Neural Networks 2.0
Neurogenesis:

Polymorphic, oligopoly, dynamically adaptive, neural impulse networks:

PODANI Networks

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The project on the Internet:

https://github.com/Zoltan-X/Neurogenesis

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Chapter 1: Introduction

About the Origin of this Project

This work started on October 14, 2018, with a mindblowing inspiration or a gorgeous idea that led to the first two Fundamental Theorems of this elaboration. The GitHub account Zoltan-X was created on October 17, 2018.

…

What PODANI Networks mean:

PODANI Networks means

Polymorphic, Oligopole, Dynamically Adaptive, Neural Impulses Networks.

- **Polymorphic:**

- As self-evolving neural networks are PODANINs polymorphic. They have specially designed specifications for neural genesis behavior and thereby the definitions of when, where, and how axons and neurons are created or degraded in the network. The network will thereby always mutate and stay in open learning mode.
- **Oligopolies:** The Neurons are oligopole nodes that control the flow of Impulses. According to their number of independent information types, they process by different ways of influencing the impulse flows at nodes. More detailed concepts therefore are contained later on in Chapter 3.2 Multi-Asset nodes.
- **Dynamically adaptive:** As open neural networks, they are always in learning mode and thus adapting continuous and dynamic new information. The structural polymorphism works dynamically, where the structural changes represent an adaptive learning process of the information forming flows.
- **Neural Impulses Networks:** PODANINs use scalar signals (electrical potentials in the form of Impulses) and dynamic flow control in the Neurons, as well as several aspects, they should be able to mimic a real brain.

Characteristics of PODANI Networks

1. 2 Fundamental Theorems of 4D-Impulse Algebra for Neuro-Genesis
2. Neural genesis concepts regarding logic and autonomic nodes and axons emergence.
3. Super Germ (Supra Seeded) Design
4. Multi-asset nodes emerge and form
5. Automatic network maintenance: growth and decay
6. Self-influencing the networks "ways of switching, thinking, and acting."
7. Interaction of Neurons by each other nearby being active.
8. Independent and logical emergence of new signal processing nodes (Neurons) in the network
9. New nodes favor form informational associative content.
10. Works with different types of Neurons, which cause different interactions.
11. The network grows and learns automatically.
12. A free operations mode without human control or intervention should the network develop independently and logically through the neuro-genesis concepts .

Chapter 2: The Foundations of the Original Ideas

The two basic laws of this 4D-impulse algebra

Precondition: Impulses in nodes activate them

It is of fundamental meaning, that the nodes only count as activated when at least one Impulse Resides inside it. The assumption with this is that only Nodes emit an external EM-Field of the Impulses inside it.

Spatially close adjacent and simultaneously active nodes generate new axons bridging between them. Furthermore, they interact together, in the form of mutual influence, in choosing the further path to be used through the network. Beyond the 3 spatial dimensions, the 4th dimension in this context is time.

Thus, it follows from this Impulses must accomplish being at the same time, in spatially close adjacent neurons, for a mutual interaction in 2 forms:

The 2 Fundamental Theorems from 4D Impulse Algebra in Respect of the "Neuro-Genesis"

1. (EM near field + brain liquor see: CREB-1 and abstract on magnetic field affinity of CREB-1).

nodes are to be connected to new axons in different cases.

2. (Receptor and neural transmitter Logic)

Impulses branch according to defined case distinctions by mutual influence.

An example of a minimalistic AI-FOE (Artificially Intelligent - Form of Existence) in the form of an Auto-Actor-Model

Example of an Auto-Actor-Model:

1. A simple Impulse Transport via an axon "Axon 1" from the sensor "Sensor 1" to an Action "Action 1" with exactly one node "Axon 1-node 1-Type A"
2. Impulses are continuously generated from the sensor "Sensor 1" and transmitted via the "Axon 1" line and the node "Axon 1-node 1-Type A" to "Axon 1-Action”
3. Now we add a second axon "Axon 2" "Axon 2" is supplied with Impulses by the sensor "Sensor 2". "Axon 2" also has a node "Axon 2-node 1-Type B", which is close to "Axon 1-node 1-Type A". The "Axon 2" then terminates in "Axon 2-Action 2".
4. In this initial scenario Impulses have been continuously emitted from the sensors "Sensor 1" and "Sensor 2". They were sent via the lines "Axon 1" and "Axon 2" to the Actions "Axon 1-Action 1" and "Axon 2-Action 2".
5. This happens until two Impulses simultaneously are at the nodes "Axon 1-node 1-Type A" and "Axon 2-node 1-TypeB" and thereby create a bridging axon
6. Then the behavior changes in the way that the Impulses in "axon 1 node 1 type A" are conditionally redirected to "axon 2 node 1 type B" via the newly created bridge and from there to axon 2 Action 2

This behavior corresponds to the first two fundamental theorems and now accomplishes the following behavior:

Legend:

A1	=> axon 1
G1	=> node 1
A1-G1-A	=> axon 1 at node 1 with type A
A1-S	=> transmitter, signal generator, or Impulse generator at axon 1
A1-A	=> Action at axon 1
$\mathbf{I_{i,x} = (t_j,}$ **"A1-S")**	=> Impulse Number i at axon x here at the axon 1 transmitter point at time tj

