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Narrative One: Essence and Evolution

Introduction

Some Novel Structural and Defining Properties

The first part of his paper describes several properties of our Universe that are so far not much acknowledged. And yet they would be, at least in our imagination, the most fundamental and defining features of our Universe.

This paper neither imagines ours as a determined Universe whose life story is shaped for all time only by events at its birth, nor does it imagine ours as an obedient Universe, controlled from the top down and in every detail by God.

It does assume a standard model of our Universe that views it as an isolated system, but only in a limited sense that it does not exchange energy or matter or even physical causality with its environment.

At this moment however that standard model does not take account of any other kinds of input to or output from our Universe. According to the standard model our Universe would seem to be a strictly isolated system, having no acknowledged input or output of any kind whatever.

And this is where imagination will take us far beyond our current fairly well-known and most fundamental descriptions of our Universe.

In some detail, this paper imagines our Universe as a complex adaptive system with input, throughput and output occurring as information borne on a flux of intelligently structured and highly articulated spacetime.

It imagines our Universe as an intelligent, cosmic-scale system that would be physically autonomous. It would be a dynamical and nonlinear system that would, like its contents, be evolving over time through familiar processes of variation, selection, and retention of traits

Its flux of spacetime throughput is imagined as myriad proto-physical fields from, and in which, all of the physical properties of our Universe would emerge.

Its throughput of informative spacetime would be generating all the internal physical properties that would distinguish our Universe as a much more vital and interesting place than our older model as a strictly isolated would allow.

This paper imagines an intelligent, semi-permeable system boundary that would enclose our Universe, and define it in the largest causal, physical, informational, and conceptual senses.

It imagines that a boundary of our Universe would consist entirely of intelligent inlets and outlets. Each inlet would be co-located with an outlet. Inlet/outlets would be everywhere present throughout our Universe.

It imagines that inlet/outlets would alternate between input and output at extremely high frequencies, and that they would articulate their input and output to convey well-informed throughput.

It imagines how, at its beginning, two kinds of inlet/outlets would have emerged, and how each kind would have participated in different ways in making and shaping our young Universe.

It imagines a first-born kind of inlet/outlet would be informing our Universe and causing it to expand at an accelerating pace.

It imagines a second kind of inlet/outlet that, in a dramatic rush of input and output, would have formed all the fields and particles that constitute physical structures of our Universe. And those same inlet/outlets would still sustain the existence of all those physical structures even to the present day.

It imagines an “Essence” of our Universe that would be an overarching intelligence coordinating functions among its inlet/outlets.

It also imagines what would be outside of a system boundary of our Universe, An environment of our Universe would be imagined as sources from which would come its input and recipients to which would go its output.

Our Universe is imagined as an integral part of a hierarchically structured Multiverse. And it imagines several properties of our Universe that would support its distinctness and causal autonomy, even from other Universes in its Multiverse.

It imagines that activity in our Universe's boundary and all that would be outside of it would be unobservable to us and to any of its internal subsystems.

This paper imagines that a constitution of our Universe would impart to it a flat geometry and evolution would appear to have conferred a "Holographic Adaptation" on some of its internal subsystems.

It imagines that our Universe would be organized very similarly to all the subsystems residing within it.

It imagines that ours would be an iterative Universe with each cycle of input/output constituting a complete iteration including feedback that would be accomplished in an output phase. Its input and output would be, at times novel and at others redundant, or repetitive, at times stochastic, evolving to chaotic and, at times, highly ordered.

And it imagines what would be some of the underlying properties of spacetime input, throughput and output of our Universe.

Its Intelligence, Dynamism and Complexity

In a second part we imagine how some dynamic, behavioral properties of our physical Universe would be understood in a different light when viewed as emergent behaviors of a complex adaptive system and its throughput of protophisical spacetime.

We imagine how a first kind of input/output of our Universe would have been causing it to expand and to make just enough room for a second generation of inlet/outlets to create all of its physical contents.

In this part we imagine how input, throughput and output of the earliest kind of inlet/outlet would be driving variable rates of expansion and causing expansion to accelerate in ways that would require a math of "Universal Relativity".

We imagine how first-born inlets/outlets would be proliferating and causing our Universe to become more and more complex as it expands. We imagine how its throughput would form a flowing and dynamically articulated context of spacetime, in currents of which physical structures of our Universe would be operating, and evolving.

We imagine how our Universe would have grown and matured to its present size and age, and how it would have become so astonishingly large in such a surprisingly short time - and how, at present, it would seem to be showing its age a little.

We imagine how, in a complex adaptive Universe, some of its dynamic properties, including: its light; its accelerating expansion; its apparent lawfulness; its gravity; its processes of star formation; its black holes; its dark energy and dark matter; its fields; its seemingly limitless creativity, synergies, and emergent processes – how all of these active physical properties of our Universe would emerge from and be drivnen by its two kinds of inlet/outlets and by their respective inputs, throughputs and outputs of spacetime.

Implications and Conclusion

Having done an imagined exploration our Universe as a complex adaptive system, in the final part of this paper we entertain some possibly striking implications that might alter the ways we think about such physical features of our Universe as:

- Our Hubble Constant;
- Our standard CDM model of cosmology;
- Our standard model of particle physics;
- The dozens of mathematical constants we seem to need to describe its properties;
- Some troublesome infinities that fall out of our math;
- Our vacuum catastrophe;
- A missing narrative that would emerge from our math;
- Its propensity for circular motion;
- Its seeming resistance to being described with a single unified model;
- Our persistent duality of observer and observed as it would relate to a multiplicity of intelligences and our hard problem of consciousness;
- Our apparent incommensurability of local realism with entanglement;
- Some discontinuous ways in which its causal connections seem to present;
- Some outlandish energy densities we encounter at its smallest scales;
- And for how, rationally, our Universe could seem to us at once to be autonomous, enduring, lawful, determined, orderly, adaptive, iterative, creative, chaotic, stochastic, intentional and intelligent.

Part One:

Some Defining Properties of our Universe Imagined as Properties of a Complex Adaptive System

This paper imagines our Universe as an intelligent, cosmic-scale system that would be physically autonomous, dynamically nonlinear and evolving over time through familiar processes of variation, selection and retention of traits.

Its Boundary

One might imagine that our Universe would be enclosed by an intelligent, selective, semi-permeable system boundary that would define our Universe in the largest causal, physical, informational, and conceptual senses.

Its system boundary would separate what would be inside of our Universe from what would be outside of it and would actively manage what would pass through it as input, throughput and output.

One might imagine a system boundary of our Universe that would be sufficiently well-defined that it would be possible, in principle, for observers within our Universe to observe what would be entering it as input (events that would have no observable causal precursors), transiting it as throughput and leaving it as output (events having no observable causal successors).

One might imagine that a boundary of our Universe would be formed entirely of very tiny, very tightly packed (perfectly tiled) inlets and outlets.

Each inlet would be collocated with an outlet. Each inlet/outlet would cycle between input and output at variable and extremely high frequencies.

One might imagine that each tiny inlet/outlet would actively select and condition what it would let into and let out of our Universe.

In articulating its inputs and outputs, one might imagine that each inlet/outlet would intelligently vary the frequency and amplitude of its cycling between input and output, and that it would determine any preponderances of input over output or of output over input.

Input and output would occur as square-wave pulses of spacetime. These would convey information as articulated spacetime throughput.

Higher frequencies of cycling between input and output would produce greater areas of space and durations of time.

Throughput would equal input minus output. A greater preponderance of input above output, or vice-versa, would produce a greater, or lesser amount of information that would be throughput in any cycle of input/output.

Units in equations describing these relationships would be baud rate where channels are assumed to be noise-free and meters^2seconds, and bits, and we would use the letters I, T and O to designate input, throughput and output.

Describing these relationships with one or more equations would be a next work in completing this passage.

One might imagine that, in a system boundary of our Universe, each inlet/outlet could itself be considered a very tiny intelligent system that would select input from events in its environment, process it as throughput and expel it as a pulse of informative output. And that pulse of output by an inlet would be a pulse of input to our Universe.

Similarly, one might imagine that each outlet would itself be a very tiny intelligent system that would select input from an event in our Universe, process it as throughput and expel it as a pulse of output from our Universe.

One might imagine that inlets/outlets would function frictionlessly, and that each would be somewhat like a perfected "Maxwell's Demon", doing organizing work of intelligence at a system boundary of our Universe, except, in this case, without having to work at it. (Maxwell's "Playful Angels"?)

Functioning of its boundary would be unobservable by any internal subsystems in our Universe. One might imagine that, as residents of our Universe, we would only be able to infer any values or operating principles of its inlets/outlets and of its Essence by observing and modeling input events and those events that would occur just before and just after its output events.

But we would be unable directly to confirm or falsify our inferences, because functioning of a boundary would lie just outside of our causal/observable Universe

Yet, still, one might imagine something that would lie even further outside of our Universe than its boundary...

An environment of our Universe would include sources from which would come its input and recipients to which would go its output.

Its Place in a Multiverse

Our Universe would be an integral part of a hierarchically structured Multiverse One might imagine that an environment of our Universe would be composed of other cosmic-scale, complex adaptive systems, functioning on different scales. They would be Universes that would also intelligently select their own input and output, which would be occurring across their respective interfaces with our Universe, and others. And, within this structure, all of these Universes would be coevolving.

One might imagine that multiple Universes would be organized in nested hierarchies. An upstream Universe would entirely enclose and suffuse our downstream Universe, so that some output from an upstream Universe, selected as input by our Universe, would be everywhere present within the latter.

And, similarly, our Universe would entirely enclose and suffuse our downstream Universe, so that output from our Universe, selected as input by our downstream Universe, would be everywhere present within the latter.

One might imagine that, as Universes evolve, their output would change over time, and that such changes would register, on their downstream Universes, as environmental perturbations, to which their downstream Universes would or would not adapt.

Multiple properties of a boundary of our Universe would assure its distinctness and autonomy from other Universes in its Multiverse stream.

Imagining that some output from an upstream Universe would be accepted as input by our Universe would seem to require that some events must occur at an interface between them that would prevent them from being just one larger Universe and that would render autonomous each Universe in a stream.

Such events would serve as markers for us, in imagination at least, to distinguish our Universe from any others.

One might imagine that ranges of size and durations of time at which Universes would operate would be unique to each Universe in a stream. One might imagine that huge leaps in scale, possibly skipping many orders of magnitude, would be key features of boundaries between interfacing Universes.

Flowing downstream, a leap in scale at a Universe interface would be imagined as going from smaller, on an upstream side, to much larger on a downstream side.

One might imagine that, at interfaces between Universes, some input events would generate sharp discontinuities in any math used to model them. It would be as if infinities associated with boundary conditions would emerge as accurate mathematical descriptions of a downstream flow of output-to-input events and

would not require renormalizing to be useful in modelling Universe boundary activity.

Another defining property of flux between interfacing Universes would be that, between any two Universes, there would be only asymmetric, one-way, non-reciprocal, non-reversible flows of output to input that would not allow for any upstream backflow.

Even though inlets would be collocated with outlets, still one might imagine that outputs from our Universe would go to another Universe than one from which would come its inputs. In other words, input to our Universe would be selected from output of an upstream Universe and some of our output would be selected as input by a downstream Universe.

One might imagine it would be as if "plumbing" that connects Universes to one another would obviate any possibility of two-way (input and output) exchanges between any pair of interfacing Universes.

One might imagine another feature of its distinctness and autonomy would be that a boundary of our Universe would not process or permit input or output of energy or of matter, making our Universe's boundary the sole source of and a hard wall that would create and conserve all energymass that would have formed within it, thus assuring its physical autonomy.

One might imagine that, working their way backward or forward in time, in any causal web, observers in our Universe would note some events that would seem to be uncaused. One might imagine that, upon witnessing such events, observers would infer that those events would be products of something that was occurring just outside of our causal/observable Universe, somewhere out in its boundary.

So one might imagine that our Universe would be causally isolated, and that all observable causal webs operating within our Universe would be contained wholly within it, originating and terminating at its boundary.

One might imagine that limits of observability and causality within our Universe would determine its distinctness. A boundary of our Universe would be so constructed that no outputs of our upstream Universe would ever intrude on our Universe. But some would be intelligently selected by inlets of our Universe and processed by them to become inputs.

One might imagine that, while observers inside of our Universe might imagine, or even infer, what would be happening in a boundary of our Universe, they would be unable, in principle, to observe directly any events occurring elsewhere than within a boundary of our own Universe. Input and output events occurring just inside of a

boundary of our Universe would be imagined as “uncaused causes” and “uncaused effects”.

Limits-in-principle of observability and causality would be a most fundamental feature of a boundary of our Universe, as seen from a perspective of observers within it and key indicators to them of a complex, adaptive nature of our Universe and of its distinctness and autonomy.

One might imagine that certain boundary characteristics would give to some observers an illusion that our Universe would not be causally autonomous. As inlet activity of each inlet/outlet would be coordinated with its outlet activity, inputs would, to some extent, condition outputs, and outputs would, to some extent, condition inputs.

A possible result of that coordination would be that it would seem, to some observers, as if inputs to our Universe would be responsive to outputs from our Universe.

This coordination might foster an illusion that two-way exchanges between Universes would be happening, even though neither two-way events upstream, nor two-way events downstream would actually be occurring or even possible between Universes.

Boundary features of our Universe would seem to impart to it a flat geometry and evolution would appear to have conferred a “Holographic Adaptation” on some of its internal subsystems.

Its Geometry

Imagining that inlets/outlets would be everywhere present across the entire boundary of our Universe, and that our entire Universe would exist along an effectively two-dimensional interface with its boundary, then inlet/outlets would be everywhere present throughout our entire Universe. And the geometry of our Universe would be flat or two-dimensional.

One might imagine that our Universe would be an exceedingly thin film lying along its boundary, maybe only one Planck length thick, so thin that it would have, for all practical purposes, only two spatial dimensions and one of time.

On cosmic scales, a sum of internal angles of all triangles so far observed in our Universe would be 180 degrees. This would seem to confirm that, at least on large scales, our Universe would be topologically flat.

And, nevertheless, this fine, thin film would contain all information of our physical Universe along its boundary interfaces.

