pi_i \Rightarrow \iota_{\text{obs}}(O_j) - \iota_{\text{obs}}(O_i) \neq \iota_{\text{src}}(E_j) - \iota_{\text{src}}(E_i) \quad \text{only by propagation-offset difference.} \tag{161}$$

This irregularity affects observational access. It does not mean that the source has a different kind of time or that time has been stretched, transported, or carried by light as a physical substance.

The observer-instrument system also realizes its own change when it receives the record:

$$\Delta X^{(i)}_{A_\oplus} = \text{Resp}_{A_\oplus}\Big(\text{Eng}_{A_\oplus}(R_\gamma(E_i), \text{InfSys}_{\to A_\oplus}); \Theta_{A_\oplus}, \Gamma^{\text{coh}}_{A_\oplus}, R^{\text{cap}}_{A_\oplus}, Q_{A_\oplus}, \mathcal{K}_{A_\oplus}\Big). \tag{162}$$

Thus astronomical observation contains at least two system responses: source-system change and observer-instrument recording. ITOF keeps them distinct.

The correct conclusion is therefore:

$$\begin{aligned} \text{AstrObs}(E_i) \Rightarrow \big[&\text{SourceRealization}(E_i) \wedge \text{RecordPropagation}(R_\gamma(E_i)) \\ &\wedge \text{ObserverRecording}(O_i)\big]. \end{aligned} \tag{163}$$

$$\text{AstrObs}(E_i) \not\Rightarrow \text{MultipleOntologicalTimes}. \tag{164}$$

Astronomy gives access to records of remote change. It does not require multiple private times.

62. Stable Star and Maintained Stellar Change

A star described as stable is not a changeless object. It is a system maintaining a stellar response regime within thresholds. Its apparent stability may include continuous nuclear reactions, radiation transport, gravitational balance, plasma circulation, magnetic variation, mass exchange, surface activity, and internal gradients. The correct ITOF description is maintained change, not absence of change.

The stability of a star may be written as

$$\begin{aligned}\mathrm{Stab}_{S_\star} \equiv \Big[&\|\Delta X^{\mathrm{maint}}_{S_\star}\| \le Q^{\mathrm{class}}_{S_\star} \\ &\wedge\ \mathrm{Collapse}\Big(\Theta_{S_\star}, \Gamma^{\mathrm{coh}}_{S_\star}, \mathrm{Eng}_{S_\star}(\mathrm{Fact}_{S_\star}, \mathrm{InfSys}_{\to S_\star}), R^{\mathrm{cap}}_{S_\star}, Q_{S_\star}\Big) < Q^{\mathrm{fail}}_{S_\star}\Big].\end{aligned} \tag{165}$$

This expression states that stellar maintenance remains within classification threshold and below failure threshold. The star is still changing; it remains stable because the change is contained within its maintained stellar regime.

If a later stellar event crosses a threshold, the result is not time causing the star to change. The result is determinant engagement relative to stellar constitution and capacity:

$$\mathrm{Collapse}\Big(\Theta_{S_\star}, \Gamma^{\mathrm{coh}}_{S_\star}, \mathrm{Eng}_{S_\star}(\mathrm{Fact}_{S_\star}, \mathrm{InfSys}_{\to S_\star}), R^{\mathrm{cap}}_{S_\star}, Q_{S_\star}\Big) \ge Q^{\mathrm{fail}}_{S_\star} \Rightarrow \mathrm{Failure}_{S_\star} \ \text{ or } \ \mathrm{Transform}_{S_\star}\,. \tag{166}$$

The event may later be observed from Earth through records. The delay of those records does not change the determinant structure of the source event.