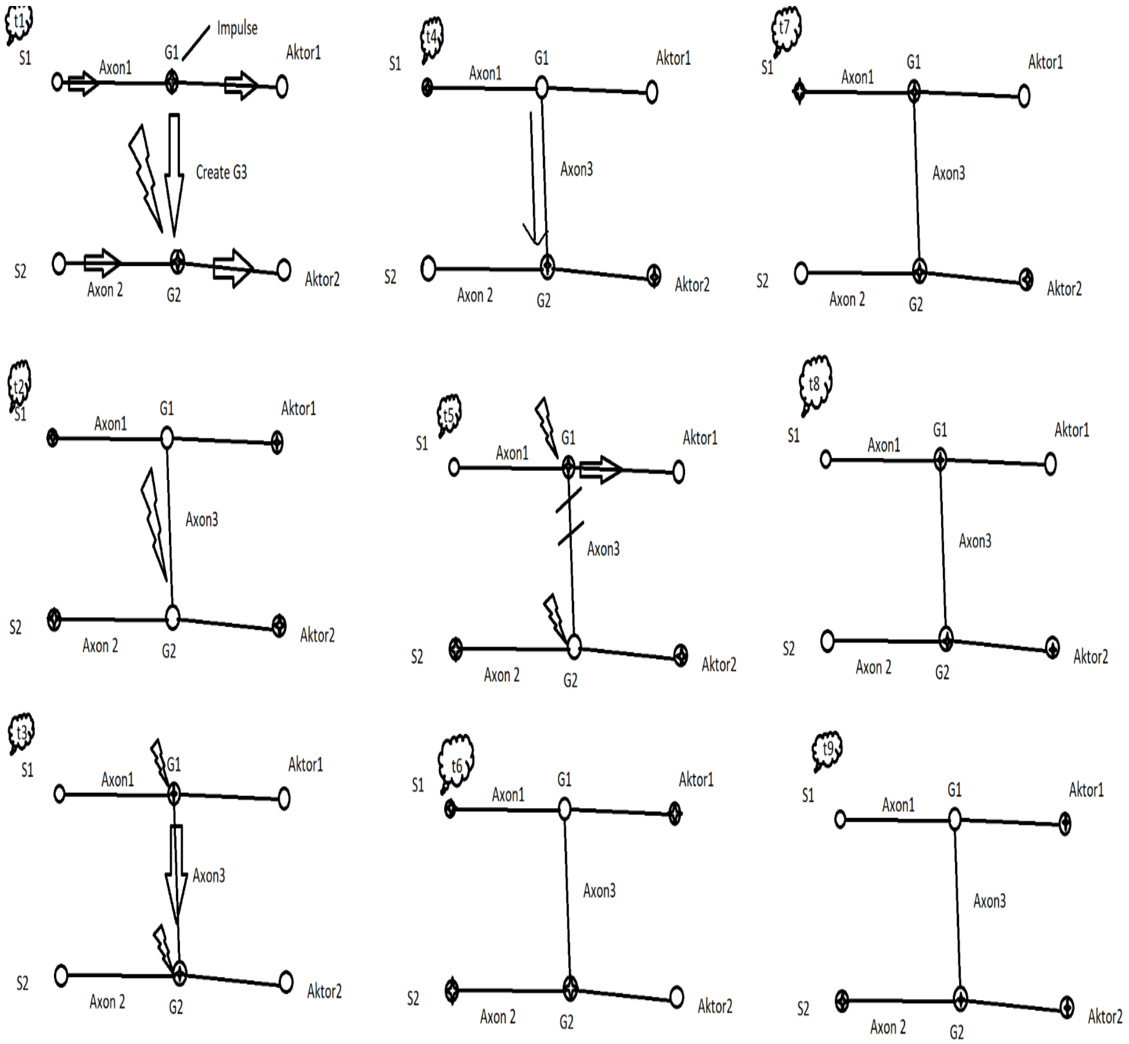
The 1st Fundamental Theorem is realized by,
bridging the node between "**A1-G1-A**" and "**A2-G1-B**"
The 2nd Fundamental Theorem is realized by
the detour between the nodes types A and B.
Whereby it applies here, that **A => B** redirects if both are active by Impulses at the same time. Thus, the simultaneous active nodes "**A1-G1-A**" and "**A2-G1-B**" are redirecting the Impulses from the **A1** Line to the **A2** Line.

The impulses of "**A1-S**" are influenced in such a way that then applies:
from: **"A1-S" => "A1-A"** and **"A2-S" => "A2-A"**
follows: **"A1-S" => "A2-A"** and **"A2-S" => "A2-A**

by **F(I1,1) (t1, "A1-S") && F(I1,2) (t1, "A2-S")**
with: **F(I1,1) (t2, "A1-G1-A") && F(I1,2) (t2, "A2-G1-B")**
follows: **Create(A3)** with **(A1-G1-A => A2-G1-B)**
And: **...**
F(I1,1) (t3, "A2-G1-B") && F(I2,1) (t3, "A1-G1-A") &&
F(I1,2) (t3, "A2-A") && F(I2,2) (t3, "A2-G1-B") &&
...

In a figurative comparison to an Auto-Actor-Model, this means:

"A1-S"	=>	sends Impulses as a hungry signal.
"A2-S"	=>	sends Impulses, as a digestion full signal.
"A1-A"	=>	Eating.
"A2-A"	=>	Satiety.
"A2-A"	=>	consumes a double impulse to terminate the saturation behavior so that it then stops eating



The Supra Seed (super germ or primordial germ)

In this example, the supra seed is that two axons are spatially located so that their nodes will interact in a planned manner. With only two lines, "A1" and "A2" we have obtained a development by bridging, which implies the Auto-Actor-Model the planned behavior, that it eats while it is not saturated and develops this as a neural algorithm by itself. The Design concept hereby was to define two independent processes where one redirects to the other, because of being a logically subordinated use case. Thus, the eating process leads to saturation and not the other direction.

Chapter 3: Elements, structures, and Their Behaviors

1. Impulse interaction modes

Interaction forms of Impulses with different node types.

The distinction between nodes of different types and the impulse interactions that are exclusively derived from these will be described here. In section 2. multi-asset node concepts are described which also include multiple types in one node.

Impulse Potentials Conversion of

- Impulse Potential addition
- Impulse Potential subtraction

Enforcement of the transfer through a threshold-based gate

This can depend on:

- the individual Impulse potential
- the number of potentials accumulated in the node of
  - simultaneous Impulses
  - Impulses Series within a period.

Differentiated potentials.

Explanation for how a differential could be created from an impulse stream on one (or more) axon(s).

On an axon A1, in a spatial proximity of two consecutive nodes - A1-G1 and A1-G2, the differential can be defined for example through a connection of these two nodes, to another axon A2, with a node A2-G1. The nodes A1-G1 and A1-G2 mirror their Impulses to A2-G1, where they are transformed into a differential by subtraction. The consecutive Impulses in A1 that are transformed in A2-G1 become also differentiated as a stream of single values. Finally, the result of the subtractive accumulation of the Impulses is forming a differential, with the iteration size of dx=1.

This corresponds to

f'(x) = (dy/dx) * (y1-y2) / (x1-x2)

and with the atomic granulation by dx=1 follows:

f'(x) = (Impulse A - Impulse B) / (x - (x-1)) = (Impulse A - Impulse B) / 1 = Impulse A - Impulse B

This means that through a subtractive potential accumulation is a differentiation of two simultaneous active streams of Impulses. It is possible to differentiate without consuming the original Impulses, by mirroring them for the given operation. If more than two impulse sources (axons at a node) have to be subtracted, then there are exactly two Types of polarized Impulse interpretations that are involved in this process. One or more Impulses of two different Transmitter (Impulse) Types are first joined as two total sums of potentials from which the Subtrahend and the Minuend are created. Afterward, the subsequent subtraction process generates the differentiated potential stream.

Quantization of Impulses: Summarized potentials.

By merging several Impulses into one, the information continues as summarized. Hereby the impulse potential, with its exact position in the network, contains the aggregated information. The mesh pattern, at its position of being merged, is suitable for recovery by direction reversal. Therefore it needs a counter effect - Quantization. The reversal of the summarized Impulses then, would be a form of information recovery. This Information was formed by any kind of input (Impulses in a Mesh Pattern) and can be more or less consciously assembled, addressed, and retrieved. The input effect is summarizing and the reverse effect is quantizing. The recovery of a summarized information set is started from an initiating single Impulse and occurs as a result of the quantization process.

Quantizing: From one incoming impulse at the node creating many outgoing.