One might imagine that such an apparently flat geometry of our physical Universe would have emerged as it would have been born from, and would continue to be sustained at a most fundamental of scales, by its evolving boundary. This would be, by input and output along an interface of two spatial dimensions and one of time. Such would be the three-dimensional interface that on our side of a system boundary we would inhabit a three-dimensional Universe, two dimensions of space and one of time.

One might imagine that all information entering our Universe as input, transiting it as throughput and carving it by its output, would register along that three-dimensional film, and that every propagation along it would capture and store information/flavors of its passage from source to observer.

As its electro-magnetic radiation, its strong and weak nuclear fields, its fundamental particle fields and its gravitational fields would simply emerge or propagate across our 3-D Universe, they would all capture and store or consist of, in some coded form, information that would describe not just their origins, but also their passages from source to observer.

Our Holographic Adaptation

One might imagine that our flat Universe would seem to us to have at least three spatial dimensions and one of time, if members of our species, and, possibly, many other observer-systems as well, would have evolved a "Holographic Adaptation".

One might imagine that, in a Universe with two spatial dimensions, and one of time, we humans would have an evolved a hardwired ability to observe, interpret, model, compute, render and to interact with an additional spatial dimension around us and within us.

We would inhabit a four-dimensional virtual world in which we could "virtually see and reach around corners" thereby gaining an exponentially richer and more intimate virtual environment in which we could anticipate events and with which we could interact. One might imagine that such an ability would confer a significant evolutionary advantage on our species and on any other observer systems that would have evolved a Holographic Adaptation.

While one might imagine that we would be among those observer/systems with this evolved ability, so far our holographic adaptation would have much coarser resolution than its coding and our nervous systems would support.

Our species might, in some future time, gain an ability to encode our three-dimensional Universe as a much finer-grained interactive virtual environment, and possibly one comprised of more than four dimensions. If it would seem to our advantage to do so, we would learn to do it, or to dope ourselves to do it. Through AI and neurotechnology, we would become able to rewire our brains to do it. And, over time, we would gradually evolve a capability to operate in five or more dimensions.

One might imagine that it would be a fluid, evanescent property of our Universe that would allow and encourage us to construct virtual four-dimensional model environments within it. And it would be an enduring nature of our Universe that would insist, by replicable evidence it affords us, that our models conform as rigorous analogies of reality.

One might imagine that, because we inhabit two interlocking coordinate systems, an actual and a virtual, some enigmas we encounter in describing our Universe would reduce to dimensional/topological considerations. One might imagine that some proposed principles of current science offer mathematical ways to describe and integrate our seemingly paradoxical relationships with a “real” geometry of our Universe versus our "virtual " holographic “observations” of it and “interactions” with it.

Its Essence

An “Essence” of our Universe would be an overarching intelligence of its boundary that would coordinate intelligent functioning among its inlet/outlets:
Each inlet/outlet would function as an intelligent node, operating autonomously and coherently in a network of system-wide intelligence. and would coordinate articulately timed patterns of releases of input and uptakes of output across small and large arrays of inlet/outlets.

Imagining that functioning of each inlet would be intelligently coordinated with functioning of its collocated outlet and that functioning of each inlet/outlet would be intelligently coordinated with functioning of many or all other inlets/outlets. one might imagine that an Essence of our Universe would be those boundary capabilities that would facilitate coordination and system-wide coherence among its inlets/outlets.

One might imagine that Essence would emerge from activities of its inlet/outlets in a bottom-up process, as a communicating and coordinating function by which inlets/outlets would come to operate collaboratively with one another across local scales, and across the entire boundary of our Universe.

Such a boundary property would emerge from a capability of each individual inlet/outlet to permit or deny entry to and exit from our Universe and to shape properties of its input and output in accordance with some intrinsic values that would be inherent in its formation.

Essence of our Universe would inform its inlets/outlets, but it would not have created them. They would be continuously creating Essence. One might imagine that variations would arise among inlet/outlets and that some would produce variations in Essence.

Its Evolution

Our Universe would be evolving through familiar processes of variation, selection and retention of traits.

One might imagine that inlet/outlets would be capable of self-reproduction and that Our Universe would evolve in ways that would be similar to other enduring systems.

(Universal Evolution...Universal Darwinism).

Boundary traits of our Universe would be those altered most directly in its course of evolution.

One might imagine that evolution of inlets/outlets would occur as variations introduced through their capacity for self-organization and self-reproduction, as responses to perturbations in their environment, and by chance, and that locally acting selective forces would affect probabilities that any local variations would or would not be retained.

Most retained variations would produce increasing differentiation with increasingly coherent and complex patterns of collaborative actions by inlet/outlets.

One might imagine that an evolving fitness of our Universe would emerge as its boundary's adaptability to perturbations in its environment and would intimately involve intelligent management of a dynamic balance between its production of increasing complexity in equitable counterpoise with its metered tolerance of increasing entropy.

One might imagine that all of its internal complex adaptive subsystems would develop within our Universe as emergent products of its input and output. They would co-evolve with one other and with a boundary of our Universe.

Our Universe would have come to contain myriad varieties of relatively small internal, intelligent, complex adaptive subsystems. One might imagine that most of

these subsystems would be functioning at far from equilibrium and co-evolving across many orders of magnitude.

Its Self-Similarities

At all scales, evolution would seem to favor the emergence of systems.

Our Universe would be similarly organized to all of subsystems residing within it. One might imagine that every entity and event within our Universe, from very large galactic super cluster down to very,very small fields, particles and interactions, would, like our Universe itself, be modellable as an intelligent, complex, adaptive system, not just in a thermodynamic sense, but also in a sense of information (as in shaping by introduction of informative input pulses and by extraction of "efformative" output pulses (as in excising waste, superfluous, nonfunctioning or dysfunctional throughput).

All energymatter subsystems in our imagined Universe would be formed and sustained by and acquire their intelligence from primordial and ongoing abiding intelligent throughput.

One might imagine that self-similarities would emerge in successive iterations across all scales, and for which fractal geometry would offer a limited way to model such emergences.

One might imagine that a system intelligence of our Universe would be always shaping dynamic behaviors of its physical subsystems and would be always in counterpoise with entropy.

Like entropy, system intelligence would be everywhere present in every one of its energymass subsystems ,from quantum to cosmic scales, and at interstices between them and during interactions among them. System intelligence would ultimately be discernible in behaviors of all complex adaptive subsystems that make up our physical Universe.

Its Input, Throughput and Output

Having imagined some structural system properties of our Universe, one might go on to imagine what would be defining properties of its input, throughput and output.

These would have to be a familiar agent, but with properties understood in the context of a Universe like the one we are imagining.

One might imagine that, accepting conservation, inputs and outputs would not, themselves, consist of energy or of matter in any form whatever.

Nevertheless, what is input. throughput and output by our Universe would have to be a real thing, with properties of its own that, in principle, would be discernable.

Its input and output would be tagged by its inlets and outlets as occurring somewhere and somewhen, so that its properties would, in principle, be spatially and temporally identifiable.

But they would be more substantial than just an abstract metric or manifold allowing us to quantify separations between things and events.

What would be input and output would have to be a plausible agent of expansion and accelerating expansion of our Universe.

It would itself be ubiquitous in and around and filling vast, otherwise mostly empty regions between physical structures.

It would be subtle and difficult to observe directly, yet it would be credibly capable of interacting with energy and matter such that its properties would be discernable, at least by inference from observations of behaviors of energy and matter.

It would flow and be modelled mathematically as if it has some properties similar to a superfluid.

It would create and express both context and content, both form and function in our Universe.

It would be expressed and articulated in such a way as to import and impart information to internal subsystems within our Universe by its input. And, by its output it would effectuate efformation, as in shaping internal subsystems by sculpting them to become what it would leave behind where/when there has been output.

Its input and output would function at once as messenger, as medium and as message.

It would not be some exotic thing, but something ubiquitous and endemic to our Universe, something familiar to us to an extent that we could assess whether or not it would meet our imagined criteria.

One might imagine that input/throughput/output of our Universe would consist entirely of highly articulated, massless, energyless, hyperfluid spacetime, understood as a real and flowing thing with properties of its own, properties from which would emerge observable properties of our physical world.

One might imagine that our Universe would receive input, contain throughput and emit output of spacetime as a much more active and articulated kind than has been previously imagined.

One might imagine, as others have, that spacetime would be modeled as if it changes its geodesics and moves in proximity to moving energymass and that, in doing so, spacetime would, in accord with a least action principle, seem to have an emergent effect on ways that energymass moves.

But one might imagine going a step further. One might imagine that spacetime could also be modellable as a rfluid-flow that would be energyless, massless, frictionless, in other words, a hyperfluid.

Further, and importantly, spacetime would be imagined and modeled as if it could be created and annihilated as input and as output respectively.

Two fundamental properties of spacetime would be its permittivity and permeability. These would be properties that were originally attributed to “free space” or “the vacuum”, properties that would be suggested by how electrical charges and magnetic fields behave in an absence of any intermediate physical materials.

It soon became evident, perhaps strikingly so, that permittivity and permeability properties of spacetime would be intimately associated with another property of spacetime, which would emerge as an invariant speed at which light propagates through what was thought to be empty space.

Using only observed values for the permittivity and permeability of spacetime one could calculate a speed of light to a value that matched verry closely observed values.

The association of light’s speed with ways in which the vacuum affects electrical charges and magnetic fields made it seem almost certain that light itself could be understood as an electromagnetic phenomenon. Ultimately an invariant speed of light would, itself, seem to be an emergent property of empty (and so, invariant ?) spacetime.

Going further yet, one might imagine that, since gravitational waves and causality also travel at an invariant speed of light, one might imagine that related properties of spacetime must interact with them in some emergent way in setting their speed of propagation, as well.

Going even further, one might imagine that some properties of spacetime flow would also place speed limits on ways that massive bodies would move through it or be borne along in flows of it.

And going even further yet, one might imagine that relativistic time dilation and length contraction would be emergent physical properties of some underlying properties of spacetime. And some ways that spacetime affects motion of energymass systems relative to one another would become discernable.

There would be two other universal and ubiquitous properties of empty spacetime. One might imagine these would be revealed by a ubiquitous zero-point energy. Another would be revealed by the Cosmic Microwave Background.

Zero-point energy is the lowest possible energy level (above zero) that any field generated by a quantum system can have. Such fields would be present in every point of otherwise empty spacetime.

Another property of empty spacetime would be revealed by a Cosmic Microwave Background. The CMB is a temperature property found in every point of empty spacetime as a cooled down relic of very high temperatures that existed during the earliest moments when, one might imagine, a huge influx of spacetime was creating our, then very hot, physical Universe.

How such ubiquitous physical properties as zero -point energy and the CMB would emerge from properties of spacetime has yet to be described.

Imagining that spacetime would emerge from intelligence of our Universe's system boundary, one might imagine that all of the properties of spacetime would be conferred on it by an intelligence of inlets and outlets that produce spacetime inputs and outputs in the first place.

Intelligence of inlets would shape spacetime input to our Universe as intention and as information. And intelligence of outlets would shape spacetime output from our Universe as attention (questions) and as efformation (sculpting). It would be questions asked and a sculpting processes performed by outlets that, with each input/output cycle of spacetime, would produce, as emergent effects, residual physical properties of spacetime throughput.

In two stages of emergence properties of spacetime would themselves be emergent properties of intelligent articulations produced by inlets and outlets as they craft input to and output from our Universe. And properties of energymass in our physical Universe would be emergent from some as-yet-to-be-fully-defined properties of spacetime.

One might imagine that one form of spacetime input and output would be as tiny toroidal vortices, and very high-frequency pulses, occurring as discrete units, (square-wave pulses?), or intelligently articulated quanta.

Such utterances of articulated spacetime would be injecting information into our Universe as their input and would be accomplishing efformation of our Universe by their output.

Pulses of information and efformation produced by inlets and outlets would be imparting to spacetime its properties as quantized instantiations of some intrinsic values inherent in inlets/outlets that input and output it.

As an articulated flux of spacetime would have a most fundamental agency in shaping our Universe, one might imagine that input and output flux of spacetime, modeled as primordial and ongoing products of its inlets and outlets, would be a most fundamental of "uncaused causes" and "uncaused effects" in our Universe.

Spacetime would give birth to and nourish continuing existence and behavior of all physical and spacetime subsystems and contribute to shaping all events in our Universe.

Imagining that flows of spacetime would be active instead of passive, proactive instead of reactive, both informed and informative, both efformed and efformative, then flowing spacetime would be modeled as a continuing first-mover and last-mover in an unfolding narrative of our Universe.

Its Beginnings

Our physical Universe would have had a discrete beginning. Its conception, birth and maturation, its fields and forces, its energies and masses, all would be stories written by active spacetime, imagined as a real thing.

One might imagine that in some early moments of our Universe a new class of inlets/outlets emerged as parts of its forming system boundary. And these new inlet/outlets would have been injecting a huge and sudden in-rush of spacetime entering our Universe through its newly forming system boundary.

One might imagine that each pulse of input and output would have begun or ended as a pulse of space and that a property of time would have been added to it, as some function of frequency as an alternation between input and output, imbuing it with a property of time, and with a system-logic of input-before-output imbuing pulses with time's arrow. Throughput would be both space-vectored, from-inlet-to-outlet, and time-vectored, as input-before-output in each input/output cycle.

One might imagine that our Universe was very small and very hot when it began, and that, early on, it underwent a brief epoch of very rapid inflation, a period of explosive growth, which one might imagine would have been a product of an extremely high rate of pulsing spacetime input, vastly exceeding its rate of output.

And each pulse of input would have been a minute vortical ring of spacetime with an area of about one Planck area (10^-70 meters^2). Shortly after each pulse of spacetime entered our Universe it would have encountered and merged with others to form a turbulent throughput of fast-flowing hyper-fluid spacetime.

Such an extreme preponderance of input over output would have produced intense turbulence forming larger and larger gyres in a flux of spacetime. One might imagine that in such extreme turbulence, gyres would have merged with other gyres, until, at some critical point of size and intensity some vortices would have crossed a threshold to evince a level of autonomy and authority that was sharply discontinuous and almost substantial.

One might imagine that, within a turbulent, and rapidly inflating Universe, there would have emerged gyres, each of which would have been composited of 10^34 Planck-sized vortical rings of input spacetime, and that these composited gyres, each with an area of about 10^-36 m^2, would have been a "womb" from which something would have emerged that was much more substantial than a spacetime vortex in which it was conceived.