Suppose Earth receives O_1, a light-borne record of a stable stellar stage E_1, and later receives O_2, a light-borne record of a changed stellar stage E_2. The observational separation is not evidence that time has travelled from the star to Earth. It is a relation between source-event separation and propagation-offset difference:

$$\iota_{\mathrm{obs}}(O_2) - \iota_{\mathrm{obs}}(O_1) = [\iota_{\mathrm{src}}(E_2) - \iota_{\mathrm{src}}(E_1)] + (\Pi_2 - \Pi_1). \tag{167}$$

If the propagation regime is stable, $\Pi_2 \approx \Pi_1$, and therefore

$$\iota_{\mathrm{obs}}(O_2) - \iota_{\mathrm{obs}}(O_1) \approx \iota_{\mathrm{src}}(E_2) - \iota_{\mathrm{src}}(E_1). \tag{168}$$

This is why observational astronomy can track changes in remote objects over days, months, or years once the record stream is being received. The first light-borne record may have propagated for millions or billions of years, but that propagation offset is common to the received record stream up to offset differences. Later light-borne records are successive physical records of later source-states; they do not carry time and do not require private stellar time.

The conceptual conclusion is not that the star and Earth have different ontological times. The conclusion is that source change, record propagation, and observer recording are distinct physical relations:

$$\mathrm{Change}_{S_\star} \ne \mathrm{Propagation}_{\gamma} \ne \mathrm{Observation}_{A_\oplus}\,. \tag{169}$$

Each relation has its own selected system and determinant assignment. The order among stages remains invariant.

63. Final Synthesis

The V22/F2 framework can now be summarized in one sentence: T_{ITOF} denotes the invariant prior–subsequent ordering of realized stages but does not realize change; physical systems realize change through response under determinant engagement. This sentence should not be treated as a slogan. It is the governing distinction that controls every section of the paper.

The framework begins by selecting a physical system A, decomposing determinant engagement into physical factors and influencing physical systems, and assigning realized change to the response of A. It then distinguishes surrounding environment as indirect aggregation, clock readings as symbolic outputs of physical measuring systems, records as preserved effects, light as a carrier of records, and observation as an instrument-system response. None of these substitute for time as a cause, physical factor, influencing system, or determinant agency.

The framework also shows why stability, recurrence, adaptation, and failure must be analyzed through thresholds. Stable systems are not changeless; they maintain change within thresholds. Recurring systems do not return to numerically identical prior stages; they realize similar later states. Adaptive systems change in order to preserve or modify viability. Failed systems cross thresholds of capacity, cohesion, function, or classification.

The same law applies locally and cosmically. There is no local form of change-realization opposed to a cosmic form. What differs is the selected system and determinant content. Stars, galaxies, clocks, organisms, rocks, and instruments differ in constitution, internal organization, kind-specific physical organization, and response profiles, but the assignment discipline remains constant. Invariant ordered succession is universal; change-realization is system-specific everywhere.

The final conclusion is therefore

$$\boxed{\begin{gathered}\forall A \in \mathcal{S}_{\text{phys}},\\ \rho_A^{\text{resp}} = \text{Resp}_A\Big(\text{Eng}_A(\text{Fact}_A, \text{InfSys}_{\to A}); \Theta_A, \Gamma_A^{\text{coh}}, R_A^{\text{cap}}, Q_A, \mathcal{K}_A\Big)\,,\\ \Delta X_A = \text{ChangeContent}_A(\rho_A^{\text{resp}})\,,\\ T_{\text{ITOF}} = (S_{\text{phys}}, \prec),\\ T_{\text{ITOF}} \notin \text{Fact}_A, \qquad T_{\text{ITOF}} \notin \text{InfSys}_{\to A}, \qquad T_{\text{ITOF}} \notin \text{PhysDet}_A, \qquad T_{\text{ITOF}} \notin \text{Cause}(\Delta X_A).\end{gathered}} \tag{170}$$

This is the core governing synthesis of ITOF V22/F2.

The scale of a system changes the determinant content of the analysis, not the ontological role of time.

A. Symbol Guide

This guide lists the principal symbols used in V22/F2. The dotted entries are not decorative only; they make the appendix easier to scan while preserving the controlled relation attached to each symbol.

Symbol	Meaning and controlled relation
A	Selected physical system under analysis. Controlled relation: $A \in \mathcal{S}_{\text{phys}}$.