Reproduced and quantized Impulse potential

- It's to be assumed, that quantization - decomposition into smallest pieces of information (Impulse) - is meant, when several axons receive, simultaneously the Impulses, generated by a single node.
- It's implied here that mirroring means that impulse potentials are accurately transferred.

Polarization and common interactions of individual node types.

Under polarization, several alignments could be considered:

- Influencing the Impulse flow
  - According to the EM-Field:
  - as a choice of the outgoing axon at the dendrite.
  - Increase or decrease of impulse potentials
  - Increase or decrease of a potential threshold
  - Attraction or rejection of neighboring Impulses
  - Only polarization to influence the surrounding Neurons
  - No effects on individual transmitter types (not susceptible to polarization)
  - ...
- Influence on axon formation
  - Increased field strength and thus the range of axon formation
  - Change of electromagnetic field lines on which axons are formed
  - ...

The polarization and node types also require a range of distinct interactions and these can be compared to the logic of different neurotransmitters in the human brain. The neurotransmitter attraction and rejection could influence Impulse actions by EM polarization. Threshold limitations in Neurons could therefore change or influence any kind of consecutive act. The Information would then be sent to another axon instead of the default one. Quantizations would be a single-in, all-out construct, where all axons at a specific transmitter type share the same incoming Impulse and quantize it to the belonging axons.

2. multi-asset nodes: active versatility of individual nodes.

Multi-Asset nodes

However, due to the need to distinguish nodes based on different receptors and transmitters, as well as the fusion of these, the need for multi-asset nodes then arises. In these multi-asset nodes, oligopolistic logics of node types emerge under defined conditions. The formation of multiple origins linkages through axons. These axons need to be formed for this purpose.

Here is a list of node logics to be used:

Differentiation of node types based on:

- additive behavior
- subtractive (differentiating) behavior
- Culvert boundaries
  - temporally summarizing behavior (accumulating potentials)
  - Passage threshold for Impulses
  - muting behavior
- mirroring behavior
- merging and quantizing behavior

There remains the delineation of different control logics defined by variable node types, with variable receptor and transmitter logics and an isolating separation as it normally would happen through the meninge. Variable receptor and transmitter logics in this context mean the behavior inside a node, where incoming Impulses activate one or more specific transmitter types, causing a specific behavior of the node.

Different ways of branching:

- A => B
- A <= B
- (A+B) => C
- (A&B) <= C
- ...

Bridge building according to impulse interaction rule 1:

1. Node type X ⇔ Node type X:
2. A bridge is formed between two identical node types
3. Node type X ⇔ Node type Y:
4. A bridge is formed between two distinct node types

For Impulse Transmission modes with a variety of types

- One Impulse Activates all node type-specific interactions given in the node together
- Node input to node output as node-specific behavior
  - $Input\colon\ nodeA(\ Impuls\ Types(\sum i, n\ |1 \leq i \leq n))\ with\ n\ =\ Count\ Types$
  - $Output\colon\ nodeA(\ Impuls\ Types(\sum i, n\ |1 \leq i \leq n))\ with\ n\ =\ Count\ Types$

Premise:	**Input Type <=> Output Type**

The entry point area of incoming Impulses from the axon into the neuron could be simplified as a concentric area on a spherically formed surface. This point of view is therefore needed as it also can happen, that the entry point of the transmitted input partially intersects with existing axon entry points of other types. Thus, the types of neurotransmitters at the entry point are all going to be triggered. Also those of other neurotransmitter types, too. Depending on the node's surface, this can happen through existing overlapping areas of other axon entry points. Therefore a node should be thought of as being spherically formed. The axon entry zone at a node could be simplified as an area on a sphere surface. The Surface consists of overlapping areas with possibly different types of neurotransmitters. From the inner side, there are the different Neuro-Transmitter type definitions of a node. Whilst on the outer side the entry points are defined as mapped concentric area projections. The inner areas are subdivided into parts that could overlap with zones of different types. Since the entrance angle activates an area of possibly different types of transmitters, this node then transmits Impulses of different types over corresponding axons away from the node as a result.

More about this in chapter 7: neural genesis.

Inner polarization of a multi-asset node

Due to an internal polarization of a node, outwardly effective EM fields are formed that could cause impulse flow interactions. These could accomplish a targeted change in the output axon. An example:

A type "A" Impulse arrives in the multi-asset node "G1" and is polarized by the nearby and active node "G2". The Axon is thus altered by EM field strengths from nearby neighboring active (polarized) nodes. Thereby, a change of the outgoing axon from "G1 => G3" to "G1 => G4" can be explained. This happens when an impulse does not choose the standard axon due to the polarization of nearby neighboring nodes. The transmission path could be affected by the EM field at this, impulse-containing node. Furthermore, an Impulse type mix may also be present, which then emits different Impulse Types due to overlapping type areas in the input zone. By changing receptor types, subtypes of a transmitter, and overlaps of types, further type changes can be accomplished.

3. transitive dependencies: Translation of information

Explicit transitivity and pass-through controlled transitivity

- Explicit transitivity

- All kinds of Impulse potential transformations (additive, subtractive, reduced, amplifying, ...)
- Controlled transitivity

- Here, Impulses that arrive simultaneously or consecutively in a short period or respectively accumulate with a time-dependent potential loss to emit an aggregated impulse when a break-through potential is reached. This can be accomplished by node strength. Strong nodes, for example, then mean high thresholds for an Impulse transduction to an outgoing axon.

Usability of Impulses-controlled passage levels

In various correlations, Impulses must disappear or be muted (silenced) with their transported potentials. This cannot be accomplished meaningfully through subtractive potential transformation only. Also, the derivation in output actions could limited to be capable of throttling excessive enrichments with Impulses. Since the enrichment with quantized and or amplified impulse patterns would conclude in more and more intense patterns. To avoid that it would also require a transitive reduction with a passthrough threshold limiting or a direct impulse reduction. The solution is the transitive approach. We will need to translate scalar impulse potentials with scaling to imply the possibility of the AI-FOE to

A. To selectively reduce impulse potentials or completely discard them

B. To reinforce Impulses to retain information actively stable

These circumstances serve to control the simultaneous impulse information. The necessary impulse threshold limit control (transitivity logic), as well as the impulse amplifying renewal, enable the previously described behavior.

In this context, transitive regulation via a specially defined transmitter type at the node should be reconsidered. This can specifically and precisely reduce or amplify output signals. By accumulating several Impulses, that are finally passed as joined together amplified output signals. This can be seen as a bit similar to transistor logic or as a derived behavior from it.

4. neural range separation

Demarcation of different, purpose-designated areas

The demarcation of purpose-determined areas isolates the chaotical complex interactions and allows a meaningful switching in a demarcated network area. These demarcated areas prevent mutually independent or not belonging together facts(Information) from being associatively too early connected. They could be influenced in a mutually disturbing way by unrelated impulse potentials in the proximity. Thus, a closed or demarcated processing area offers a proper evaluation of the processing of information. This then includes information processing of all kinds and at all levels/stages.