Within each one of these critical-sized gyres of massless, energy-less, frictionless toroidal flux of spacetime one might imagine there would have emerged, in each, one fundamental physical constituents of our Universe in each, a fundamental particle, an indivisible unit of energy/field/force/mass.

From Wit-to-Bit & Its Informative Nature

One might imagine that an intelligence possessed by each inlet/outlet in the boundary of our Universe, in a "wit-to-bit" process, would actively produce a flow of information in the form of articulated spacetime input and output.

The flow would be modeled as alternating square-wave pulses. In articulating its inputs and outputs of spacetime, one might imagine that each inlet/outlet would intelligently vary the duration and amplitude of each of its input pulses coordinated with the duration and amplitude of its output pulses.

As part of articulating its input and output, the intelligence of each inlet/outlet also would select an equivalence or preponderance of input over output, or of output over input. Throughput would equal input minus output produced in a single input/output cycle or in a group of cycles.

Such articulations of input and output would convey information to our Universe as articulated spacetime throughput.

Higher cycle rates between input and output, and greater areas and durations of spacetime that would be input in each cycle, along with greater preponderances of input above output, or vice-versa would generate greater amounts of information that would be carried by throughput.

Units used in equations describing these relationships would be hertz, baud rate (where the channel is assumed to be noise-free) and meters^2seconds, and bits. We would use the letters I, T and O to label input, throughput and output variables.

Describing these processes and relationships with one or more equations and diagrams will be a key step in completing this passage of Narrative One.

From Bit-to-It & Its Creative Nature

One might imagine that in some early moments of our Universe a new class of inlets/outlets emerged as parts of its newly-forming system boundary. By their input/output, these new inlet/outlets would have been injecting a huge and sudden net in-rush of spacetime entering and adding information to our Universe through its newly forming system boundary.

One might imagine that each pulse of input and output would have begun or ended as a pulse of space. And that a property of time would have been added to it, as some function of the frequency of alternation between input and output, imbuing it with a property of time, and with the system logic of input-before-output imbuing the pulses with time's arrow. Throughput would be both space-vectored, from-inlet-to-outlet, and time-vectored, as input-before-output in each input/output cycle. And each initial pulse would constitute one bit of information

One might imagine that our Universe was very small and very cold when it began, and that, early on, it underwent a brief epoch of heating and very rapid inflation, a period of explosive growth, which one might imagine would have been the product of an extremely high rate of pulsing spacetime input, vastly exceeding its rate of output.

And each pulse of input would have generated a minute vortical ring of spacetime that would have been the size of one Planck area (10^-70 meters^2. Shortly after each pulse of spacetime entered our Universe it would have encountered and merged with others to form turbulent throughput of fast-flowing hyper-fluid spacetime.

Such extreme preponderance of input over output would have produced intense turbulence forming larger and larger gyres in the flux of spacetime.

One might imagine that in such extreme turbulence, gyres would have merged with other gyres, until, at some critical point of size and intensity some vortices would

have crossed a threshold to evince a level of autonomy and authority that was sharply discontinuous and almost substantial.

One might imagine that, within a turbulent, and rapidly inflating Universe, there would have emerged gyres, each of which would have been composited of 10^34 Planck-sized vortical rings of input spacetime, and 10^34 bits of information. Each of these composited gyres, each with an area of about 10^-36 m^2, would have been a "womb" from which something would have emerged that was much more substantial than the spacetime vortex in which it was conceived.

In a "bit-to-it" process within each one of these critical-sized gyres of massless, energy-less, frictionless toroidal flux of spacetime one might imagine there would have emerged, in each, one of the fundamental physical constituents of our Universe, each consisting of a fundamental particle, an indivisible unit of energy/field/force/mass.

In an "It from Bit" substantiation, energy/field/force/mass would have emerged from information that was conveyed in vortices of spacetime throughput.

One might imagine that these words would describe a process in which the entire variety of fundamental particles described in the Standard Model of Particle Physics would have emerged and would be sustained to the present.

-Here insert imagined descriptions of various spacetime womb sizes, information contents and vortical intensities that would be needed to substantiate and sustain the existence of all of the various kinds of fundamental particles and their relationships as described in the Standard Model of Particle Physics-

Describing these processes and relationships with one or more equations and diagrams will be key steps in completing this passage of Narrative One.

One might imagine that sometime later, as multiple fields intersected, these fundamental particles would gather together, ultimately, as condensed matter that would evolve to form the seemingly endless array of physical properties exhibited by our more or less stable physical Universe.

One might imagine that, to the present time, each one of those critical-sized hyperfluid wombs of spacetime would still be driven by input and guided by output of spacetime with its throughput still circulating frictionlessly and that each one of them would continue to nourish and sustain ongoing existence of its one fundamental field/particle.

But one might imagine that, even before our physical Universe emerged, our younger Universe had already been producing a more primitive kind of inlet/outlet

that also would have bee producing pulsing input/output of spacetime, but doing it much less reliably.

-Here insert the stories of discovery that understood our Universe to be expanding and that understood its expansion to be accelerating-

Its Quantum Fluctuations

Before birth of our energymass Universe, its newly emerging system boundary would originally have been created by the birth of an earlier class of inlets/outlets.

One might imagine that these first-born inlet/outlets were everywhere in our young Universe, and that everywhere they would have been producing zero-point energy that was manifesting as "quantum fluctuations". These would have been the very first kind of spacetime input to and output from our infant Universe.

-Here insert a fuller description of Quantum Fluctuations and how we discovered that what we thought was empty space is not empty, but full of quantum fluctuations -

One might imagine that this original kind of inlets/outlets were generating spacetime gyres operating in a somewhat similar way to, and on a scale that would be identical to a later kind. Except this earlier, and more immature kind of inlet/outlet could not maintain, for more than a moment, gyres at a critical size needed to sustain energymass fields/particles.

Within that moment "virtual" fundamental particles would be born and die.

One might imagine that, like that other kind, quantum fluctuations were produced by inputs of space coupled with an emergent property of time as each inlet/outlet cycled at varying frequencies between input and output. It would have been variable cycle rates, combined with a system logic of input-before-output that also would have imbued quantum fluctuation inputs of space with properties of time, and with time's arrow. Resulting input/output of that first "spacetime", would be imagined and modeled as very high frequency pulses or quanta of spacetime, also in a form of very small toroidal vortices.

Unlike that other kind, however, virtual or ephemeral particles produced in quantum fluctuations would emerge and vanish in an interval almost too short to measure when, very quickly, their brief pulse of precursor spacetime input would fall below some critical threshold.

Ephemeral particles produced by quantum fluctuations might be imagined as simply evanescent by-products of spacetime input to and output from our Universe.

And unlike steady, reliable cycling input/output of spacetime that created and sustains all physical properties of our Universe, spacetime input/output of quantum fluctuations would be somewhat more variable, intermittent, seemingly random with very high-frequency cycles of vortical spacetime input, throughput and output. One might imagine that, even as virtual particles would arise and vanish, still, with each cycle a portion of their precursor spacetime fields would remain behind as throughput, as a net preponderance of spacetime input exceeding output.

Before, while and ever since it made its physical contents, the boundary of our Universe would have been making more and more quantum fluctuation inlets/outlets.

One might imagine that quantum fluctuations would be the very pulses of spacetime input that would, taken together, be leaving behind, in aggregate, almost inconceivably huge net increases in hyperfluid spacetime entering our Universe as input and remaining, however briefly, as throughput.

Quantum fluctuations continuing in our present time would be imagined as ongoing, minute, ubiquitous, and ephemeral inputs/outputs of spacetime occurring everywhere and everywhen throughout otherwise empty space, between and within all physical features of our Universe. As origins of spacetime quantum fluctuations could be imagined as a most primordial, essential, and fundamental property of spacetime.

One might imagine that behavior of quantum fluctuation inlet/outlets would initially have been stochastic, with no discernable underlying order.

But, even before our physical Universe began to emerge, they would have begun a process of maturing to become chaotic and turbulent, beginning to exhibit an underlying, potentially discernable intelligence. And this process of maturing would be continuing in out present time.

One might imagine that, in quantum fluctuations, our young Universe would have been playing with, and practicing how to make a sustained physical Universe, experimenting with sustainability at some upper limits of spacetime input/output.

In just a short time, during its beginning moments, our young Universe would have invented two distinctly different kinds of inlets/outlets: Quantum fluctuation inlets/outlets (Qfio) and Continuous flux inlets/outlets (Cfio). And they would have been producing and would continue to produce two distinctly different kinds of spacetime throughput that, taken together, would have created and shaped and would still be shaping our Universe.

One might imagine that, at all sizes from smallest quantum scales to largest cosmic scales, a story of our Universe, and all of its behaviors would ultimately resolve to interactions between two kinds of spacetime flux produced in Qfios and Cfios.

One might imagine that a number of Cfio's in a boundary of our Universe has remained constant at about 10^120 inlet/outlets since it began, a number that would equal an estimated number of inlet/outlets needed to form 10*85 fundamental particles in our Universe.

On the other hand, any preponderance of input over output, along with self-replication of inlet/outlets, an overall number of Qfio's would have been increasing exponentially since our Universe began. Although at local levels things would have looked, and still would look, very different.

I-O=T. Input Minus Output Equals Throughput

Size and age as properties of our physical Universe would be properties of its throughput as emergent from properties of net of spacetime input minus output.

Every quantum fluctuation inlet/outlet would be able to vary amplitude ("Size") of its space input/output and frequency ("Duration") of its cycles of input/output as well as to vary its ratio of input to output in each cycle.

Most complex, adaptive systems would tend to grow in size and increase in complexity as they age. Usual growth of complex, adaptive systems would be a result of intelligently selected input that would exceed output over time, with some throughput being retained by such systems for a time, causing them to expand.

One might imagine that our Universe would be expanding in that sort of way, if an overall average input of spacetime from quantum fluctuations would exceed their output.

One might imagine that classically defined isolated systems. having no input or output of any kind whatever, (if any such systems could exist or would have existed for more than a short time in our Universe), would not grow as they age. and would not age well.

One might imagine that, by its very architecture, any expansion of our Universe would always produce growth of its 2-dimensional area (meters^2) of its boundary and would require it to give birth to exponentially increasing numbers of new quantum fluctuation inlets/outlets (Qfio's) that would have to emerge in order to constitute its enlarging boundary.

One might imagine the class of inlets/outlets that created and sustains existence and the number of all the physical entities in our Universe would maintain their ratio of input to output at about one-to-one, would not be contributing to expansion, and would not be replicating.

It would be only quantum fluctuation inlet/outlets that would be producing variable increases of residual spacetime throughput and would be causing our Universe, and its boundary to expand.

On the other hand, one might imagine that, even though our Universe as a whole would be expanding at an accelerating pace, still, not all quantum fluctuation inlets/outlets would necessarily host a preponderance of input. One might imagine that in some regions, and at some times, they would host preponderances of output.

As an aggregate spacetime throughput of our Universe would increase, an area of its boundary would expand. And as any aggregate of spacetime throughput would decrease, the area of its boundary would shrink.

One might imagine that any local preponderant output of spacetime would cause a dimpling of the Universe's boundary as some involved circumstantial inlet/outlets would be eliminated in order to shrink the corresponding area of the boundary. And reduced numbers would accelerate their output so as to maintain spacetime output of the shrinking region.

SUMMARY OF PART 1 AND PRELUDE TO PART 2

One might imagine that all of the properties of our physical Universe would be emerging from properties of spacetime, and that properties of spacetime would be emerging from properties of intelligently articulated input and output passing through intelligent inlets/outlets that would make up the intelligent boundary of our Universe.

In Part Two, each of the sections imagines how some particular dynamic properties of our physical Universe would emerge from some particular properties of spacetime.

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Narrative One: Essence and Evolution

Part Two:

Some Dynamic Behaviors of our Universe, Imagined as Properties of a Complex, Adaptive System

Its Expanding, Contracting and Accelerating Nature

One might imagine that our Universe would be a nonlinear dynamical system, that its output would not always equal it input and that any rate at which it would expand would always be undergoing multiple and complex kinds of acceleration.

One might imagine that, for any given and variable preponderance of input over output, an ongoing geometric increase of the area of its boundary would increase the total number of quantum fluctuation inlets/outlets which would, in turn, add geometrically more input, throughput, and output of spacetime to our Universe as it expands.

So its rate of expansion, expressed in units of meters^2 per second, would always and necessarily be accompanied by a baseline of acceleration of expansion, expressed, in SI units as m^2 per sec^2.

A fundamental constant of our Universe is expressed in those same units. That constant is c^2, the speed of light squared.

Let's assume for the moment a geometrically flat universe and to keep it simple let's assume a uniform acceleration of expansion equal to the speed of light squared.

What would be expanding at an accelerating rate since its beginning would be the area, measured as the size of our universe.

To see whether that value makes any sense as an acceleration of expansion, we can run a calculation:

The acceleration rate of expansion would be equal to the speed of light squared, 10^17 m^2/sec^2. It would be denoted as A

After expansion has been accelerating for 13.8 billion years the present rate at which our Universe is expanding, denoted as E, would be calculated as:

E = A x T.

where A is the acceleration of expansion and T is the age of our Universe in seconds,

A = 10^17 m^2/s^2 and T = 4.32 x 10^17 s.

Calculating the values, we get:

E = 10^17 m^2/s^2 x 4.32 x 10^17 s

E = 4.32 x 10^34 m^2/s. The present rate of expansion

We can calculate what the average or arithmetic mean rate of expansion, has been. This would be denoted as. Eavg:

Eavg = E divided by 2

Substituting the value of E, we get:

Eavg = 4.32 x 10^34 m^2/s / 2

Eavg = 2.16 x 10^34 m^2/s

Then we can calculate the size of our observable universe, denoted as Sc,

Sc = T x Eavg

Substituting the values for T and Eavg, we get:

Sc = 4.32 x 10^17 s x 2.16 x 10^34 m^2/s

= 10^52 m^2

This calculated size is quite close to a widely accepted size of our observable universe = 6 x 10^53 m^2.

So one might imagine that the speed of light squared is also the rate at which the expansion of our Universe is accelerating. And so imagining, one might suspect that some correlations, or even causal relationships may exist among the relativistic and quantum properties of our Universe and the ways in which spacetime flows into, through and out of it.

But, one might also imagine that such a baseline of acceleration also would always be accompanied by variations in preponderances of input or output occurring through quantum fluctuations.