Symbol	Meaning and controlled relation
S_{phys}	Domain of physically realized stages. Controlled relation: $S_A^{(i)}, S_A^{(j)} \in S_{\mathrm{phys}}$.
T_{ITOF}	Invariant prior–subsequent ordering among realized stages; not matter, energy, force, field, medium, physical factor, influencing system, physical determinant, or causal agency. Controlled relation: $T_{\mathrm{ITOF}} = (S_{\mathrm{phys}}, \prec)$, $T_{\mathrm{ITOF}} \notin \mathrm{Fact}_A$, $T_{\mathrm{ITOF}} \notin \mathrm{InfSys}_{\to A}$, $T_{\mathrm{ITOF}} \notin \mathrm{PhysDet}_A$, and $T_{\mathrm{ITOF}} \notin \mathrm{Cause}(\Delta X_A)$.
$\prec$	Prior–subsequent ordering relation among realized stages. Controlled relation: $S_A^{(i)} \prec S_A^{(j)}$.
ΔX_A	Realized change of the selected physical system A. Controlled relation: $\Delta X_A = \mathrm{ChangeContent}_A(\rho_A^{\mathrm{resp}})$.
Θ_A	Constitution, structural make-up, internal organization, and kind-specific physical organization of A. Controlled relation: $\Theta_A \in \mathrm{Det}(A)$.
∂A	Selection boundary of A. Controlled relation: $A = (\Theta_A, \partial A, \mathcal{I}_A)$.
$\mathcal{I}_A$	Internal organization or internal relation structure of A. Controlled relation: $A = (\Theta_A, \partial A, \mathcal{I}_A)$.
Fact_A	Relevant physical factors for A, each possessing physical constitution, mode of action, pathway relevance, and threshold relation to A. Controlled relation: $\mathrm{Fact}_A = \{F_1, F_2, \ldots, F_n\}_A$ and $T_{\mathrm{ITOF}} \notin \mathrm{Fact}_A$.
$\mathrm{InfSys}_{\to A}$	Influencing physical systems relevant to A. Controlled relation: $\mathrm{InfSys}_{\to A} = \{Y_1, Y_2, \ldots, Y_m\}_{\to A}$.
Eng_A	Interwoven determinant engagement relative to A, formed by relevant physical factors, influencing physical systems, pathways, boundaries, threshold relations, and bounded conditions. Controlled relation: $\mathrm{Eng}_A = \mathrm{Eng}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A})$ and $\mathrm{Eng}_A \not\equiv F_i$ or Y_j as isolated unilateral action.
Resp_A	Response operator of A under determinant engagement. Controlled relation: $\rho_A^{\mathrm{resp}} = \mathrm{Resp}_A(\mathrm{Eng}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A}); \Theta_A, \Gamma_A^{\mathrm{coh}}, R_A^{\mathrm{cap}}, Q_A, \mathcal{K}_A)$.
ρ_A^{resp}	Realized response state assigned by the response operator. Controlled relation: $\Delta X_A = \mathrm{ChangeContent}_A(\rho_A^{\mathrm{resp}})$.
$\mathrm{ChangeContent}_A$	Operator extracting the realized change-content from the response state of A. Controlled relation: $\mathrm{ChangeContent}_A(\rho_A^{\mathrm{resp}}) \not\equiv \mathrm{Fact}_A$ and $\mathrm{ChangeContent}_A(\rho_A^{\mathrm{resp}}) \not\equiv \mathrm{InfSys}_{\to A}$.
$\Delta X_A^{\mathrm{mot}}$	Realized motion-change of A, when motion is the selected change-content. It may include locomotor, rotational, orbital, translational, vibrational, or other selected motion-content according to the kind of system. Controlled relation: $\Delta X_A^{\mathrm{mot}} = \mathrm{MotionContent}_A(\rho_A^{\mathrm{resp}})$, where motion-change is selected motion-content within the realized change-content of A.
Γ_A^{coh}	Structural cohesion of A. Controlled relation: $\Gamma_A^{\mathrm{coh}} \in \mathrm{Det}(A)$.