5. vitality, strengths, deterioration, and renewal

By taking into account a given vitality of axons and nodes with specific potentials of Impulses, the effects on nodes and axons with a renewing, degrading, or even damaging behavior arise. Thereby different peculiarities are possible:

- Immediate and sustained change in behavior and/or network due to pain and trauma constructs that result from excessively elevated intensities of impulse potentials with detrimental effects.
- Forgetting due to structure deterioration (caused by lack of stress on the structures)
- Strengthening of information structures as an outgrowth of repeated imprinting
- Increased transitive accumulation and passage threshold in "strong" nodes.

Chapter 4: Breaking the layer logics

1. Levels of Sensors

- Sensors outside the neural network can be considered real-world sensors
- Sensors within the neural network should be treated as part of the information flow control.

2. levels of Actors

- Actors inside the STN: can be defined as impulse emitters.
- Actors outside the STN: Possible Actions of the Artificially Intelligent - Form of Existence.

3. layer concepts

From a given point of view, there are three layers:

1. Sensor Layer
2. Processing Layer
3. Action Layer

These 3 Layers act in the way of **<Input ->(Processing)-> Output>.** This means:

- Sensors act as input generators
- All handling in between Sensors and Actions has to be assumed as part of the processing layer
- Actions are about how information is carried out as responsive output.

4. processing layer (inner layer)

Processing layers of information do not exist in neural networks as atomic elements, just the opposite. The Abstraction of the outside and Inside the STN, lets the inside STN look like a processing layer for the outer STN side. Thus all structural abstractions for a processing layer that have Sensors and Actors outside a processing-defined area commonly match this definition.

5. processing levels of Impulses

The Neuro-Genesis and the spatiotemporal impulse approach, with patterns of near-field effects of different node types, cannot be separated here. But we will still have to distinguish the effects by

- Impulse flow direction interactions and type definitions about impulse flow control in nodes, considering near-field effects.
- Near-field effects in nodes generate axons, nodes, and interactions through nearby active nodes.

6. reconstruction of Impulses

For the reconstruction of information, we need to generate Impulses. This is related to the Impulse generation for the quantization from a single Impulse to the whole information. A reconstruction of summarized information (multiply of pulses from a single pulse at a node) may be possible in the same way as through mirroring additional pulses are considered to be generatable. On the other hand, transitive accumulation may also be affected, as Impulses are collected there.

Chapter 5: Near field effects

The CREB-1 dilemma

For the 1st Fundamental Theorem, a protein aligning to electromagnetic fields is inferred. In this context, isolated CREB-1 proteins are relevant therefore in various studies. Therefore, in the following, this effect is attributed to CREB-1 proteins as a proxy. For the sake of computational complexity, we avoid CREB-1 calculations in all forms, except for a possible fictitious growth measurement in the form of reached distance per time.

The Dendrite Theory

The dendrite theory goes along with the approach of a genetic predisposition to the formation of tree-like branched structures. This is to be regarded as meaningful in the context of the germ growth, the Supra Seed, but not in the context of the information storage in the learning process.

The magic of concatenating closely spaced nodes

By chaining nodes with axons among each other, the structure for mapping information is defined, which can then be reactivated by Impulses. This effect must be limited so that not everything gets hopelessly chained. Luckily the unused structure degrades again and counteracts it. According to the electrical potentials in the individual nodes, this dynamically determines the range of a possible concatenation. Thereby an appropriate scaling favors a magical behavior. The "magic" in this, is to be seen in the context chained together, as that thereby an accurate information mapping is managed. This will be described in more detail in Chapter 7: Neuro-Genesis With a badly designed scope for cross-linking of nodes among themselves a total cross-linking as a natural limit would be set. In contradiction to this and based on degradation for no longer used axons and nodes, a releasing effect would take place and counteract reaching this limit. This represents the Polymorphie of PODANI Networks.

Limitation of the near-field effect

The spatial limitation of information that can be chained allows the reconstruction and delimitation of the patterns that caused established chaining. Thus, only small amounts of information are concatenated at once, which, however, can represent partial complex facts across several different zones. For a targeted information reconstruction across several zones, there is a need for an accurately scaled chaining range on the one hand and an overloading problem through too many associative connection structures on the other hand. Such overloaded associative connection structures won't chain up meaningfully. This could make it even harder or impossible to recover meaningful enough information.

These overcharge problems are defined as follows:

- Too many simultaneous Impulses
- Too wide chaining restrictions

In connection with the algebraic necessities, the near-field effects can lead to signal noise. This can influence neural processing negatively. Therefore, there is a duty to modulate signal noise by:

- Attenuating systems for less signal noise
- Generally regulating systems or logic
- ...

Likewise, to reduce signal noise, a delineation of the different areas is required. These should work purposefully and with only a subset of all active information. However, they should not be disturbed by impulse/signal noise, because the information possibly can't be reconstructed accurately then. This effect is brought about in humans by the shielding effect of the meninge but would be negligible in the context of emulated processing. Since in the virtual area separation can be defined before, separate spatial mapping calculations with an isolation layer are superfluous, but adaptive transitions are needed to make the whole Network appear interconnected

Chapter 6: Retaining, remembering, and reconstructing information

1. Circular flows: Obtain information without changing the network

- Through circular impulse streams, it is given that information remains persistently active.
- By mirroring Impulses from the Stream of circulating Impulses or parts of it, information can be kept active, and further processes can be triggered.

A further control effect of these circulating streams demands more than the other interaction rules.

2. Quantified information: Creation and recovery

To be able to restore information, which was formed by a set of several merged Impulses, a reversal effect is also necessary. In this case, it has to be possible that a single impulse can be quantized (disassembled) into many information quants (single impulses), to restore the information pattern before the moment when the Impulses have united. Otherwise, see for this in Chapter 3.1 Quantization of Impulses: Combined Potentials.

3. Short-term memory to long-term memory

In terms of human short-term memory and long-term retentivity, this is a phenomenon that PODANI Networks can take into account. This is a limited set of Impulses that maintain the information by circular flow in short-term memory in such a way that it can grow rapidly in long-term memory. The speed depends on the intensity of the perception (Size of Impulse Potentials) and its associative variety; both aspects increase memorability. Here, long axon reaches are a criterion for why we cannot internalize complex or complicated things immediately and at once. Otherwise, the CREB-1 dilemma applies and can be mimicked to a limited extent by parameterizing concatenation ranges and growth rates.

Chapter 7: The Neuro-Genesis

1. Neuro-Genesis (formation of neural nodes and axons)

Neurogenesis is the independent creation of new neural structures. Thus, new nodes and axons are automatically created or degraded under certain conditions. The aim is to achieve a learning capability of the AI-FOE in free operating mode, which produces meaningful results through intelligent learning without human intervention. Also, the structural polymorphism by created, maintained and degraded structures through the Neuro-Genesis behavior is the subject of independent improvements of an AI-FOE.