Changes in preponderance of input or output would be some of the principal ways that inlets/outlets would articulate their inputs/outputs. And they would produce a second kind of acceleration, coming on top of baseline acceleration of expansion.

And here is where things get more complex.

Acceleration of acceleration is kind of a funny thing to deal with mathematically. One might imagine that any change in preponderance of input or output through quantum fluctuations would necessarily introduce acceleration of acceleration of expansion, ("AofAofEofE"). And the math would call for expressing it in units of m^2 per sec^3,

AofAofE computes as a discontinuous function, and the term "Jerk" is applied to it when it involves motion in a straight line and it is called vector acceleration of acceleration. It is expressed as an instantaneous third derivative of position with respect to time.

But our imagined kind of AofAofE would be a different kind, not be a vector acceleration. It would be a third derivative of area with respect to time. It would be a sharp, effectively instantaneous "Jerk" event spread out over an affected area.

It would be a discontinuous change that would register as a kind of shockwave, not propagating as a wavefront, but emerging throughout the affected locale of hyperfluid spacetime as a sharp jump in the size of an area of spacetime undergoing AofAofE.

One might imagine that, as effects of other changes in rates of input or output. quite possibly there would also be fourth, fifth and sixth derivatives (and on) of area with respect to time, expressible as m^2/sec^4, m^2/sec^5, m^2/sec^6, etc.

Informally and humorously the terms "Snap", Crackle" and "Pop" are used when referring to vector hyper-accelerations. One might imagine that third, fourth, fifth and sixth derivatives of area with respect to time would produce somewhat analogous shockwaves, each of which would have its own unique signature.

One might imagine that, considering the variability of quantum fluctuations, rather than rare events, Jerk, Snap, Crackle and Pop shock events, would ultimately be understood as familiar and frequent events, occurring for different durations and in different regions of our Universe.

One might imagine that some amazing, possibly instantaneous, physical transformations would emerge locally from and accompany such abrupt events wherever, whenever changing preponderances of quantum fluctuation inputs and outputs would be causing hyper-accelerations.

One might imagine that how our Universe got so large in such a short time suggests that its rate of expansion, while including some periods of contraction, must have undergone almost uncountable preponderances of input with an almost uncountable number of significant local hyper-accelerations of expansion.

One might imagine that interplay among geometric expansion, baseline acceleration of expansion and various higher order accelerations would be leaving behind a complex history of growth for our Universe.

Its Integrity

One might imagine that input and output, space and time, expansion and acceleration of expansion, energy and mass, age and size all would be deeply inter-connected as fundamental co-varying macro-properties of our Universe, not so-far fully described, as co-evolving properties in its unfolding story.

Even though space and time are united in the same framework, they would not be two different words referring to the same thing. Likewise, even though energy and mass are united in their framework, they also would not be two different words referring to the same thing.

One might imagine that there would be some universal constants we would use as conversion factors between them and, even perhaps, among them all, One might imagine that the speed of light and acceleration of expansion, c and c^2 respectively, would be some key conversion factors for our Universe.

The invariant speed of light in a vacuum, ~3 x 10^8 meters per second, stated as the letter “c” would be the conversion factor between space and time and c^2 would be the conversion factor between energy and mass as well as between size and age. But one might imagine that there would be other connected pairs, also with conversion factors that would mediate between them…

One might imagine that ever since its earliest epochs, our Universe would have had an estimated, and unchanging, cumulative mass-energy throughput of about 4 x 10^69 joules and an estimated mass throughput of about 3 x 10^52 kilograms. A

ratio of mass-energy (joules) to mass (kilograms) would calculate to be about 1.33 x 10^17, and there it would be, again, a conversion factor that, maybe not coincidentally, would also be very close to c^2.

Viewed as its throughput one might imagine that the size and age of our Universe would also be paired properties related by their own conversion factor:

Employing SI units, our observable Universe appears, at the moment, to have an accumulated space throughput (one might imagine viewing space throughput as its "size") with an area of about 6 x 10^53 meters^2. And it appears to have an accumulated time throughput as second^2. One might imagine viewing time^2 throughput as its "age"^2. With an age^2 of about.13.7 billion years^2, or about 1.6 x 10^35 seconds^2. A ratio of size (meters^2) to age squared (seconds^2) would calculate to be about 10^18:1, a ratio, maybe not coincidentally, quite close to a conversion factor expressed as c^2.

One might imagine that, with a little algebra, E = mc^2 would become E/m = c^2, from which one might understand that, in our Universe, its ratio of energy-to-mass would be expected to equal about the same value as c^2. 10^17: 1. And at the Planck scale the ratio of Planck energy to Planck mass and of Planck area to Planck time^2would also relate by a conversion factor of about 10^17:1.

One might imagine that, like space and time, like energy and mass, like size and age, there would be some other similarly paired properties of our expanding, accelerating Universe, and that some such pairs, as yet to be identified, would also be associated, in their own framework, by a conversion factor of c = 3x10^8 or c^2 = 10^17: 1.

Cutting through complexities of accelerating expansion, our Universe would seem to operate on several baseline ratios of throughput.

One might imagine that the equivalences among many conversion factors would suggest that spacetime input/throughput/output and expanding, accelerating spacetime would be affecting how all of these paired relationships would be operating in our physical Universe. But exactly how those effects would be occurring has so far not been modeled mathematically.

And it would even be suggesting that some causal relationship, so far not modelled, would exist between spacetime input/output and myriad physical properties of our Universe.

Going a bit further one might imagine that, operating within something like a homeostatic range, our Universe would be cycling around a set-point for its acceleration of expansion with a value of about 10^17 m^2 / sec^2.

One might imagine that what would seem, by their effects, to be extreme variations of acceleration would not actually involve very big numbers, but would just be our intelligent Universe varying and fine-tuning the properties of its throughput of spacetime from region to region and from time to time.

One might imagine that, if evidence would support calculating a harmonic mean value for acceleration of expansion across various regions and periods of changing accelerations, that mean value would approximate 10^17 meters^2 per second^2 in SI units, which would also be understood as the squared SI value for the vector speed of light in a vacuum, expressed as meter^2 per seconds^2.

One might imagine that acceleration of expansion and the apparently invariant speed of light would be mathematically paired in some determinative relationship, that the conversion rates between space and time, between energy and mass and between size and age would all seem to involve our value for the speed of light in a vacuum, or its value squared, and that something quite profound would emerge from models we would use to describe acceleration of acceleration of expansion.

One might imagine that necessarily compounding increases in the number of inlets/outlets that produce quantum fluctuations would always produce s baseline of geometric acceleration of expansion, and that varieties of local preponderance of input or output would accelerate that baseline acceleration, possibly as third, fourth, fifth and sixth derivatives of area with respect to time.

One might further imagine that jerk, snap, crackle and pop shock waves would be keys to modeling, on very granular levels, how our Universe would be intelligently fine-tuning key environmental conditions of spacetime throughput as a protophysical flux, and so would be adjusting and optimizing both spacetime systems and matter-energy systems, from moment to moment from region to region. Taking this approach, c^2 would not be understood as a universal constant. Instead it would be considered a universal homeostatic setpoint and the speed of light would derive as a square root of the value of that setpoint or from the excursions around it.

Its Light

The behavior of light itself would relate, in some so far not entirely defined ways to spacetime's flow and to the accelerating expansion of our Universe.

One might imagine how behaviors of spacetime would not be just passive metrics but would be actively assigning to light its invariant speed of propagation.

One might imagine that, beyond the properties of massless propagations themselves, the ways our Universe would produce their remarkable invariance would owe to

some deep environmental property of whatever it would be that would suffuse both sources and observers and comprise whatever would lie between them.

One might imagine that this would be some dynamic property of spacetime itself. Perhaps it would relate to the rate at which spacetime would be expanding, or to an acceleration of that rate.

One might imagine that, by some articulating input and output, spacetime flux produced in quantum fluctuations would be setting/resetting/adjusting/fine-tuning values for the very most fundamental physical and protophysical properties of otherwise empty spacetime.

Some of those would be setting the speed of light through otherwise empty spacetime (formerly imagined as the “ether” or the “vacuum” or “empty space” before it was determined that empty space was not empty at all, but filled with quantum fluctuations).

So, one might imagine that the speed of light and accelerating expansion would be related to one another by events that occur in quantum fluctuations. And that the speed at which light propagates from its sources to the far reaches of the Universe would be associated intimately with values for accelerating expansion of our Universe as it would be given by particular qualities of quantum fluctuations in any of a variety of regions through which light would pass.

How one would model active, flowing, expanding, accelerating input, throughput and output of spacetime would seem to be a key to modeling how it would actually produce, as its square root, the invariance of light’s speed.

In tying together light’s invariant speed as the square root of a rate of accelerating expansion of flowing spacetime one might imagine that we would understand in much richer context how light’s wavefront would experience no passing of time, and how all relativistic and quantum effects would become imbued with more granular and more intuitive meanings, and with implications for relationships between the very large and the very small properties of our Universe.

Additionally, one might imagine that, in deriving how an invariant speed of electromagnetic propagations would emerge from the permittivity and permeability of empty spacetime, one might imagine that. possibly, from some other analogous and yet-to-be identified properties of spacetime one would be able to derive the invariant speed at which, for instance, causality and gravitational waves propagate.

Coming back around at it from another perspective, one might imagine that some of our math would propose an association and suggest yet again another way to imagine how the tern c^2 understood as a conversion factor, and understood now as

accelerating expansion of spacetime, would emerge as a property of our physical Universe:

The SI value for a uniform acceleration of expansion of our universe, denoted by the letter A, is imagined to equal the SI value of the speed of light squared, denoted as c^2. Units for both being expressed as m^2/sec^2.:

$$A = c^2 =$$

$$10^{17}\ m^2/s^2$$

Given a widely accepted age of our universe in seconds denoted as T

$$T = 4.32 \times 10^{17}\ s,$$

a present rate of expansion, E, would be calculated:

$$E = AT$$

$$10^{17}\ m^2/s^2 \quad X \quad 4.32 \times 10^{17} s =$$

$$4.32 \times 10^{34}\ m^2/s$$

Imagining approximately uniform acceleration since the beginning of the universe, an arithmetic mean rate of expansion, denoted as Favg, would be calculated:

$$Eavg = E/2$$

$$Eavg = 2.16 \times 10^{34}\ m^2/s$$

A calculated size of our observable universe, Sc, would be:

$$Sc = Eavg\ I$$

$$2.16 \times 10^{34}\ m^2/s \ \text{x.} \ 4.32 \times 10^{17}\ s =$$

$$Sc = 10^{52}\ m^2$$

Our calculated result would be less than two orders of magnitude smaller than a widely accepted size, Sw, of our observable universe,

$$Sw = 6 \times 10^{53}\ m^2.$$

One might imagine that over so many orders of magnitude such a close result would suggest that there may be some connections worthy of exploration between accelerating expansion, an invariant speed of light and some known or unknown substantive properties of spacetime as a protophysical flux.

It is important to note that imagination is a long way from knowledge and that these calculations would only give a rough impression that such connections may exist. Much further work is needed to confirm or falsify any connections and to quantify their relationships if they do appear to exist.

With a large data-set obtained and calculated from many observations, one might imagine that a harmonic mean rather than an arithmetic mean would offer a better value for a mean rate of expansion over the life of our Universe.

But even based on the above calculations, one might be justified to imagine that the term c^2, the speed of light squared, would, for some unknown reason match closely the acceleration of expansion and would suggest some connections among acceleration, light's invariant speed and some as yet undefined properties of spacetime.

Some recent studies seem to suggest a likelihood that acceleration of expansion would not have been uniform at all, and instead would have fluctuated from epoch to epoch, or even from moment to moment, and from region to region, or even from location to location.

One might imagine that such fluctuations would be small excursions around some imagined setpoint value for acceleration of expansion.

One might imagine that some future observers would see evidence from many regions and periods of varying accelerations of expansion, even that acceleration of acceleration of expansion has been ubiquitous and frequent in the life of our Universe.

A proposed Inflationary Epoch of very extreme accelerations in the earliest moments of our Universe would be widely accepted. And other epochs and regions with changing accelerations have also been noted or proposed.

Imagined preponderances of input or output during some periods and in some regions of our Universe might incline one to question whether acceleration of expansion would ever have been uniform and whether some regions would always be undergoing observably unique accelerations of expansions.

Imagining that a narrative of varying accelerations over the history of our Universe would become more settled science, one might then imagine that, at some point, we

would be able to calculate an acceptable harmonic mean acceleration of expansion, or a setpoint value for varying accelerations in our observable Universe since its beginning.

Using that mean value as an approximate setpoint of our Universe, which one might imagine would equal about 10^17 meters^2 per sec^2, calculations predicting the then present size of our observable Universe would be consistent with a then-currently accepted value for its observed size.

One might even imagine that modeling ways in which light behaves in a context of accelerating expansion would provide some keys to decoding several other deep properties of spacetime and of its relationship with our physical energymass Universe as well.

One might imagine that we may soon craft new mathematical models that would describe how changing quantum fluctuation rates of inputting and outputting spacetime in any region would drive acceleration of expansion and would describe how that acceleration would determine changes in the speed of light in a vacuum in any region.

One might imagine new models that would describe how jerk, snap, crack, pop shockwaves would form and what their signature effects would be in any region and period in which events would occur that we would be modeling as higher derivatives of area with respect to time.

One might imagine that such models would begin to predict how everything in such regions, including values for permittivity and permeability, would re-scale instantly as a response to shockwaves produced by AofAofE events and how a locally observed speed of light squared would always give local acceleration of expansion, or vise-versa.

One might imagine that this would be an emergence of c^2 as a potent and universal constant (and setpoint) for the whole of our observable Universe.

One might imagine models describing how, in a "Universal Relativity", whenever acceleration of expansion changes instantaneously in any period and region, resulting shockwaves would cause all clocks instantaneously to run faster or slower and all tools for measuring distances instantaneously to get shorter or longer.

One might imagine that changes in the length of a meter and the duration of a second would track mathematically with discontinuous changes in the value for acceleration of expansion, and would be described by some yet-to-be-imagined mathematical functions.

One might imagine that all of our mathematical models in Classical Physics, in Quantum Theory, in Special and General Relativity would each describe local and conditional cases of motion and relationships among space, time, energy and mass, and that all of these local cases would come to be comprehended by and function within a math of Universal Relativity that would span across all narratives of our Universe from our accounts of its very smallest systems to our epic stories of its very largest events and entities and of everything in between.