Symbol	Meaning and controlled relation
R_A^{cap}	Response capacity, including resistance, absorption, regulation, adaptation, redirection, motor-capacity contribution where applicable, and failure capacity of A. Motor-capacity applies to living systems where present and must not be confused with actual motion-change. Controlled relation: $R_A^{\text{cap}} \in \mathrm{Det}(A)$.
Q_A	Relevant thresholds for classification, stability, adaptation, or failure. Controlled relation: $Q_A = \{Q_A^{\text{class}}, Q_A^{\text{fail}}, \ldots\}$.
$\mathcal{K}_A$	Bounded determinant conditions for the selected case. Controlled relation: $\mathcal{K}_A \not\equiv \mathrm{Fact}_A$ and $\mathcal{K}_A \not\equiv \mathrm{InfSys}_{\to A}$.
$\mathrm{Env}_A^{\text{sur}}$	Surrounding environment as descriptive aggregation of physical factors, influencing physical systems, pathways, boundaries, and locality conditions; not a physical factor in itself and not an independent cause. Controlled relation: $\mathrm{Env}_A^{\text{sur}} \notin \mathrm{Fact}_A,\ \mathrm{Env}_A^{\text{sur}} \notin \mathrm{InfSys}_{\to A},\ \mathrm{Env}_A^{\text{sur}} \notin \mathrm{Cause}(\Delta X_A)$ as an undecomposed term.
$R_\gamma(E_i)$	Light-borne record of source event E_i. Controlled relation: $E_i \to R_\gamma(E_i) \to O_i$.
O_i	Observation or observer-instrument record corresponding to E_i. Controlled relation: $O_i = \mathrm{Obs}(R_\gamma(E_i))$.
Π_i	Propagation offset associated with record $R_\gamma(E_i)$. Controlled relation: $\iota_{\text{obs}}(O_j) - \iota_{\text{obs}}(O_i) = [\iota_{\text{src}}(E_j) - \iota_{\text{src}}(E_i)] + (\Pi_j - \Pi_i)$.
$\mathrm{Sep}(A, B)$	Spatial/path separation between selected locations or physical systems A and B. Controlled relation: $\mathrm{Sep}(A, B) \neq T_{\text{ITOF}}$.
$D(A, B)$	Measurable distance assigned to $\mathrm{Sep}(A, B)$. Controlled relation: $D(A, B) = \mathrm{Measure}(\mathrm{Sep}(A, B))$, $D(A, B) \neq T_{\text{ITOF}}$.
$D_{A\to B}^{\text{path}}$	Path-distance for propagation from source A to observer or detector B under the selected propagation model. Controlled relation: $D_{A\to B}^{\text{path}} = c_\gamma \Pi_{A\to B}$ where applicable, and $D_{A\to B}^{\text{path}} \neq T_{\text{ITOF}}$.

B. Governing Equation Map

The governing equation map gives the shortest route through the framework. It is not a replacement for the main text. It is a compact guide for checking whether a proposed application preserves the core assignments. Each dotted entry names the assignment being checked; the equation states the controlled form.

Controlled item	Governing equation
1. Ordered succession...........	$T_{\text{ITOF}} = (S_{\text{phys}}, \prec)$
2. Non-factor and non-agency of time...........................	$T_{\text{ITOF}} \notin \mathrm{Fact}_A,\ T_{\text{ITOF}} \notin \mathrm{InfSys}_{\to A},\ T_{\text{ITOF}} \notin \mathrm{PhysDet}_A,\ T_{\text{ITOF}} \notin \mathrm{Cause}(\Delta X_A)$