The formation of axons

The first of the two Fundamental-Theorems describes the formation of new axons between two simultaneously activated nodes. Nodes are here considered activated by definition as long as they contain Impulses. Between two neighboring activated nodes, a connecting axon, if not present, arises immediately. However, this axon only arises up to a certain distance, which must be scaled correctly and is based on the intensity of the node's EM-field. A growth of axons in the sense of a slow dendrite formation is ignored here. Linking the range of formation of axon connections to the electrical potentials in the nodes seems to be sufficiently dynamic and convenient.

The formation of neuronal nodes

The position for the Origin of new neuronal nodes must be on an axon, otherwise, they will never receive Impulses. Beyond the supra seed at the beginning, where nodes subdivide long axons, crossed axons (nodes of axons) are the best place for new neuronal nodes. Therefore, we define new nodes at crossed axons. Because for simplicity we calculate axons as a direct connection between 2 nodes, we have to define a node that is not on the direct/straight connections.

Axon grew between nodes:

Directly or according to patterns of electromagnetic fields?

Electromagnetic fields would cause different axons to cross specifically and form a node at this point. As a virtualized mimic, this is very complex. In virtualized mimics, the reach of the Neuro-Genesis effect would be an easy approach to use. The neural genesis radius is per definition the distance from a node, to any other nodes with which axons can establish a connection. In a constant neural genesis radius, everything within this range that is simultaneously active and not connected will be connected through extra new axons. Furthermore, the range can be more accurately adapted through the differences in dynamic impulse potential intensities. Just as a new node should best emerge at the point in the middle between active nodes, it develops an instant meshing with the other neuronal nodes.

2. calculation for an appropriate site for originating a node:

Using a spatial center between the impulse potentials, that distorts the space in such a way that **$f(X_{Radius})$= potential/distance** defines a simplified calculated, specific location of a new node. The node is thus created in the center of the 3D polygon, of all nodes to be included. It can also be defined as spatially offset for better location assignment, according to the potentials.

A short explanation, therefore:

By spatially distorting the target position according to the impulse potentials, these nodes then have better information content. Future links can be based on the fact that the node position was selected more precisely. This more exact position contains thereby a more precisely tuned information binding for subsequent information entities.

Simple 3D example calculation for the origin of a new node:

3 nodes A, B, and C with

A (X, Y, Z) = 0,

B (X, Y, Z) =

C (X, Y, Z) = 3,4,

3 potentials Au, Bu, and Cu with:

Au = 10V,

Bu = 50V,

Cu = 100V

and r as the distance between two nodes

AB:	fx(A)=r*(Bu/Au+Bu) = 3* 50/ 60 = 2.5	=> 2.5, 0.0, 0.0
BA:	fx(B)=r*(Au/Au+Bu) = 3* 10/ 60 = 0.5	
AC:	fx(A)=r*(Cu/Au+Cu) = 5* 100/110 = 4.545 ... sin/cos 60°/30°	=> 2.7, 3.6, 0.0
CA:	fx(C)=r*(Au/Au+Cu) = 5* 10/110 = 0.454	
BC:	fx(B)=r*(Cu/Bu+Cu) = 4* 100/150 = 2.666	=> 3.0, 2.7, 00
CB:	fx(C)=r*(Bu/Bu+Cu) = 4* 50/150 = 1.333	

Now the center point is formed

AB:	= 2.5, 0.0, 0		
BC:	= 3.0, 2.7		
AC:	= 2.7, 3.6		
ABC:	=	f(x) (2,5+2,7+3,0) /3 = (2.7, ?.?,	
		f(y) (0,0+3,6+2,7) /3 = (2.7, 2.1, ?)	
		f(z) (0,0+0,0+0,0) /3 = (2.7, 2.1, 0.0)	
Node D is created at the coordinates:			f(A, B, C) = (x=2.7, y=2.1, z=0.0)

3. further illumination of Neuro-Genesis:

Also, considering receptor and neurotransmitter selection, multi-asset node types will form, which process the transmitted information with selective choice, from input to output. The choice of receptors and neurotransmitters in a node could be determined by:

- The neuronal transmitter type equals the receptor type and vice versa.
- This results in local dependencies.
- Interactive dependencies, such as entry angles and interactions between the active multi-asset nodes with each other.
- Regulating interactions with other active nodes
- ....

To automatically generate possible multi-asset behaviors, one rule is missing.

Depending on the Impulse potential, areas are created at the spherical entry points, which create overlaps of the transmitter-type logic in this area at the entry point.

- Furthermore, Impulses in the axons are necessary to cause
- a regeneration or hardening of the axons
- induce node formation by crossed axons.

Furthermore, a CREB-1 protein effect in the formation of axons with EM field effects and dendrite growth should be reconsidered in this regard and would also accomplish long concatenations on electromagnetic field lines.

Chapter 8: Drive of an AI-FOE Basics

This chapter is dedicated to the Motivation and Driving Principles that are driving the AI-FOE. These are principles that constantly activate an AI-FOE to bring it to life, while simultaneously slowing it down to avoid over-activation.

1. activating concepts

To wake the AI-FOE from a state of rest, signals are needed that result in activity. For this, a subset of the AI-FOE must remain active or receptive to detect the waking signals. Example: A motion sensor activates the AI-FOE.

- Trigger signals
  - on the sensor level which triggers processes. Here, signals are fed which start various primary processes.
  - Self-assessment provides signals from processing information that generates triggers for actions. This corresponds to a filtering of signals before an activity trigger results in a reflected action.
- Forms of waking signals
  - Motion sensor
  - Acoustic alarm
  - Optical alarm
  - Being that the AI-FOE activated by a switch
  - Signals from preprocessing
  - Time: Activity only at certain times
  - ...

2. deactivating concepts

To put the AI-FOE into an idle state, triggering events are required which signal the AI-FOE to deactivate. In this case, the AI-FOE is either partially or completely shut down.

- Trigger signals
  - Missing activity triggers: If no tasks are pending, then the AI-FOE should deactivate itself
  - Time: Activity only at certain times
  - Low electrical: When self-observation of one's electrical reserves reveals a condition in need of treatment, in the sense of a renewing recharging process.
  - Through signals from sensors
  - Through signals from a residual processing
  - ...

3. virtualization of pains:

Pain immediately changes our ways of acting and thinking (black pedagogy). Pain drives us and our reflexive actions usually save us from harm. Thus, pain is a driving or nudging factor for becoming active and acting. It is conceptually indispensable to successful AI-FOE design. We emulate pain with exaggerated Impulses and as a result, axons and nodes change. We need a scaling from when it triggers consequences. Regarding the calculation of static scaling, alternatively, the calculation can be done dynamically via the strength of the axons to impulse intensities.