Is it Really Lawful or Is it Just Intelligently Consistent?

Imagining a dynamic model of spacetime as intelligent first-and-last-mover would seem to suggest that any apparently lawful ways in which our Universe would have evolved, and would be behaving at present, would be more results of a constancy of its intelligence and a consistency of its values in adapting to change than results of adhering to some set of rules and abstract laws.

One might imagine that a huge, overarching intelligence operating the system boundary of our Universe, its Essence, would be honoring and collaborating with individual and eternal values inherent in each of its inlet/outlets to assure that only some output from our upstream Universe would be selected as input by our Universe. And one might imagine that output by our Universe also would be intelligently, honoringly and collaboratively selected.

Then there would be randomness of input and output in quantum fluctuations, a likelihood of perturbations in the environment of our Universe and an unpredictability of synergetic and emergent events, any of which our Universe would be adapting to in uncountable iterations.

So one might imagine that any apparently deterministic obedience by our Universe to some underlying rules and laws over almost 14 billion years actually would have more to do with adaptiveness and coherence and consistency of its values residing in its inlet/outlets and with their persistent and evolving intelligence as they frame their outputs and inputs.

Move to or paraphrase above passage to include in a new section in Implications about determinism.

Its Built-in Duality

Two distinctly different kinds of inlet/outlets would produce two distinctly different kinds of throughput.

Imagining that our Universe would have one kind or inlet/outlet that would produce regularly sustained pulses that nourish its established physical contents, and another kind that would produce variable, intermittent pulses arising in its quantum fluctuations, one might then imagine making useful distinctions between the character of "legacy" throughput and properties of our Universe and the character of its "circumstantial or emergent" throughput and properties.

Legacy properties, and the intelligences and values that shape them would be imagined as arising primarily in reliable sustained pulses of input/throughput/output of spacetime that would seamlessly sustain the most minute enduring physical features of our Universe.

Circumstantial properties, on the other hand, and intelligences and values that shape them, would arise in turbulent, initially chaotic pulsing input/output of quantum fluctuations.

One might imagine that legacy and circumstantial properties of our Universe would each be expressions of their own respective intelligences and sets of interacting values inhering in their respective inlet/outlets.

Legacy values and the kinds of intelligences at play in them would be constructed in very different terms than would be necessarily statistically-based intelligences and values of circumstantial processes, conditioned, as the latter would be, by sometimes chaotic inputs and outputs of spacetime through quantum fluctuations.

One might imagine that legacy processes would be more involved with properties of mass, momentum and gravity. While circumstantially driven processes would involve values and intelligences more relating to properties of charge, magnetism, the strong and weak nuclear interactions and fundamental particle fields.

One might imagine that, over any interval of space and time, input of spacetime by legacy inlets/outlets, would always equal output, and would be quite localized in regions that are rich in aggregated energy/matter.

For circumstantial inlets/outlets, however, one might imagine that there would be, over time and for both denser and emptier regions, wide variations with respect to their preponderances of input or of output.

Proof of Concept

One might imagine that, if there were to be a growing list of equations in which the term “c^2” appears as a key conversion factor or as a predictive ratio, or as a value for acceleration of Universal expansion, such would be steps toward proof of concept and worthiness of hypothesis. experimentation and observation seeking evidence that would tend to falsifying or confirm that a flux of spacetime would be a prime mover in our Universe.

Its Aging

Our Universe would seem to be aging gracefully.

One might imagine that 13.8 billion years would be a very long time for a completely isolated system to endure, even one that had a huge kick-start.

One might imagine that, if our Universe were a completely isolated system, with no ongoing intelligent input/output of any kind, processes of entropic heat-death described in the Second Law of Thermo-dynamics would long ago have left our Universe a cold, dark place.

Since it hasn’t, one might imagine that our Universe would not belong in a class of perfectly isolated systems the Second Law talks about.

But it would, instead, be imagined and modeled as a complex, adaptive system, that would be intelligently managing, by its input, throughput, and output of spacetime, to maintain a dynamic balance between increasing orderliness in counterpoise with increasing disorderliness, and would be evolving over these billions of years, having produced a variety of system-sustaining adaptations and would be functioning at a very high level of intelligent system management of its accelerating intelligence in counterpoise with its accelerating entropy.

The rate at which new stars are forming in our Universe and the size of new stars both seem to have diminished over the last few billion years. Complex, adaptive systems do age, evolve and die, but most, one might imagine, would take longer to do so than do completely isolated systems.

One might imagine that, over the last few billion years, our complex, adaptive Universe would simply “be showing its age". And, as any such system would, our Universe would have a potential to reinvent/rejuvenate itself, possibly by initiating newly articulated iterations of its already accelerating input and output. One might imagine that accumulating evidence would show that our Universe would have been doing just that in many regions, on many occasions in the past.

Its Gravity Versus Its Accelerating Expansion

Observed ways that gravity works and is modeled in describing our Universe, would seem to leave open some deeper questions inquiring how gravity would come to work the way that it does.

We know about gravity by observable and very reliable effects its fields exert on motions of things in proximity with one another and by features that spacetime seems to exhibit in association with gravitational fields.

One might imagine that, while we model effects of gravity to a high degree of accuracy, we would not yet have composed models of gravity that describe, in more granular and intuitively satisfying ways, how it produces those effects.

Imagining that we live in a Universe in which spacetime would not just move passively, in the sense that moving energymass would cause spacetime to change its curvature, one might also imagine that we inhabit a Universe in which spacetime would flow, as a hyperfluid, and that flowing spacetime would assertively affect movement of energymass.

Focusing on Cfio's one might imagine a chain of "how questions" about "legacy" properties of gravity that would, toward the end of the chain, begin to illuminate some mysteries surrounding how gravity would be created and how it would do what it does:

To begin, one might imagine models describing how sustained, legacy input and output of hyperfluid spacetime would be occurring. Then one might imagine models that would describe how such input and output would drive fluid-like flows of spacetime.

Next, one might imagine models that would describe how legacy currents of hyperfluid spacetime would have produced spacetime gyres and how those gyres would be the very gravitational fields of physics.

Next one might imagine models describing how those fields would, in the earliest moments of our young Universe, have constituted or created the energymass into which they would have been flowing.

One might go on to imagine models of how long-standing (legacy) currents of spacetime flowing into energymass would be continuing to the present day to sustain a stable ongoing existence of energymass at their centers.

One might then imagine something akin to a vortical fluid-dynamical model that offers an intuitively satisfying notion of how currents of spacetime flowing into regions of energymass would tell all energymass in their fields how to move convergently, in a manner consistent with an inverse-square field law and a principle of least action.

Finally, one might imagine intuitively satisfying models that would describe how, engaged in such convergent motion, both legacy and circumstantial hyperfluid spacetime would itself undergo alterations that would complete field models describing both inverse-squared and least action principles, as well as some other, so far undefined, properties of mutual attraction.

Building somewhat analogously from dynamic field models of gravitation, one might imagine how, generated by tiny, omnipresent quantum fluctuations, "circumstantial" flows of spacetime would generate properties of electromagnetism, nuclear interactions and unique personalities of particle fields that would emerge as statistical operators both over very, very short ranges and, at opposite extremes, would produce ubiquitous effects associated with massless propagations and accelerating expansion on cosmic scales.

Going further, one might imagine how all of these circumstantial fields would operate and influence one another, as described in the Standard Model, and then, how these fields would interact with dynamic legacy field properties of momentum and gravity.

The most notable legacy properties of gravity would be to gather larger things together. And, driven by quantum fluctuations, the properties of electromagnetism, nuclear interactions, and the binding energies of fundamental particles would have extremely high energy densities that would operate on extremely small scales, over very short distances, and would have an effect of holding very tiny things very tightly together.

On a huge cosmic scale, quantum fluctuations would also be producing very large-scale effects, such as electromagnetic propagations that would be discernible across vast reaches of our Universe, far beyond the range of any discernible effects produced by gravity.

In an intimately related way, input of spacetime produced in quantum fluctuations would also cause accelerating separation, even if indiscernibly, between the very tiniest of things, as they would drive accelerating universal expansion of spacetime, which itself would be produced, at its source, by the very, very smallest of all possible actions, by a preponderance of spacetime inputs over outputs in very tiny pulses associated with uncountable inputs and outputs of an ever-increasing amount

of quantum fluctuations produced by ever-increasing numbers of quantum fluctuation inlets/outlets.

One might imagine that accelerating expansion would not be modellable as an effect of any force, would not be itself modellable as a force, nor would it be modellable as a cause of any force.

It would be simply an ever-increasing presence of new inlets/outlets and new spacetime input to and throughput in our Universe.

One might imagine that, as it would not be a force in any sense, accelerating expansion would not be contradicted by any force either, not by gravity, not even by high binding forces among fundamental particles.

If at any size from quantum to cosmic, effects of accelerating expansion would appear to be contradicted either by gathering effects of gravitational legacy flows or by binding effects of circumstantial forces at quantum scales, those apparent contradictions would only be errors of inference resulting from scales at which such appearances would be noted.

Although gravitationally bound and quantum bound systems might seem not to be undergoing accelerating expansion, relative to the huge size of our Universe any of these systems would be far too small for their local rate of expansion to be discernible.

In quantum systems binding forces would be produced by the very same influx/efflux of spacetime and proliferating inlet/outlets that that would be causing accelerating expansion.

And one might imagine that, given the minute sizes of quantum systems, accelerating expansion would be far too tiny ever be observable. Imagining that jerk, snap, crackle and pop accelerations would be ever-present, Universal Relativity would factor into interpreting results of observations of expansion involving all locations, periods and orders of magnitude.

Its Stars

Its stars would owe their formation and ongoing existence to its two streams of spacetime throughput.

One might imagine that, with our Universe expanding at accelerating paces, most of its circumstantial inlets/outlets would have to be hosting preponderances of input over output. Some, one might imagine, would even host a huge preponderance of circumstantial input.

If there were fairly large regions in which quantum fluctuation inlets/outlets of this sort were to become concentrated, one might imagine that, operating in collaboration with a gathering/ focusing/compacting effect of legacy properties, they would ignite locally intense reactions that would lead to star formation and a surrounding gravitational field that would, locally, be drawing ever more legacy energymass into it.

Its Black Holes - Gravity and Nullity

Its black holes would owe their existence to a different kind of collaboration – a partnership of Gravity with "Nullity".

One might imagine that, even though our Universe would be expanding at an accelerating pace, still, not all quantum fluctuation (circumstantial) inlets/outlets would necessarily host a preponderance of input.

One might imagine that in some regions they would host huge preponderances of output.

One might imagine that any local preponderant efflux of spacetime would cause a dimpling of the Universe's boundary as some involved circumstantial inlet/outlets would be eliminated in order to shrink the corresponding area of the boundary. And reduced numbers would accelerate their output so as to maintain their preponderance of spacetime output in the shrinking region.

At some point the area of output would become so small and the rate of output would become so huge that not only spacetime but also nearby energy/mass would be drawn into that small region.

It would be at some point in such a region that a black hole would form.

But involved inlet/outlets would only be able to output spacetime and not energymass so any energymass that was drawn in would "get suck" at the outlets.

Operating in collaboration with gravity driven by input, would be another agency one might label "nullity", which would be a process driven by output.

Combining of gravity with nullity, focused in a small area, a relentless outflowing spacetime would produce a voiding, collapsing, nullifying of all spacetime interstices within all systems great, medium and small. Until, inside a black hole, there would be almost no spacetime available to sustain any energymass systems that would have been drawn into it, as almost all of the forces of nature would be temporarily nullified, in a huge stream of spacetime output flowing out of our Universe fushing around an energymass singularity.

Since our Universe would be expanding at an accelerating pace, one might imagine that quantum fluctuation inlets/outlets with such huge preponderances of output would be quite rare, relative to a much higher count of inlets/outlets that would have significant preponderances of input.

One might imagine that some spacetime output of our Universe, including that occurring through black holes, would feed, via irreversible transfers, to inlets of some downstream Universe.

At an interface between our Universe and such a downstream Universe, one might imagine that infinities would emerge from math used to model events, where discontinuous shifts would be occurring in sizes of spacetime output or input.

One might imagine that, in such a downstream Universe, some of its inlets/outlets would be "White Holes" that would be associated with black holes in our Universe. And similarly, if white holes were to be observed in our Universe, they would be the other side of black holes in a Universe upstream of ours.

Its Dark Energy and Dark Matter

Its dark energy and dark matter would owe their existence to milder preponderances of spacetime input or output through quantum fluctuations.

While imagining extreme nullity conditions that would produce black holes, one might also imagine that there would be large regions of milder preponderances of spacetime input or output that would also produce some distinctive physical effects and some milder alterations (bulges and depressions) in the shape of the Universe's boundary.

One might imagine that inlet/outlets with milder preponderances of spacetime input would produce some effects in our Universe that would be somewhat "energy-like" and would evince ubiquitous and weakly interacting field properties ascribed to dark energy ("preponderant energy"?) that would be associated with galaxy formation, star nurseries and formation of galactic groups and clusters.

One might imagine that there also would be large regions of circumstantial inlet/outlets with milder preponderances of outputting spacetime.

One might imagine that properties we ascribed to dark matter would be associated with such regions where milder output preponderances would be producing weakly interacting effects that would be viewed as "matter-like"("preponderant matter"?).

One might imagine that, operating through quantum fluctuations, preponderant energy and preponderant matter would be acting as silent partners, collaborating

weakly with ordinary legacy energy and ordinary legacy matter to form and guide many entities and events we observe in our Universe.

Since our Universe seems to be expanding at an accelerating pace, one might imagine that there would be a much larger aggregate number of inlet/outlets producing preponderant energy compared with a much smaller aggregate number of inlet/outlets producing preponderant matter.

As our Universe expands, one might imagine that a throughput ratio of preponderant energy to preponderant mass, if it were expressed in SI units, would. like our ratio of legacy energy to legacy mass, be maintained at or around 10^17 : 1.

Its Physical Formations, Forces, Fields and Flows

All motion of energymass in our Universe would resolve as multiple emergent and confluent fluxes of spacetime.