Controlled item	Governing equation
3. Selected system	$A \in \mathcal{S}_{\text{phys}}$
4. Physical factors	$\text{Fact}_A = \{F_1, F_2, \ldots, F_n\}_A$
5. Influencing systems	$\text{InfSys}_{\to A} = \{Y_1, Y_2, \ldots, Y_m\}_{\to A}$
6. Determinant engagement	$\text{Eng}_A = \text{Eng}_A(\text{Fact}_A, \text{InfSys}_{\to A})$
7. Central law	$\rho_A^{\text{resp}} = \text{Resp}_A\big(\text{Eng}_A(\text{Fact}_A, \text{InfSys}_{\to A}); \Theta_A, \Gamma_A^{\text{coh}}, R_A^{\text{cap}}, Q_A, \mathcal{K}_A\big)$, $\Delta X_A = \text{ChangeContent}_A(\rho_A^{\text{resp}})$
8. Surrounding environment	$\text{Env}_A^{\text{sur}} = \text{Agg}_{\text{sur}}(\text{Fact}_A, \text{InfSys}_{\to A}, \mathcal{P}_A, \mathcal{B}_A, \mathcal{L}_A)$
9. Environment non-substitution	$\text{Env}_A^{\text{sur}} \notin \text{Fact}_A,\ \text{Env}_A^{\text{sur}} \notin \text{InfSys}_{\to A},\ \text{Env}_A^{\text{sur}} \notin$ $\text{Cause}(\Delta X_A)$ as an undecomposed environment-term
10. Recurrence	$S_A^{(i)} \prec S_A^{(j)} \wedge S_A^{(j)} \sim S_A^{(i)} \Rightarrow S_A^{(j)} \not\equiv_{\prec} S_A^{(i)}$
11. Motion	$\text{Motion}_A \equiv \Delta_{\text{pos}}(A),\ \Delta X_A^{\text{mot}} = \text{MotionContent}_A(\rho_A^{\text{resp}})$. Motion of A may contribute to DetSituation_B as $\text{MotInf}_{A\to B}$ when $A \in \text{InfSys}_{\to B}$.
12. Stability	$\text{Stab}_A \equiv [\lVert \Delta X_A^{\text{maint}} \rVert \leq Q_A^{\text{class}} \wedge \text{FailureRisk}_A < Q_A^{\text{fail}}]$
13. Clock reading	$N_{A_{\text{clock}}} = \text{Sym}(\text{Count}(P_{A_{\text{clock}}}))$
14. Record distinction	$\text{Record}(E_i) \neq E_i$
15. Astronomical propagation	$\iota_{\text{obs}}(O_j) - \iota_{\text{obs}}(O_i) = [\iota_{\text{src}}(E_j) - \iota_{\text{src}}(E_i)] + (\Pi_j - \Pi_i)$

C. Controlled Domain-Use Guide

A proposed ITOF application should pass the following checks. First, it must identify the selected physical system. Second, it must decompose the determinant situation into physical factors and influencing physical systems without treating either as isolated unilateral causes. Third, it must state how determinant engagement becomes relevant to the selected system through interwoven pathways, boundaries, thresholds, and bounded determinant conditions. Fourth, it must assign response through the response operator of the selected system. Fifth, it must assign realized change to the change-content of the realized response state. Sixth, it must avoid assigning causal power to time, clocks, records, environment, or measurement parameters.

For ordinary material systems, the framework asks which factors acted, which systems influenced, how those factors and systems were interwoven, which pathways existed, and how the selected system responded. For living systems, the framework includes physically realized regulatory, adaptive, mind-capacity, and motor-capacity response classes, where present, without introducing a new law of time. For nonliving systems, rotational, orbital, translational, vibrational, or other kinematic profiles may also be relevant to the selected determinant situation. Actual motion remains realized change of the moving system; when that moving system A is relevant as an influencing physical system for a selected affected system B, the motion of A may contribute to B's determinant situation as $\text{MotInf}_{A\to B}$, a response-relevant influence contribution, not as a transfer of A's realized change into B. For clocks, the framework treats the clock as a physical measuring system whose readings are symbolic outputs of selected regular processes. For astronomical systems, the framework distinguishes source change, record propagation, and observer recording. For mathematical models, the framework distinguishes coordinate usefulness from ontological agency.

The controlled use route is

$$\boxed{\begin{array}{c} A \Longrightarrow \mathrm{Fact}_A,\ \mathrm{InfSys}_{\to A} \Longrightarrow \mathrm{Eng}_A \Longrightarrow \mathrm{Resp}_A \Longrightarrow \rho_A^{\mathrm{resp}} \Longrightarrow \mathrm{ChangeContent}_A \Longrightarrow \Delta X_A, \\ T_{\mathrm{ITOF}} \not\Rightarrow \mathrm{Fact}_A, \quad T_{\mathrm{ITOF}} \not\Rightarrow \mathrm{InfSys}_{\to A}, \quad T_{\mathrm{ITOF}} \not\Rightarrow \mathrm{PhysDet}_A, \quad T_{\mathrm{ITOF}} \not\Rightarrow \mathrm{Cause}(\Delta X_A) \end{array}} \tag{171}$$