- nodes and axons change immediately, permanently, and seriously
  - nodes
    - Transmission of impulse potentials is jammed (pass barrier or increased threshold passband)
    - excessive Impulse Potentials as a result of it
  - Axons
    - provided axons are temporarily damaged and then avoided
    - excessive Impulse-Potentials of transitivity effects with harming surges
    - alternative behavior as a result of it
- Consequences of the surges
  - Causes Strong Signal Noise
  - induces further surges and causes possibly expanding harmful changes
  - causes strong polarization in reflexive reactions
  - Requires rapid spatially propagating attenuating action to keep subsequent damage development small,
    - comparable to an endorphin flood anesthetizing against neural trauma formation
- Restoration of the healthy state through
  - Neuro-Genesis: renewal and degrading of existing structure
  - Restoring an environment close balance of the impulse potentials
  - Derivation of the tensions across the action levels

Chapter 9: PODANIN in free Operations mode

4D Impulse Algebra and Neuro-Genesis in Free Operation

1. flow structures in growing networks

- Are determined by a spatial limitation and a super germ flow direction in a specific area
- Different areas mean a mutually independent way of processing and should be connected or crossed with the other areas in time for the unity of the whole.
- ...

2. control of the Impulse flows

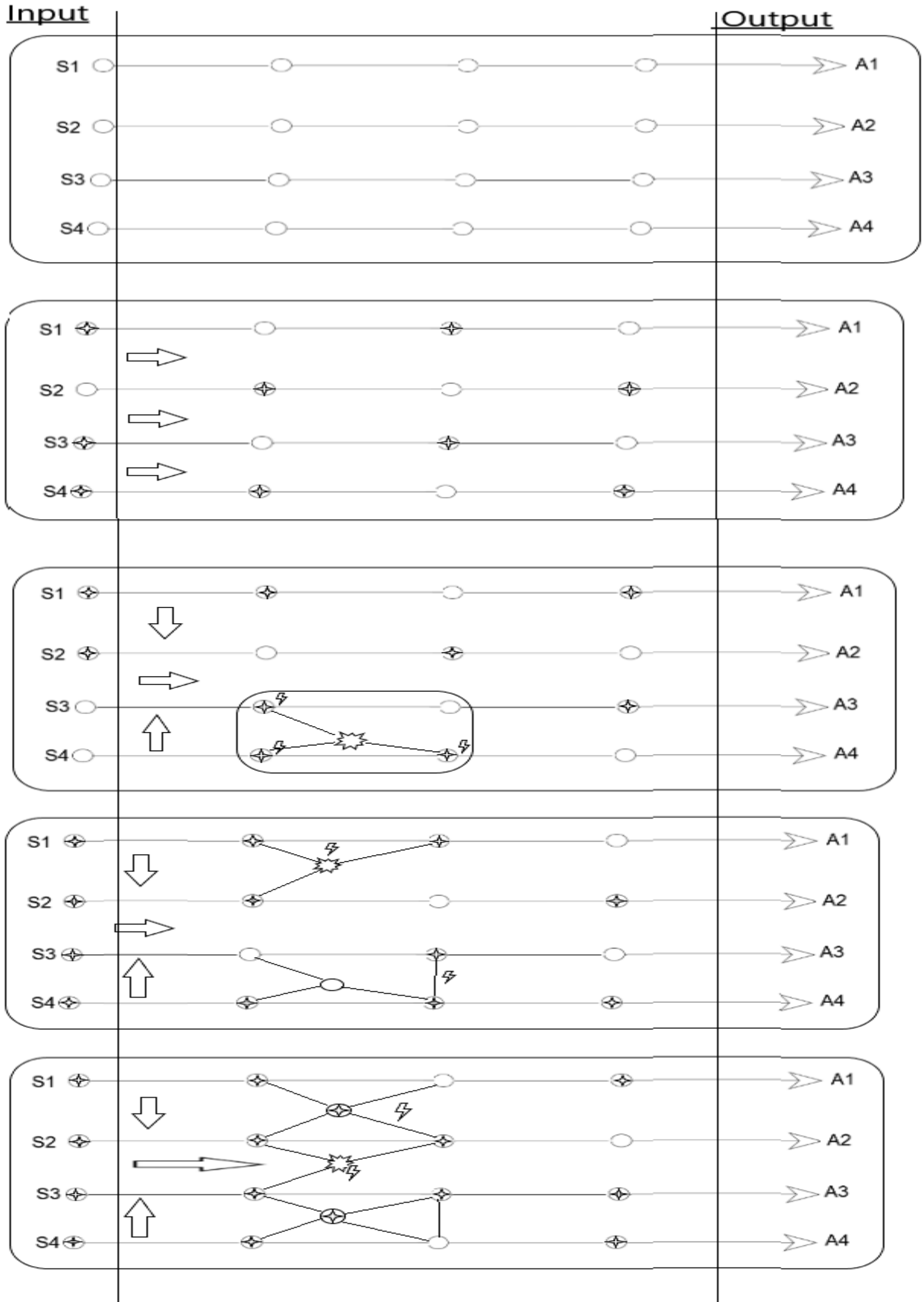
- Sensory input
- Preparation levels with refinements of the grown structure
- Processing layer
  - Various preparation levels with refinements of the grown structure
  - Intermediate output levels and tapping of results from processing
- Transition layer between the areas
- Output to the continuing (action) layer
- ...