One might imagine that an existence and actions of all material structures in our Universe would be resolvable to an existence and interactions among discrete fields, and that all classical and quantum fields would be the very environmental conditions that shape all interactions in our Universe, as all fields would be resolvable as flows of spacetime.

Viewed through a lens of Universal Relativity, one might imagine that, for all fields, what would be flowing would be hyperfluid spacetime. And, at their origins, actions driving this flux would be countless, ubiquitous minute inputs and outputs of hyperfluid, flowing spacetime entering and exiting our Universe through inlet/outlets that would be much smaller than even the smallest fields they would collaborate to form.

Differing field properties/interactions might be imagined as arising from dynamic differences among their associated spacetime inputs and outputs.

Gravity, nullity, electromagnetism, strong nuclear fields, weak nuclear fields, unique field properties associated with fundamental particles, all might be imagined and modeled as if they would be driven by distinctive combinations of properties of their tiny associated spacetime inputs or outputs.

Drivers of field differentiation would include differing contributions of legacy versus circumstantial inputs and outputs, and/or their directions of rotation, and/or the angular velocity of their toroidal spin, and/or numbers of their related inlets/outlets that would be acting in a collaborative/coherent fashion, and/or differing preponderances of input or output at their associated inlets/outlets, and/or

as frequency or amplitude modulations produced in their associated inlets/outlets as they cycle between input and output and/or as they express increasing or decreasing volumes of input and or output.

On top of all that, one might imagine that a key differentiator would be variably timed, highly intelligent patterns, as “choruses”, articulately coordinated across large arrays of inlet/outlets.

Disorder and Its Intelligent Orderliness

Our Universe would be at once a stochastic system and a chaotic one.

One might imagine that, in the boundary of our Universe an intelligently iterative quality of its quantum fluctuations would produce what would somewhat resemble emergence of a fractal-like geometry with its self-similarities and implicit orderliness.

On the other hand, with its imagined input and output occurring as randomly timed and varied quantum fluctuations, one might imagine that our Universe would have begun as, probably would still be, a stochastic system.

Imagining that those input and output events would have been intelligently coded, occurring through uncountable iterations, one might imagine that ever since it began our Universe would have been evolving as an increasingly chaotic and complex adaptive system, making it increasingly sensitive to initial conditions which, for our Universe, would be imagined as its input.

And it would be sensitive as well to its final conditions, which would be imagined as its output, which would also be imagined to function as something like feedback.

Imagining that our Universe, as a complex adaptive system, would be always exposed to very intelligently organized initial conditions, still they would emerge stochastically as quantum fluctuation input events. And it would be a system that would be always exposed to very intelligently organized final conditions that would emerge stochastically as quantum fluctuation output events.

It’s entire system boundary would operate a little like a highly intelligent random number generator in the sense that locations and timing of input and output events through quantum fluctuations would sometimes be stochastic. And yet as an increasingly chaotic system it would always be very sensitive to initial conditions as input and to final conditions as output.

One might imagine that, unlike classically chaotic system models, both input to and output from our Universe would themselves be undetermined, not exactly

repetitions, but reliably redundant, in the sense that their content would be "invented" by their inlet/outlets and register on the system as "uncaused causes" (as input) and "uncaused effects" (as output).

Also, unlike the determinism of classically chaotic systems, the kinds of ubiquitous, spontaneous input and output of our Universe would often interrupt causal chains, sponsoring intra-system synergistic and emergent throughput from which properties of outcomes would neither be necessarily predictable, nor even necessarily caused by properties of their antecedents.

Its Myriad Intelligences

Universal Darwinism would underlie emergence in our Universe of its myriad varieties of intelligence.

One might imagine that over-arching, coordinating kinds of intelligence that would comprise Essence would be very different from localized kinds of intelligence that would operate individual inlets/outlets.

And one might imagine that intelligences of inlets that would guide input processes would have very different intelligences than would outlets that would guide output processes.

The former would introduce variation and be feed-forward, inspiring, expansive, creative, expressive, additive, while the latter would introduce feedback, and selectivity and would be discriminating, reductive, extractive, and sculptural.

Then there would be a multitude of kinds of intelligence that would govern steady, sustaining flows of legacy input and output of spacetime, and these would be very different from various kinds of intelligences that would imbue with meaning stochastic, circumstantial input and output occurring as quantum fluctuations.

Kinds of intelligence that manage variable preponderances of input would be different from kinds of intelligences that would manage preponderances of output.

Kinds of inlet/outlet intelligences that would modulate frequencies and amplitudes of their input would be different kinds of intelligences from those that would modulate frequencies and amplitudes for their output.

Then, for all subsystems residing inside of our Universe, there would be huge varieties of intelligences that would be guiding functions of complex, adaptive spacetime subsystems and energymass subsystems.

These internal subsystems would be leveraging and multiplying various intelligences of their associated inlets/outlets expressed as uncountable iterations of intelligent

input/output to create, in some combination of stochasticity and emerging chaos, endless varieties and species of subsystem intelligences also beyond counting.

And always creativity of its inlets would be paired collaboratively with powerful selective sculpting of its intelligent outlets.

Its Complexity

Evolution, diversification and a multiplicity of system-specific intelligences would combine to underlie our Universe's adaptiveness, its playfulness, its creativity and, most significantly, its accelerating complexity.

Imagining that the boundary of our Universe would be ubiquitous within it, one might then imagine that every energymass subsystem within our Universe would have two general and fundamental streams or kinds of inter-Universe intelligence that would operate its input/throughput/output. Two most fundamental streams would be inter-Universe circumstantial streams, and inter-Universe legacy streams.

The origin and emergence of all energymass subsystems in our Universe could be modeled as synergetic processes produced by these two distinct kinds of flows of spacetime throughput. And their life-stories would track as lawful courses of variation, selection and retention of traits in long-running, very localized processes, through almost uncountable stages of increasing complexity.

On the other hand, leaving aside legacy throughput, one might imagine that subsystems comprised only of spacetime would be affected only by circumstantial flux through quantum fluctuations, so that legacy flows would only affect energymass systems .

Energymass subsystems in our Universe that would have endured long enough to be noticed would be functioning at far from equilibrium in terms of exchanges of matter-energy and information-efformation with their environments. They would be instantiating our accepted models of evolution and would be producing, as natural synergies/emergences, more and more complexity.

Most physical properties we observe in our Universe would be evolved products of emergent energymass processes that would, in turn, have been emergent from and born to and shaped by evolution and play of purely spacetime subsystems. And further, these would have been emergent from and born to and shaped by a play of highly intelligent inter-Universe input and output of in-flowing and outflowing articulated spacetime.

One might imagine that our Universe operates in an iterative, subjunctive, almost imaginative mood. Tentative emergences and synergies would constantly introduce novel properties that are then submitted to the rigors of selection.

One might imagine that, in the flux of spacetime, there would be both emergent and submergent spacetime processes. Emergent or synergetic processes would be associated with multiple coherent, ongoing input events to our Universe. And submergent or synergetic processes would be associated with multiple coherent ongoing output events.

One might imagine that, to whatever extent some products of emergent and submergent processes would exceed or diverge quantitatively or qualitatively from the qualities and sums of their contributing parts, such divergences would owe principally to contributions or eliminations made by their associated inter-Universe spacetime input and output events.

One might imagine that, as inlets/outlets would also be continuously evolving one source of increasing complexity in our Universe would emerge from evolved changes in functioning of its intelligent inlets/outlets in its boundary. Such changes would be expressed as an intelligence of any of their qualitative/quantitative inputs and outputs, and would drive variation of throughput as environmental perturbations impacting any, or all internal subsystems in our Universe, both energymass and purely spacetime systems.

However, one might imagine that novel variations of inter-Universe input and output of spacetime, and novel synergies arising out of confluent spacetime flows, would not be the only sources of innovation and ever-increasing complexity in our Universe.

One might imagine that our Universe would also have two streams or kinds of intra-Universe intelligent flow as well.

The first kind of intra-Universe stream would be regular energymass flows originating as input to internal complex adaptive subsystems, selected by them from outputs of other internal complex adaptive super-systems.

And a second kind of intelligent intra-Universe spacetime flux that would be novel flows of intelligence. These would be originating internally, within our Universe as flows of spacetime qualia that would emerge in long-lived systems operating at far-from-equilibrium as nonlinear self-organizing events, as well as from

confluences and vortices in which synergies would produce synthesized qualia that would introduce to our Universe novel flows of spacetime and events and entities, none of which would be knowably attributable to or predictable from regular energymass intra-Universe input or output events.

One might imagine that these flows, emerging as products of innovative intelligence inherent in all internal systems (as shaped by flux of articulated spacetime), would be modeled to fall somewhere along a continuum between random variation/perturbation events in evolutionary processes at one end, and as creative/ synergetic/emergent learning events/processes, at the other end of the continuum.

Wherever they operate on the continuum, all novel variations would be exposed to powerful selective forces and most would not survive. Any novel properties of spacetime flux that would survive would affect throughput and would produce changes in complexity among all the processes in which they would participate, some, possibly in huge leaps of scale.

Novel spacetime outputs would leave behind novel efformed/submergent traits that would register as something unfamiliar both on internal system outlets and on Universe boundary outlets as well. Unfamiliar inter-Universe output would condition subsequent inter-Universe input at an inlet/outlet level. and, since internal synergies/emergent properties would produce effects on inlets, which would effect subsequent input, one might imagine and model such processes as back propagations of errors.

Having no access to what would be going on in our Universe boundary, such models would have to be considered tentative and inherently incomplete.

One might imagine that some creative products, being unpredicted by any of the intelligent flows that would precede them, would be our Universe operating almost in a subjunctive mood and in an iterative manner.

One might imagine that something like a playful imagination, or like intuition, (imgination's close cousin, and collaborator) would be naturally recurring, endemic features of our Universe. They would be both "inceptual" and conceptual. They would anticipate, initiate and signal a series of novel flows of spacetime that would guide successive iterations, pulse-by-pulse, as they would evolve from mutation through selection and retention.

Imagining that managing many, many fundamentally distinct kinds of intelligence streams through every complex adaptive internal system, and imagining that most of them also would be managing increasing complexity and increasing entropy, would seem to be adding a lot of new meanings to our already complex notions about complexity.

One might imagine that inter-Universe evolutionary processes of variation, selection and retention would proceed as a one-way flux, moving only from upstream input to downstream output, while physical intra-Universe flux would always proceed as co-evolutionary, with two-way flows, driven from the bottom up, from the top down and from inside to outside and from outside to inside.

Imagining that the boundary of our Universe would be ubiquitous within it, one might then imagine that all complex adaptive subsystems within our Universe would have two fundamental streams or kinds of inter-Universe intelligence that operate input/throughput/output.

The two most fundamental kinds of stream would be inter-Universe circumstantial streams, and inter-Universe legacy streams.

One might imagine that subsystems comprised only of spacetime would be affected only by circumstantial flux through quantum fluctuations. On the other hand, nergymass systems would be affected by both legacy and circumstantial input/throughput/output.

The origin and emergence of all energymass subsystems in our Universe could be modeled as synergetic processes produced by the two distinct kinds of flows of spacetime throughput.

Their life-stories would track as lawful courses of evolution by variation, selection and retention of traits in long-running, very localized stair-up-stepping processes, through almost uncountable stages of increasing complexity.

Energymass subsystems in our Universe that would have endured long enough to be noticed would be functioning at far from equilibrium in terms of exchanges of matter-energy and information-efformation with their environments, would be instantiating our accepted models of evolution and would be producing, as natural synergies/emergences, more and more complexity.

Most of the physical properties we observe in our Universe would be evolved products of emergent energymass processes that would, in turn, have been emergent from, born to and shaped by the evolution and play of purely spacetime subsystems that, in their turn, would have been emergent from, born to and shaped by a play of

highly intelligent inter-Universe input and output of in-flowing and outflowing articulated spacetime.

One might imagine that our Universe operates in an iterative, almost imaginative and subjunctive mood with tentative emergences and synergies constantly introducing novel properties that it then submits to the rigors of selection.

One might imagine that, in the flux of spacetime, there would be both emergent and submergent spacetime processes. One might imagine that some emergent or synergetic processes would be associated with multiple coherent, ongoing input events to our Universe. And some submergent or synergetic processes would be associated with multiple coherent ongoing (sculpting) output events.

One might imagine that, to whatever extent some of the products of synergetic/emergent and submergent processes would exceed or diverge quantitatively or qualitatively from the nature and sums of their contributing parts, such divergences would owe principally to contributions or eliminations made by their associated inter-Universe spacetime input and output events.

One might imagine that one source of increasing complexity in our Universe would emerge from evolved changes in functioning of its intelligent inlets/outlets in its boundary, and that such changes would be expressed as an intelligence of any of their qualitative/quantitative inputs and outputs, and that such changes would drive variation of throughput as environmental perturbations impacting any, or all of the internal subsystems in our Universe.

One might imagine that novel variations of inter-Universe input and output of spacetime, and novel synergies arising out of confluent spacetime flows, would not be the only sources of innovation and ever-increasing complexity in our Universe.

One might imagine that our Universe would also have two streams or kinds of intra-Universe intelligent flow as well.

The first kind of intra-Universe stream would be regular energymass flows originating as input to internal complex adaptive subsystems, selected by them from outputs of other internal complex adaptive super-systems.

And a second kind of intelligent intra-Universe spacetime flux that would be novel flows of intelligence.

These would be originating internally, within our Universe as flows of spacetime qualia that would emerge in long-lived systems operating at far-from-equilibrium as nonlinear self-organizing events, as well as from confluences and vortices in which synergies would produce synthesized qualia that would introduce to our Universe novel flows of spacetime and events and entities, none of which would be knowably

attributable to or predictable from regular energymass intra-Universe input or output events.

One might imagine that these flows, emerging as products of the creative intelligence of internal systems as shaped by flux of spacetime, would be modeled to fall somewhere along a continuum between random variation events in evolutionary processes, at one end, and, at the other end, as synergetic/emergent learning events/processes.

Wherever they operate on the continuum, they would be exposed to powerful selective forces and most such innovations would not survive.

Any surviving novel properties of spacetime flux that would emerge from throughput would produce changes in complexity among all he processes in which they would participate, possibly in huge leaps of scale.

Novel outputs would leave behind novel efformed/submergent traits that would would register as something unfamiliar both on internal system outlets and on Universe boundary outlets.