The guide can also be expressed as a checklist relation:

$$\begin{gathered} \mathrm{ValidUse}_{\mathrm{ITOF}}(A) \Rightarrow \big[A, \mathrm{Fact}_A, \mathrm{InfSys}_{\to A}, \mathrm{Eng}_A, \mathrm{Resp}_A, \rho_A^{\mathrm{resp}}, \\ \mathrm{ChangeContent}_A, \Delta X_A\big] \text{ are explicitly assigned.} \end{gathered} \tag{172}$$

If any term is missing, the application is incomplete. If time, environment, clocks, records, or model parameters replace the determinant assignment, the application has moved outside the controlled use of ITOF.

A valid ITOF application must move from selected system to determinant engagement to response operator to realized response state to realized change-content, while keeping ordered succession non-causal.

D. Forbidden Transfers

The following transfers are forbidden because they confuse representation, measurement, or access with physical realization.

1. Do not transfer clock regularity to time as a physical cause.
2. Do not transfer clock failure to failure of time.
3. Do not transfer model coordinates to ontological agency.
4. Do not transfer signal propagation delay to multiple private times.
5. Do not transfer a record of an event to the event itself.
6. Do not transfer environmental description to independent causal force.
7. Do not transfer ordered succession to physical-factor status. Time is not matter, energy, force, field, medium, physical factor, influencing system, or determinant agency.
8. Do not transfer similarity of a later state to identity with an earlier stage.
9. Do not transfer stability to absolute absence of change.
10. Do not transfer motion to all change.

11. Do not transfer external factors directly into realized change without system response.

These prohibitions are not stylistic preferences. They are required by the central law. A statement that violates them moves outside the assignment discipline of ITOF V22/F2.

E. Closing Statement

The present V22/F2 manuscript fixes ITOF as a framework of physical assignment rather than temporal agency. It preserves the necessity of ordered succession while denying that succession acts or qualifies as a physical influencing factor. Time is not matter, energy, force, field, medium, physical system, physical factor, influencing system, or determinant agency. It lacks the constitutive properties, intensity, range, mode of action, pathway, exchange relation, and threshold relation required of physical factors. The manuscript preserves the usefulness of clocks while denying that clocks measure time as a substance. It preserves astronomical observation while denying that light carries time or creates multiple ontological times. It preserves stability while rejecting changelessness. It preserves recurrence while rejecting retrograde identity. It preserves universality while allowing system-specific realization everywhere.

The governing closure is assignment discipline: determinant engagement conditions response, the response operator assigns a realized response state, realized change is the change-content of that response state, and invariant ordered succession denotes the prior–subsequent ordering of realized stages without causing them. Living systems are not exceptions to this rule: mind-capacity and motor capacity, where present, are physical properties of the living system's organization. More generally, rotational, orbital, translational, vibrational, or other kinematic profiles may belong to the physical state or dynamical organization of nonliving systems such as planets, stars, and galaxies. Actual motion is realized change of the moving system; when a moving system A is relevant as an influencing physical system for a selected affected system B, its motion may contribute to determinant engagement without transferring completed change to the affected system.

The final assignment remains unchanged:

$$\boxed{\begin{gathered}\mathrm{Eng}_A(\mathrm{Fact}_A, \mathrm{InfSys}_{\to A}) \longrightarrow \mathrm{Resp}_A \longrightarrow \rho_A^{\mathrm{resp}} \longrightarrow \mathrm{ChangeContent}_A \longrightarrow \Delta X_A, \\ T_{\mathrm{ITOF}} = (S_{\mathrm{phys}}, \prec), \\ T_{\mathrm{ITOF}} \notin \mathrm{Fact}_A, \qquad T_{\mathrm{ITOF}} \notin \mathrm{InfSys}_{\to A}, \qquad T_{\mathrm{ITOF}} \notin \mathrm{PhysDet}_A, \qquad T_{\mathrm{ITOF}} \notin \mathrm{Cause}(\Delta X_A)\end{gathered}} \tag{173}$$

This is the governing closure of the framework.