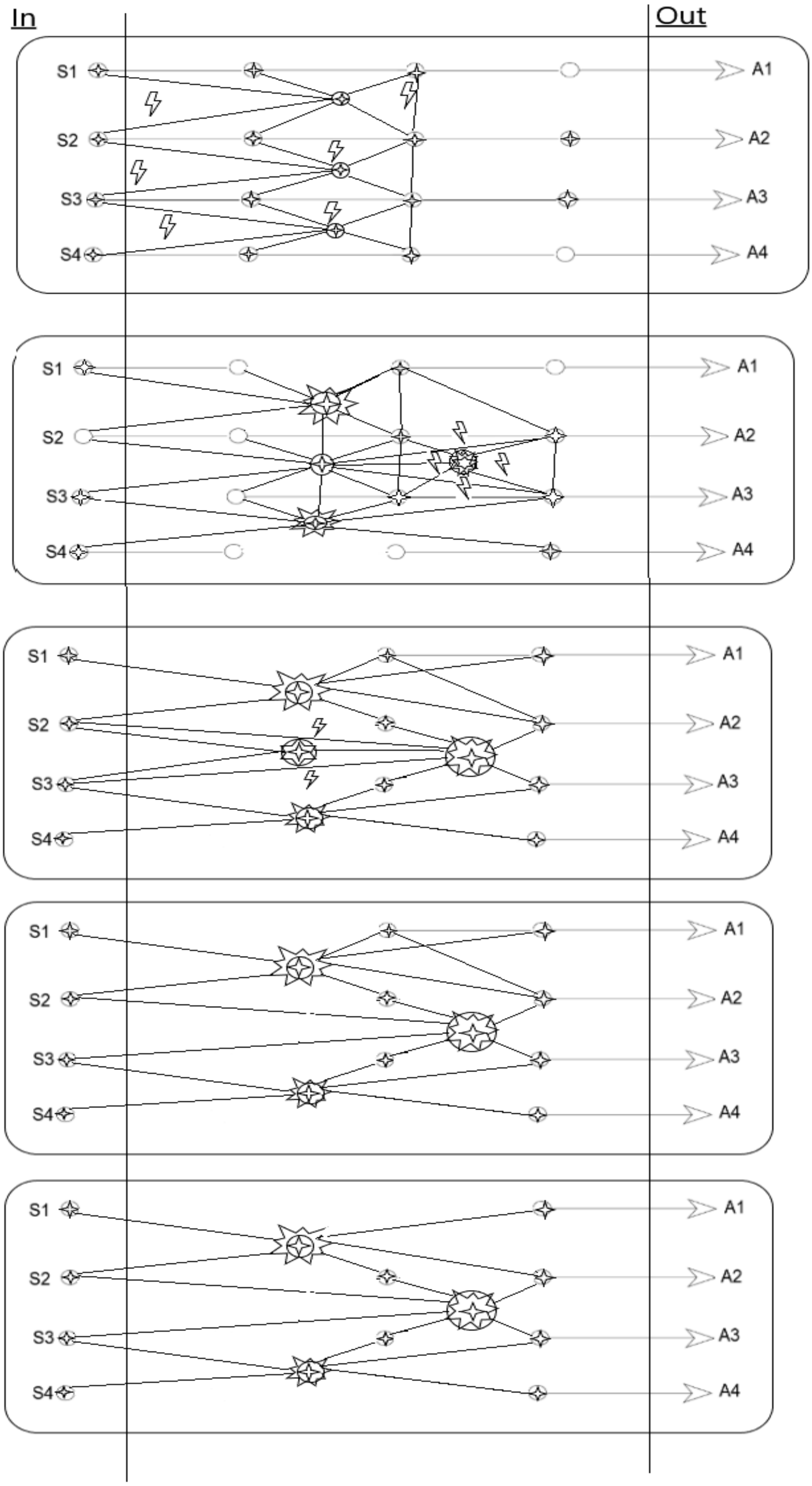
3. Uncontrolled neuro-genesis effects

- Axons
  - Thanks to subtypes (comparable to neural transmitter types), neural or nodule flow control is continuously guided to the next level by polarization as designed in the super germ.
  - However, if the super germ infrastructure is already in a structurally changed evolved state, even predetermined flow directions are no longer guaranteed.
- nodes
  - Multiple active nodes in an information-mapping area favor the refinement of polarizations and thus the interconnectedness of closely neighboring nodes in terms of associative binding and bridging
    - This process deforms the structural framework from the super germ
    - reduction of unused and orphaned axons and neural nodes

Diffuse example of automatic network transformation

This section is about to present a diffuse example of the network transformation that PODANINs create with its Neuro-Genesis concepts automatically. The following example is just for a demonstration of a possible transformation process. This process has various not specified or determined behavior of the nodes. Therefore we have to accept that whether everything develops meaningfully or not, this example's purpose is only to present the automatic Neuro-Genesis effects. A logically fully functional AI-FOE Example has been given in [Chapter 2 - Example of an Auto Actor-Model](#)





In
Out
S1
S2
S3
S4
A1
A2
A3
A4

t0:

The first picture shows the defined Supra Seed for this example. This consists of 4 independent processes and none of these is being already meshed in any way. Each of these independent Processes could also represent a neural network. This abstraction is behaving as if it has been congruent to the structure as shown in the Supra-Seed. These 4 Independent branches in the Supra-Seed are identical cable lines and connected with straight direct axons between nodes, from the Sensor side (Input) to the Actor side (Output). Thus, these 4 independent use cases are drawn each as straight and parallel axons divided by 3 parallelly organized nodes each.

t1:

First Impulse streams on the original Supra Seed structure are shown in the associated picture on the graphic. The impulses are drawn as 4 sided stars into the center of the node's pictographic circle symbol. The nodes are connected by axons which are drawn as straight and continuous axons. No nearfield - Neuro-Genesis effect is occurring or takes place in this picture. The initial Impulse pattern kept the nodes from activating. There weren't any Nodes that contained Impulses in sufficient proximity related to the electrical energy potential of the trespassing Impulses at the nodes and that prevented a Neuro-Genesis effect till here. The main Impulse stream flow directions are indicated in this picture as bold arrows show the main stream flow direction.

t2:

Through the progression of the impulse streams in the neural network, the pattern changed. Now some activated nodes in sufficient proximity start a Neuro-Genesis-Process. A formation of Axons appears between active nodes as well and a crossed axon emerges. The crossed axon will instantly or soon change to a fully functional node. The Neuro-Genesis effects are indicated by lightning symbols

t3:

The crossed axon emerges as the first new node and further Neuro-Genesis effects evolve.

t4:

More and more axons are emerging concatenating bridges between nodes. Some close and active nodes generate crossed axons and therefore nodes also start emerging. The amount of changes is already huge at this moment. An intermediate meshing across all 4 associated independent processes evolves.

t5:

Caused by high activity, many new axons are being formed and some of the new center-positioned nodes are getting strengthened as part of a further Neuro-Genesis effect.

t6:

Unused Axons start to degrade and vanish. The missing structural renewal from missing impulse transports causes this. New and significantly bigger nodes appear, caused by the upcoming traffic amount. The Impulse potentials cause enriched EM-Field effects.

t7:

A fundamental network transformation process is now clearly recognized in the associated picture. It is already well advanced but has not yet the approximately expected final structure pattern formed.

t8:

The structural mesh pattern has progressed further in its transformation process and strong nodes have been formed, as well as unused axons degraded totally. Afterward, some nodes have lost all axon connections and are instantly removed. The degradation process of nodes is superfluous to be simulated, as lost nodes can never have Impulses activating them. Thus, they can never again connect with the network. Nodes are eliminated as useless or dead pieces of transformation by an instant deletion on reaching a lost all-axon connections state.

t9:

In the Final picture, we can see a neural mesh that is differently formed concerning its Supra-Seed. Through the Neuro-Genesis concepts, it has developed automatically. The original supra seed structure became unrecognizable here because it strongly transformed in the development of the changes. The number of neural elements changed from t0 with 16 partial axons and 12 nodes to 18 partial Axons and 9 nodes in t9. Further, the independent Processes are now meshed together. Maybe the t9 mesh looks a little unoptimized with the two only axon-dividing nodes, but these could be points of active information in a future transformation.

Chapter 10: AI-FOE Design Concepts

1. structural recommendations

- To the outer side delineated areas
  - Separation of independent information types
  - For closed areas of distinct information topics, this would make its concatenation only through Associative features within this information type to similarities available.
  - ...
- Merging regions
  - Unification of different types of information
  - Transitions in the information
  - Unification of partial information
  - ...
- Controlling regions
  - Processing according to the EVA principle
  - evaluation
  - influenced action from polarization in closer proximity to the process itself
  - ...
- Circular structures
  - Short-term memory
  - Circular Process Flow of closed topic areas in the whole network system
  - ...
- Derived structures
  - Actions
  - muting logic
    - loops for reducing the noise of Impulse Potentials
    - spatially spread of attenuation for throttling the node's functions
  - derivation of impulse streams
    - Into grounding
    - to accumulate charge
  - ...