In as much as unfamiliar inter-Universe output would condition subsequent inter-Universe input at the inlet/outlet level, and, since internal synergies/emergent properties would produce effects on inlets, which would effect subsequent input, one might imagine and model such processes as somewhat similar to feedback loops or as back propagations of errors.

Having no access to what would be going on in our unobservable Universe boundary, bsuch models would have to be considered tentative and inherently incomplete.

One might imagine that some creative products that would be unpredicted by any of the intelligent flows that would generate them, would be our Universe operating almost in a subjunctive mood or iterative manner.

One might imagine that something like a playful imagination, or like intuition, imitation's close cousin, and collaborator, would be naturally occurring, endemic properties of our Universe.

They would be both "inceptual" and conceptual. They would anticipate, initiate and signal a series of novel flows of spacetime that would guide successive iterations, pulse-by-pulse, as they would evolve from mutation through selection and retention.

One might imagine that such emergent and synergetic processes as these would not be rare occurrences, but fairly common ones in our Universe, whether or not it contained systems like brains.

Any exceptionally brain-like hyper-local and extreme concentrations of synergetic intelligence would be more rare but would have emerged and would function self-similarly to simpler complex adaptive systems of a Universe that would create and contain them.

Imagining that managing many, many fundamentally distinct kinds of intelligence streams through every complex adaptive internal system, and imagining that most of them also would be managing increasing complexity and increasing entropy, and would seem to be adding a lot of new meanings to our already complex notions about complexity.

One might imagine that inter-Universe evolutionary processes of variation, selection and retention of traits would proceed as a one-way flux, moving only from upstream input to downstream output, while physical intra-Universe flux would always proceed as co-evolutionary, with two-way flows, driven from bottom up, from top down and from inside to outside and from outside to inside.

One might imagine that metrics of complexity would arise as the number of intelligent/coherent interactions per square meter per second, or per system per second, averaged over time, or as rates of change, or even changes ind rates of change of t density of such interactions over some standardized scale-appropriate interval of size and time.

One might imagine that modifications in complex adaptive systems as they would be observed to function and evolve through differentiation and selection within our Universe would produce, as principal features of their evolution, sustained and increasing densities of coherent interactions and, so, of increasing complexity up to some limit of complexity.

One might imagine that there would be minimum and maximum critical densities of coherent interactions, and rates of change in complexity, below which systems would not form and above which systems would be too unstable to persist for more than a brief period.

One might imagine that, as Essence of our Universe would evolve, its aggregate of complexity would increase, and that its rate and manner of expansion would place a maximum value on local density of interactions.

Variation and selection of accumulating spacetime input/output associated with quantum fluctuations would both increase a cosmic-scale aggregate of complexity and, by its local expansion of spacetime, place an upper limit on local density of coherent interactions, thus maintaining density of interactions in a sustainable range of complexity.

One might imagine that, while c^2 acceleration of expansion would be deeply implicated in any mathematical models describing how it would set the speed of light in a vacuum.

c^2 would also factor into models describing an evolution of complexity in our Universe and into models describing how c^2 would set a speed of light passing through more dense and complexly interacting systems.

One might imagine that increasing intelligence in the boundary of our Universe would operate in counterpoise, and as a co-regulating, complementary pair, with increasing entropy, and that an evolutionary fitness of our Universe, discovered through variation, selection and retention of traits, would be a most elemental determinant in how our Universe would age and endure.

Its evolutionary fitness in responding to perturbations of its environment would be a function of how intelligently it generates and manages accelerating increase of complexity at all scales, in dynamic, metered complementarity with an accelerating increase of local and aggregate entropy.

In such models, system intelligence would stand everywhere and always in counterpoise with entropy.

One might imagine that our Universe would be approximately self-similar to complex adaptive systems residing within it, as well as to those in its environment.

All would be evincing analogous properties and evolutionary processes through many, many layers across very many scales of size and grains of denotation.

On a largest scale, one might imagine that a system comprised of multiple Universes would, itself, be a huge complex adaptive system, a super-grand system that would include our own Universe and those Universes that would be upstream and downstream of it, as well as all internal complex adaptive sub-systems that would reside in each member Universes.

And all of these would be self-similar in some important ways and that their very large-scale co-evolution would, over time, be generating an increasingly vast array of complexities and managing an increasingly adept permission of entropy.

For complex adaptive subsystems composed only of spacetime, containing virtually no matter or energy, one might imagine that such systems would be organized around circumstantial inlets/outlets,.

One might imagine some such spacetime subsystems that would be extremely complex, as complex as, or more complex than any systems that contain significant amounts of energymass.

For every energymass entity/system in our Universe one might imagine that there would be a corresponding spacetime entity/system hosted by both legacy inlets/outlets and circumstantial inlets/outlets that would envelope and suffuse it.

SUMMARY OF PART 2 AND PRELUDE TO PART 3

Stated most boldly, one might imagine that all evolving physical properties of our Universe, including its accelerating expansion, would be emergent properties arising from evolving dynamic behaviors of spacetime. And modelling those underlying dynamical properties of spacetime would have some profound implications for how we would model our physical Universe

Part Three:

Some Implications One Might Imagine Would Fall Out from Modeling our Universe as a Complex, Adaptive System Shaped by Its Input and Output of Spacetime

-Here insert Our Hubble Constant; Our standard CDM model of cosmology; Our standard model of particle physics;The dozens of mathematical constants we seem to need to describe its properties-

Some Troublesome Infinities

One might imagine that oundary conditions of our Universe would be implicated in producing some troublesome infinities.

Some math used to model processes in our Universe generates asymptotes or discontinuities. One might imagine that this math would be modeling events around actual boundary processes occurring where/when Universes interface with one another and/or would also include math of acceleration-of-acceleration.

One might imagine that any infinities these models generate would just be modeling discontinuous leaps, or phase changes, involving several tens of orders of magnitude that would be occurring as output from an upstream Universe becomes input to a downstream Universe, and that these infinities simply would stand as boundary markers of Universe input/output events.

Asymmetric or irreversible events occurring at Universe interfaces, events that would distinguish one Universe from another, would be so abrupt and involve such huge leaps in scale that any infinities emerging from mathematical models describing them would not be seen as anomalous and not require renormalizing, but would be seen as consistent with what would actually be going on in very dynamic boundary processes being modeled on either side as Universes interface.

A Vacuum Catastrophe

Inputs and outputs through its quantum fluctuations would have implications for our "vacuum catastrophe".

Our math proposes a huge and unpredicted value for the energy density of the vacuum, with our best theoretical predictions differing from observed values by possibly 120 orders of magnitude.

One might imagine that this discrepancy in how our vacuum seems to present itself would emerge from our mathematical attempts to model emergent properties arising in massless, energyless, frictionless dynamism of spacetime input and output events occurring as quantum fluctuations.

Huge discrepancies may arise because spacetime inflow, throughflow and outflow would not be treated mathematically in the same way as motion of energymass would be.

But spacetime input/output would evince an extreme angular acceleration as pulsing units of vortical motion, and would produce a very high (irresistible?) vacuum pressure on expansion in a form of "mass-like/energy-like" input, without yet producing any real, interacting fields/energy/particles/mass, other than ethereal energymass and very transient properties of virtual fields/particles that appear, and, pretty much instantly, disappear, as ephemeral by-products of that spacetime input and output.

On the other hand, if ethereal (dark) mass and ethereal (dark) energy, emerging as throughput of countless minute contributions of new spacetime vortices, somehow would be included in our calculations, one might imagine that our "catastrophic" vacuum discrepancy would be reduced or eliminated.

A Missing Narrative

A huge gap in scales of our nath between Planck values and our Standard Model of Particle Physics would have implications of a missing narrative.

One might imagine that, at very small scales, one would eventually encounter an input/output boundary that would be our limit-of-observability, and a point at which our imaginings would also have to stop...

Or maybe there would be an exception, at least for imagined input functions...

One might imagine that something very interesting may be going on at input scales much smaller than those employed in the Standard Model of particle physics.

Starting at a scale of one Planck area (about 34 orders of magnitude smaller than the very tiniest physical events/entities described in the Standard Model of Particle Physics), whose values we would only derive from first principles, and that we might never be able to confirm by direct observation, one might still imagine an

ongoing pulsing input of both regular and intermittently variable toroidal vortices of hyperfluid spacetime occurring just above the Planck scale.

One might imagine units of pulsing input in a form of toroidal vortices, each with a size of just over one Planck area, about 10^-70 meters^2.

These minute units of input would appear and merge with others nearby them, forming larger and larger vortical murmurations, ultimately, perhaps, comprising throughput gyres or murmurations of murmurations, achieving relatively huge flows of massless, energyless and frictionless hyperfluid spacetime, with some gyres reaching a critical area of ~10^-36 meter^2.

It would be an only-to-be-imagined process in which, driven by input just above Planck-scale units of spacetime, these vortical murmurations would aggregate and grow through 34 orders of magnitude to become gyres of a size corresponding to a minimum scale at which our Standard Model operates.

One might imagine a narrative in which spacetime gyres would accumulate to a size that would present conditions necessary to produce all fields/particles and interactions described in a Standard Model of Particle Physics.

And, if some such gyres were to be less stable than others, these would generate input/output of spacetime to/from our Universe that accompanies quantum fluctuations and accelerating expansion.

One might imagine that a story describing growth from Planck-scale events to Standard Model events would unfold as a Missing Narrative - missing because it would actually be a narrative of another Universe, not our own.

It would be a narrative of an imagined Planck Universe that would have preceded, and would, by its output, have given birth to and, thereafter, would continue to nourish and grow our own quantum/relativistic Universe from the scale of our Standard Model of Particle Physics all the way up to cosmic scales.

One might imagine that any math used to model input to and output from a Planck Universe would encounter boundary conditions that would seem to yield asymptotic results from mathematical models used to describe them.

Within our own Universe, our narrative would continue with production of yet other apparent infinities...

A Grand Unified Narrative

Distinguishing a stochastic flux of spacetime produced as quantum fluctuations from smooth, continuous flux of spacetime supporting our physical Universe would have

implications for a seeming resistance of our Universe to being modeled with one Grand Unified Narrative.

One might imagine that, in modeling legacy and circumstantial flows of spacetime, there would be a sharp discontinuity in math to which either side would be susceptible.

It would be as if one mathematical framework just would not be able to model relatively smooth and stable legacy flows of spacetime in terms compatible with those for modeling stochastic intermittent circumstantial flows of insubstantial and extremely small, though utterly irresistible prime movers in a form of spacetime gyres produced in quantum fluctuations.

One might imagine that intelligence governing legacy properties of our Universe would differ in fundamental ways from necessarily statistically driven intelligences that would govern its (inherently “unreliable”. highly changeable) circumstantial/emergent properties.

On the other hand, one might imagine that in the boundary of our Universe, it would be all the nurseries in which all properties of our physical Universe would be born and sustained and that legacy inlets/outlets would be acting shoulder-to-shoulder and collaboratively with circumstantial inlet/outlets in expressing and appreciating spacetime with similar values.

And, even though actions of circumstantial nurseries would be much more stochastic than legacy nurseries, still their input and output would be collaborating and coherent intelligences, and, at the tiniest level of uncaused causes their products of spacetime flows would necessarily evince some emergent and coherent mutually supportive intelligence. And, as each cycle of intelligent input/output constituting a single iteration, through uncountable iterations, gradually chaos would be replacing stochasticity.

One might also imagine that, at the very finest scale of inlet/outlets, spacetime flows in our Universe would be modeled as quantized, both spatially and temporally, by the locations and pulsing rates of input and output at each discrete inlet/outlet of which quantum gravitational fields would be comprised.

One might imagine that, in our quantum Universe, input and output of spacetime, that would accompany quantum fluctuations, would, with each pulse, form a discrete/quantum unit of spacetime of which fields of Quantum Field Theory would be composed.

An apparent extent of relativistic spacetime would inherit a property of collective “here-there” and “now-then” logic, of all the inlet/outlet locations and time signatures that would comprise the system boundary of our Universe.

Primordial locations of each discrete inlet/outlet would define spatial nodes in a lattice of space.

A ticking clock of quantum time would be an emergent property of the duration of each input/output cycle at each inlet/outlet.

One might imagine a temporal continuum from past to future who's "present" would be a nexus formed in an instant at which an inlet/outlet would switch from input to output, or from output to input. A ticking clock of advancing time as an apparent arrow of time would be an emergent property of cycling input and output, and an "input-before-output" logic in our Universe's system boundary.

So tiny would be pulse units of spacetime vortical rings and so large would be scales at which their compounded flows would be modeled in our physical Universe, at and above scales of our Standard Model, one might imagine that spacetime processes would be fittingly modeled either as continuous phenomena or as quantized, depending on the scale of questions one would be asking of nature.

So Much Circular Motion

Vorticle spin of spacetime inputs would have implications for our Universe's evident love of circular motion. Spinning, rotating, revolving, spiraling, orbiting, helicity, vorticity seem to be common ways to model motion at almost all scales in our Universe, from fundamental particles to galaxy clusters.

Rotating of larger objects may be imagined as a summing of angular moments of all smaller more fundamental units of which larger objects would be composed.

One might imagine, further, that spin of the most fundamental physical units would be a summing of angular acceleration of the input of spacetime as vortical rings and gyres that would produce those physical units in the first place and that would continue to sustain their existence and their circular motion in the present.

Stars and Structures

Variable preponderances of spacetime input and output would have implications for mysteries surrounding the forming and behaviors of stars.

One might imagine that work of circumstantial spacetime flows, as they generate local flux of preponderant (dark) energy and preponderant (dark) matter, would have major roles in collaboration with "normal" legacy energy and matter in

forming/informing galaxies, in guiding ways stars are born and move within them, and in guiding ways that galaxy clusters and super-clusters form and move relative to one another.

Intelligence and Consciousness

By de-conflating intelligence and consciousness, one might imagine a simple model of consciousness would emerge that would have implications for our apparently stubborn duality of "observer and observed" and, at the same time, for resolving our “hard problem of consciousness”.

One might imagine that all enduring systems within our Universe would be modeled as complex, adaptive subsystems evincing wide ranges of complexity.

From the very smallest fundamental, unitary systems to the very largest composited systems of systems, in uncounted layers upon layers, each member subsystem would have its own intelligent system membrane that would selectively receive inter-Universe and intra-Universe inputs and emit intra-Universe and inter-Universe output.