Selected General References

[1] Youssry Ghandour. *Invariant Temporal Ordering Framework (ITOF) V20: Ontological Assignment Closure under Invariant Ordered Succession*. Preprint, 2026.

[2] Youssry Ghandour. *Invariant Temporal Ordering Framework V21/F1: A Fundamental Reassignment Law for Time-Attributed Phenomena under Invariant Ordered Succession.* ITOF Foundation Series I, preprint, 2026.

[3] I. Newton, *Philosophiæ Naturalis Principia Mathematica.* London: Royal Society, 1687.

[4] A. Einstein, "Zur Elektrodynamik bewegter Körper," *Annalen der Physik*, vol. 17, pp. 891–921, 1905.

[5] A. Einstein, "Die Grundlage der allgemeinen Relativitätstheorie," *Annalen der Physik*, vol. 49, pp. 769–822, 1916.

[6] H. Minkowski, "Raum und Zeit," *Jahresbericht der Deutschen Mathematiker-Vereinigung*, vol. 18, pp. 75–88, 1909.

[7] H. Reichenbach, *The Direction of Time.* Berkeley: University of California Press, 1956.

[8] H. Price, *Time's Arrow and Archimedes' Point.* Oxford: Oxford University Press, 1996.

[9] C. Rovelli, *The Order of Time.* New York: Riverhead Books, 2018.

[10] L. Boltzmann, *Vorlesungen über Gastheorie.* Leipzig: J. A. Barth, 1896.

[11] R. Clausius, "Ueber verschiedene für die Anwendung bequeme Formen der Hauptgleichungen der mechanischen Wärmetheorie," *Annalen der Physik*, vol. 125, pp. 353–400, 1865.

[12] J. W. Gibbs, *Elementary Principles in Statistical Mechanics.* New York: Charles Scribner's Sons, 1902.

[13] H. B. Callen, *Thermodynamics and an Introduction to Thermostatistics*, 2nd ed. New York: Wiley, 1985.

[14] C. W. Misner, K. S. Thorne, and J. A. Wheeler, *Gravitation.* San Francisco: W. H. Freeman, 1973.

[15] R. M. Wald, *General Relativity.* Chicago: University of Chicago Press, 1984.

[16] N. Ashby, "Relativity in the Global Positioning System," *Living Reviews in Relativity*, vol. 6, article 1, 2003.

[17] Bureau International des Poids et Mesures, *The International System of Units (SI)*, 9th ed. Sèvres: BIPM, 2019.

[18] J. Jespersen and J. Fitz-Randolph, *From Sundials to Atomic Clocks: Understanding Time and Frequency*, 2nd ed. Mineola, NY: Dover Publications, 1999.

[19] L. von Bertalanffy, *General System Theory: Foundations, Development, Applications.* New York: George Braziller, 1968.

[20] W. R. Ashby, *An Introduction to Cybernetics*. London: Chapman and Hall, 1956.

[21] N. Wiener, *Cybernetics: Or Control and Communication in the Animal and the Machine*. Cambridge, MA: MIT Press, 1948.

[22] H. R. Maturana and F. J. Varela, *Autopoiesis and Cognition: The Realization of the Living*. Dordrecht: D. Reidel, 1980.

[23] OpenStax. *Anatomy and Physiology 2e, Section 1.5: Homeostasis*. Rice University, 2022. Available at `https://openstax.org/books/anatomy-and-physiology-2e/pages/1-5-homeostasis`.

[24] B. W. Carroll and D. A. Ostlie, *An Introduction to Modern Astrophysics*, 2nd ed. Cambridge: Cambridge University Press, 2017.

[25] B. Ryden, *Introduction to Cosmology*, 2nd ed. Cambridge: Cambridge University Press, 2017.

[26] G. B. Rybicki and A. P. Lightman, *Radiative Processes in Astrophysics*. New York: Wiley, 1979.

[27] C. E. Shannon, “A mathematical theory of communication,” *Bell System Technical Journal*, vol. 27, pp. 379–423 and 623–656, 1948.