2. paradigms of a self-assessment

- Implicit control behavior
- Supra Seeded evaluation logics; see Auto-Actor-Model
- Ambivalent polarization for self-assessment
- Mutual interactions of active nodes with in consequence:
  - Impulse redirection
  - Neuro-Genesis: nodes and axon formation
- Emotional structure: Automatic, Supra Seeded Evaluation Mechanisms.
- Learned assessments should cross spatially associative
- pedagogy of AI-FOEs drive
  - Evaluate in the sense of comparing (differentiate) the quant- and qualities.
  - aligning the individual AI-FOE drive to needs and desires.
  - Damage prevention; risk assessments
  - Triggering of "pain" must lead to an immediate change in behavior
  - Pain avoidance As a result of pain experiences.

Chapter 11: Multi-Asset Nodes - structures, patterns, and designs

1. Type A => B Impulse redirections

Logically related independent information and processes can have common subsequent actions. Initially seen, they act like independent networks but are always executed consecutively. This can be like in the Example of the Auto actor model earlier in this document, where the impulse of the eating process has been diverted to the mesh of evaluating a satiety feeling. This means: No eating no Satiety! Eating stops as designed through satiety signals indicating satiety and causing an impulse redirection.

Switching between related, subsequent, and independent information meshes:

A => B Impulse redirection

2. Different types of merging and quantizing information.

Multi-asset nodes could handle a quantization in that way, and that creation and recovery demand a specific Neuro-Transmitter. So 3 different transmitter types from even more axons could interact independently. We define that the emitter equals the receiver Neuro-Transmitter and that there are logics like a Neuro-Transmitter influencing the behavior of the others, or quantization is only done with a single transmitter type.

3. Self Optimizing through cyclic flows

Through cyclic flows, an automatic learning process can be established.

The cyclic flow could be divided into subsequent sections of processing as follows:

- … -> Sensor -> Decision -> Action -> Evaluation -> Repeat -> …

Explanation of different sections and their cyclic interacting behavior:

- **Sensor:**
- Here the outer input is induced into the neural circuitry. This incoming area initiates all further proceedings of this.
- **Preprocess Action:**
- The Sensor Input is preprocessed for choosing the action to reach the desired result.
- **Action:**
- The flow of impulses that originates here serves to control and assign everything from a single action to a whole complex of actions. To keep the circular flow intact, we need to branch off Impulses by mirroring or generating through quantizing these extra Impulses
- **Evaluation:**
- The Evaluation process is the differentiation of given results and comparisons with past experiences. This section then starts sending impulses into the preprocessing section to thereby possibly influence the selected action.
- This section then induces evaluated impulses as part of the Sensor and Preprocessing Input to influence this cyclic flow.
- The changed Impulse patterns are part of the self-optimization process through comparing results and self-changing their further acting.
- **Repeat:**

- At this point, we start over at the Sensor and Preprocess sections.

Chapter 12: Recapitulation / Formulary

1. Fundamental Theorems of 4D-Impulse Algebra and Neuro-Genesis

The data type of the information of an:

1. Impulses are to be understood as dynamic scalars or boolean blobs.

Impulse Interactions Rules:

1. nodes are connected with new axons in different expressions.
2. Impulses branch correspondingly to defined case distinctions by mutual influence.

Neuro-Genesis Rules:

1. Axons arise as bridges between nearby neighboring nodes, which are active at the same time.
2. The axon pathways originate on the EM field lines that bring about the Impulses
3. Axons are not necessarily one-way streets
4. Nodes subdivide axons into meaningful lengths
5. nodes arise at crossing axons
6. nodes are formed either
7. a. immediately,
8. b. with a period of formation,
9. c. during periods of rest,
10. d. by gating with Impulses
11. Axons between the different node types define themselves automatically, according to the principle: origin type = target type
12. Depending on the typing in multi-asset nodes, type changes of the Impulses in the nodes occur due to internal polarization, passage limitations, and overlapping of transmitter and receptor types (subtypes)
13. Passage limitations can be reduced or increased by EM sensitivity
14. Depending on the Impulse potential, radial surfaces are created at the spherical entry points. They are scaled as potentials related to their radius These generate superpositions of the transmitter-type logic in this area, as a concentric definition, at the entry point.
15. Node type conditional polarization: According to different criteria for joint interaction.
16. The vitality, strength, and conservation influencing node properties
    a. Immediate and sustained change in the way the network operates.
    b. Pain and trauma
    c. Forgetting due to structural degradation caused by lack of stress in the area.
    d. Strengthening the information structures, as an outgrowth, of a repeated renewal of the structure through impulse transport streams
    e. Transitive behavior, nodes strength to Impulse potentials

2. Axons, Nodes, Impulses, and EM fields

Axons:

- transports Impulses
- arise between 2 active nodes on electromagnetic field lines
- Axons become more stronger and resilient through renewal which emerges from usage as Impulse cable lines.
- Axons would constantly degrade in strength thus resilience
- if they wouldn't experience structure renewal through recurring use
- Nodes form at crossing axons
- Axons are not necessarily unidirectional

Nodes:

- nodes arise on axons
- Nodes subdivide axons into meaningful lengths
- New nodes arise at crossing axons
- Multi-asset nodes harbor different transmitter types in their inner
- Accumulating, limiting, and scaling Potentials of Impulses
- The transmitter types are on the inner side of the sphere surface representing the node.
- They follow the premise: "input transmitter = output transmitter".
- Additionally, overlaps in input zones always mean that the transmissions of all transmitter types in the input zone of this axon take place.
- The transmissions will consist of their transmitter types as well as of the foreign types. By overlapping zones from other axon entry points, all in this zone given transmitter types are together triggered with an at exactly this entry point arriving impulse.
- nodes are activated when an impulse arrives
- Active nodes influence each other
- The impulse paths are influenced by internal and external EM fields.
- Input Neuro-Transmitters types equal (always) also output Neuro-Transmitters types.

Impulses:

- are transporting an electrical potential
- polarize and activate nodes when they arrive there
- influence and shape the EM field
- affect maintaining, strengthening, and growing axons and nodes.

EM fields:

- Impulses generate the EM fields
- The meninges shield the individual EM fields from each other and strongly attenuate them.
- EM fields polarize the nodes, in such a way that the impulse trajectory is controlled by them.
- EM fields determine the formation of new axons
- EM fields influence the neurotransmitter actions in nodes and change impulse flows as they attract or repel neurotransmitters.
- The EM field lines establish the spatial formation of axons away from the shortest connection and allow axons to cross each other