As recipients of input all systems would, to some degree, be observers and as generators of output all systems would, in principle, be observable.

Imagining that every complex adaptive system within our Universe would have multiple streams of input/throughput/output, one might imagine that there would be multiple and fundamentally different kinds of system intelligence at work in every system.

One might imagine, for example, that, for intra-Universe intelligence, attention would function at the input side and intention would function at the output side. But one might imagine that it would be just the opposite for inter-Universe intelligence, with intention arising on the input side and attention arising on the output side.

Then there would be consciousness and its imagined role in relationships among observers and observed.

One might imagine that consciousness would be generated in a special subsystem of intelligence producing thinking, awareness, cognitivity and mind. It would be only one among many specialized subsystem intelligences residing within a generally non-conscious distributed supersystem of interacting intelligences in any host system.

One might imagine functions of a consciousness subsystem would be only to witness, record, recall and report events occurring in its host's surrounding nonconscious, distributed intelligent systems, operating in such way as to empower its host to communicate, coordinate and collaborate with other intelligent hosts in ways that otherwise would be impossible.

One might imagine that there may be some conflation of consciousness with intelligence generally, and that such conflation would be a principal source of the "hard problem of consciousness", as well as our apparent duality of observer and observed.

One might imagine that, for all systems, their agency would emerge from, and be a property of their relatively huge, system-wide, highly integrated and efficient, non-conscious, distributed system intelligence (DSI).

And some DSI's would evolve to contain, as an intelligent subsystem, a group of functions we would call consciousness, a Conscious System Intelligence (CSI), as a cluster of such specialized functions as mind, awareness, thought, cognition, retrievable memory and meaningful emotion among others.

One might imagine that since a CSI would be wholly contained within its DSI, the only intra-Universe events a CSI would be witnessing, recording, recalling and reporting would be events that would be occurring in and processed through its DSI, some of which throughput its DSI would download to its CSI.

A DSI would determine whether processes occurring in it would be downloaded to its CSI and whether processes occurring in its CSI would be uploaded to its DSI. Both downloading and uploading would be directed entirely by a DSI with no initiative functions residing in a CSI.

Remote as a CSI would be from the physical environment with which its DSI would be adapting, one might imagine that no DSI would delegate any agency, initiating or executive authority to its CSI.

One might imagine no CSI would ever have such a global function as volition. Volitional/initiating processes would reside solely in a system's DSI.

As a relatively minor subsystem embedded in a DSI, a CSI might be imagined to exchange intra-Universe input/output only with its host DSI, having no direct sensory or motor access to physical environment surrounding its DSI and having only witnessing, recording, recalling and reporting functions that would be activated and directed by its DSI, but no intra-Universe intentional or attentional functions, and not any creating, initiating, volitional or executive functions either.

The agency of any host intelligence would reside entirely in its DSI.

One might imagine that even high-level cognitive and symbolic processes that seem to occur in one's CSI would actually originate in and form only in one's DSI and would be selected there to be downloaded to its CSI, to be witnessed, recorded, recalled and reported back, upon demand, by its DSI.

On the other hand, imagining that all system and subsystem intelligences in our Universe also would be receiving and emitting inter-Universe flows of both legacy and circumstantial throughput, one might also imagine, so would all CSI's.

One might imagine that all functions of every system intelligence, including CSI's, would be evolving in intimate relationship with their legacy and their circumstantial spacetime inter-Universe input and output.

One might imagine that processes as ephemeral as imagination itself and intuition would be special kinds of cognitive function, such that circumstantial inter-Universe input and output and resulting synergies and emergent properties would be major factors in the presence of imagination and intuition in both DSI's and CSI's.

One might imagine that a hugely predominant source, but not necessarily all, of imagination and intuition would be processing done in DSI's, some of which a DSI would be selectively downloading to its CSI.

One might imagine that some vaunting of consciousness and its cognitive content, along with our misplaced sense of its agency, may have come about during our recent evolutionary past and result most directly from our culturally driven collaborations in a technological quest for prediction, control and transmissibility, all in service of our quest for constant improvement of our tool-based instrumentalism and its apparent need for complex systems of collaboration and then of incentivization.

One might imagine that co-evolving with our intensifying development of tool technology, consciousness, as we know it today, with its powerful internal witnessing, recording, recalling and reporting functions would have co-emerged with and potentiated our social ability to collaborate with each other and to develop art and and other symbolic languages.

All of these converging developments would have been needed to produce what has been termed Human Behavioral Modernity.

And all of this would have occurred possibly in a period between 100,000 and 30,000 years ago, or probably less than one-third of our species' time on Earth.

One might imagine that in the millennia preceding development of our behavioral modernity, our ancestors and our pre-human ancestral species would slowly have

evolved precultural ways of collaborating using language and consciousness that were quite rudimentary compared with our modern highly elaborated versions.

One might imagine that some illusion of separation between observer and observed may be a relatively modern aberration having arisen only quite recently along with culturally driven extreme to which we would identify our agency, and ourselves, with our consciousness, together with a growing illusion that our consciousness would be the main or sole locus of our "real" selves.

A rapid development and perceived importance of consciousness and cognition would have introduced an unfortunate (and hopefully temporary) side-effect of alienating ourselves, as observers, from, and so objectifying, all that we observe and extract from nature, convert to tools and manipulate with our increasingly potent instruments.

One might imagine that, as we adapt to unintended side-effects of alienation and objectification, our resultant dualities of observer and observed would resolve and our me/not-me, mine/not yours' dichotomy would come to be viewed not as adualities, but as deeply embedded and tightly bound parts of one system.

A growing recognition that the same Universal intelligences that invented and nourish us would also would have invented and nourish everything, even including those parts of nature that we view as our "resources", would support a notion of apparently unified and egalitarian relations among all subsystems within our Universe even while all would be embedded in myriad hierarchies of systems.

Uncaused Causes and Uncaused Effects

Inputs and outputs of spacetime as uncaused causes and uncaused effects would have implications for a weak but stubborn insistence on local realism. One might imagine that causality would operate very differently in a complex adaptive Universe than it would in a strictly isolated-system Universe.

In an imagined complex, adaptive Universe observers would be able, in principle, to track every causal web back to myriad Inter-Universe input or output events, events that they would perceive to be "un-caused causes" or "uncaused effects".

Inputs and outputs would be events for which, in principle, no causes or consequences would be discernable, residing, as those causes would, in system intelligence located in the boundary, just outside of our observable Universe.

But in a classically isolated-system Universe one might imagine that the only un-caused causes and uncaused effects would have occurred in the first moments of its

birth, with all subsequent causes and effects cascading forth from and traceable, in principle, back to its birth moments.

Whatever caused such primal birth-moments, those causes would also be un-observable, not just owing to their remoteness in space and time, but in principle, because the initiating events would have been operating outside of the Universe they created.

In such a Universe, any event for which causal precursors could not, in principal, be observed would be a source of great cognitive dissonance and persistent efforts to identify possible causes.

In the boundary of a complex adaptive Universe, on the other had, one might imagine that widely separated large and small intelligent collaborations of inlet/outlet activity would be quite common and would be causing countless flurries of internal quantum fluctuation events to occur as simultaneous, complex and nearly identical input/output events located in widely separated clusters of inlet/outlets.

One might imagine that such coordinated and paired input/output flurries, occurring in and just inside the boundary of our Universe, would produce similar or identical physical events or entities at widely separated locations, but with no intra-universe observable causal links connecting them to one another.

Consistent with models of local causation (Local Realism), such events would give observers in our Universe a misimpression that such physical events must be associated with one another in some information transfer of causal, but hidden, intra-Universe action-at-a-distance and at superluminal speeds. Or they would seem to match predicted results consistent with quantum theoretical models describing entanglement.

In recent years, journal papers have reported directly detecting samplings of quantum fluctuations. Other papers have reported tests that yielded very nearly loophole-free results showing what would appear to be pretty clear cases of entanglement and, therefore, violations of local realism.

One might imagine integrating something like the apparatus and procedures of the first kind of experiments with those of the second kind. Then one might imagine a lab equipped to detect both distinctive paired patterns or clusters of quantum fluctuations and any ostensibly entangled physical phenomena that would occur at the same two or more spacetime coordinates.

One would then be able to obtain paired sets of data-captures from which consistent correlations could be inferred between paired flurries of quantum fluctuations having a distinctive spacetime signature, paired with flurries of physical events that otherwise would appear to be entangled.

If such correlations were to accumulate, one might imagine that there would emerge postulated models of input/output for such results that would be more parsimonious and offer more potential for discovery than either Local Realism, with its hidden variables or multiple black box formulations of quantum theoretical models.

If one imagines that not all causes would lie within our observable Universe, that some would operate in an intelligent boundary just outside of our Universe, the only "real" connections between some correlated events within our Universe would reside in myriad intelligently collaborative events occurring in the boundary of our Universe ("Essential Meta-realism"?).

And these would be operating beyond our ability to observe directly. Input/output events would be the only potentially observable events occurring in our Universe for which, in principle, no causes would be discernible. Spontaneity and autonomy would be signature properties of such input and output events.

In addition to entanglement, one might imagine that similar approaches would be used to model and study some other discontinuous ways in which our Universe's causal properties seem to present, including quantum tunnelling, larger-scale synchronicities, and possibly would include some events that, today, are thought of as paranormal or parapsychic phenomena events.

Small Events and High Energy Densities

Boundary conditions also would have some implications for outlandish energy densities at the smallest scales.

One might imagine that apparent energy densities go asymptotic as the size of processes/entities we would be modeling would drop down toward an input scale of ~10^-36 meters^2.

At this size, legacy input gyres would have been large enough to have created and to maintain, as emergent properties, familiar and semi-stable small-scale features of our quantum/relativistic Universe and, concurrently, in less stable forms, to generate as by-products very short-lived fields/particles that would show up as circumstantial gyres, quantum fluctuations that would leave behind, as new input, a huge amount of intermittent residual pulses of spacetime.

One might imagine that at size ranges of extremely small entities/events, energy densities/ frequencies would seem to be hugely higher than for intermediate-sized entities or events, and that, as one approaches these lower limits of un-limitedness, the smallest fundamental entities would be ones affected most directly by a pure, undissipated input/output of dynamic spacetime.

Some diffusion of energy density of fundamental entities would be occurring as inlet/outlets coordinate in forming larger and larger composited entities, at the same time as their binding energies become "diluted" or spread across greater and greater areas of spacetime that would separate them.

Top-Down or Bottom-Up?

Tracing a bottom-up construction sequence by which our Universe is built and functions would have implications for how we would study its shortest wavelengths/ highest energy densities.

At and near its input/outputs the smallest and most particular ways in which spacetime flux would shape our physical Universe would seem to be hidden from us behind a wall of huge energy densities/high frequencies.

In order to study events much smaller than interactions described in our Standard Model of Particle Physics particle physicists calculate it would require energy densities that would be orders of magnitude greater than any we can create.

So far, our approach to the problem has been to devise brute-force, top-down energymass experiments with mathematical models and extremely high-energy instruments that focus on splitting larger things into their smaller constituents.

One might imagine that taking a bottom-up approach complimenting a top down approach for modelling and eventually for observing how the smallest of things are maintained in their existence and combine with or separate from one another in a flux of spacetime input and output would become a necessary as well as a productive way to complete our narratives of our physical Universe in its spacetime context.

A Lot of Mutually Contradictory Descriptors?

Myriad intelligences of our Universe would often present as dichotomies some distinctions it would already have resolved. Our Universe could potentially, and quite rationally, seem to us at once to be autonomous and determined, ephemeral and enduring, lawful and spontaneous, relativistic and quantum, stochastic and orderly. chaotic and predictable, adaptive and stubborn, playful and disciplined, creative and persistent, repetitive and iterative, attentive and intentional, affectionate and demanding.

One might imagine that an emergence, sustained co-existence and interplay among seemingly incompatible properties of our Universe would come to be viewed as

accurate and complementary characterizations of how myriad intelligences of our Universe actually work in complimentary collaboration with one another.

Such views would suggest an almost biological or artistic way of modeling our Universe that would acknowledge an evolving interplay among myriad system intelligences that operate its legacy properties and those that operate its circumstantial properties, and to a propensity of its internal complex adaptive systems to undergo seemingly random variations, as novel and delightful emergent properties/synergies, with selection and retention acting on a sustained and evolving increase in complexity while always carefully metering increasing entropy.

Imagining that multiple system intelligences of our Universe would be managing input, throughput and output, any randomness and turbulence its circumstantial properties would evince would be mostly boundary features, which, though fundamental properties of our Universe, would be fundamental in highly localized, variable, dis-continuous, emergent ways compared with its legacy properties.

Any apparent lawfulness of throughput, both of legacy and circumstantial streams would be evidence of an underlying and inherent intelligence at its origins and at its destinations.

One might imagine that, even amidst fluctuating turbulence at the boundary of our Universe, its intelligent filtering of spacetime input and output would nevertheless impress ultimately intelligible patterns on its input and carve ultimately intelligible residual patterns by its output, patterns that would resolve as intelligent throughput we would come to know and appreciate about our Universe.

Conclusion

One might imagine that, just inside the boundary of our Universe, coherent input/output patterns-within-turbulence would become discernible to human observers once we develop mathematical descriptive models, software and hardware that would be needed to capture, record and process large samples of circumstantial input in quantum fluctuations, to track throughput of spacetime across multiple layers of emergences and synergies and to discern meaningful features sculpted by its output.

Postulating a complex, adaptive system Universe, and noting evidence of intelligible patterns of input, throughput and output, one might imagine that we would embark on a deep and large-scale Search for Cosmic Intelligence at Origins (SCIO).

Then one might imagine that, from our vantage points within our Universe, we would decode and model its dynamic processes as if they would be generated and

driven by values expressed in comings and goings across its system boundary and by emergences and synergies occurring within it. And we may look inside of ourselves and out at our Universe and begin to understand how similarly and intimately we and it work, from input to throughput to output.

One might imagine that, even in our minute locality and limited as we are to very narrow bandwidths of size, time and energies, possibly some of our cultures would undertake, ever more intelligently, responsibly and artfully, to collaborate with our living Universe in nurturing and limiting its accelerating complexity and in responsibly metering its permission of accelerating entropy.

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Afternote: One might imagine that one would combine or adapt the text under any one of the 50 foregoing headlined sections to become an abstract for a separate paper.