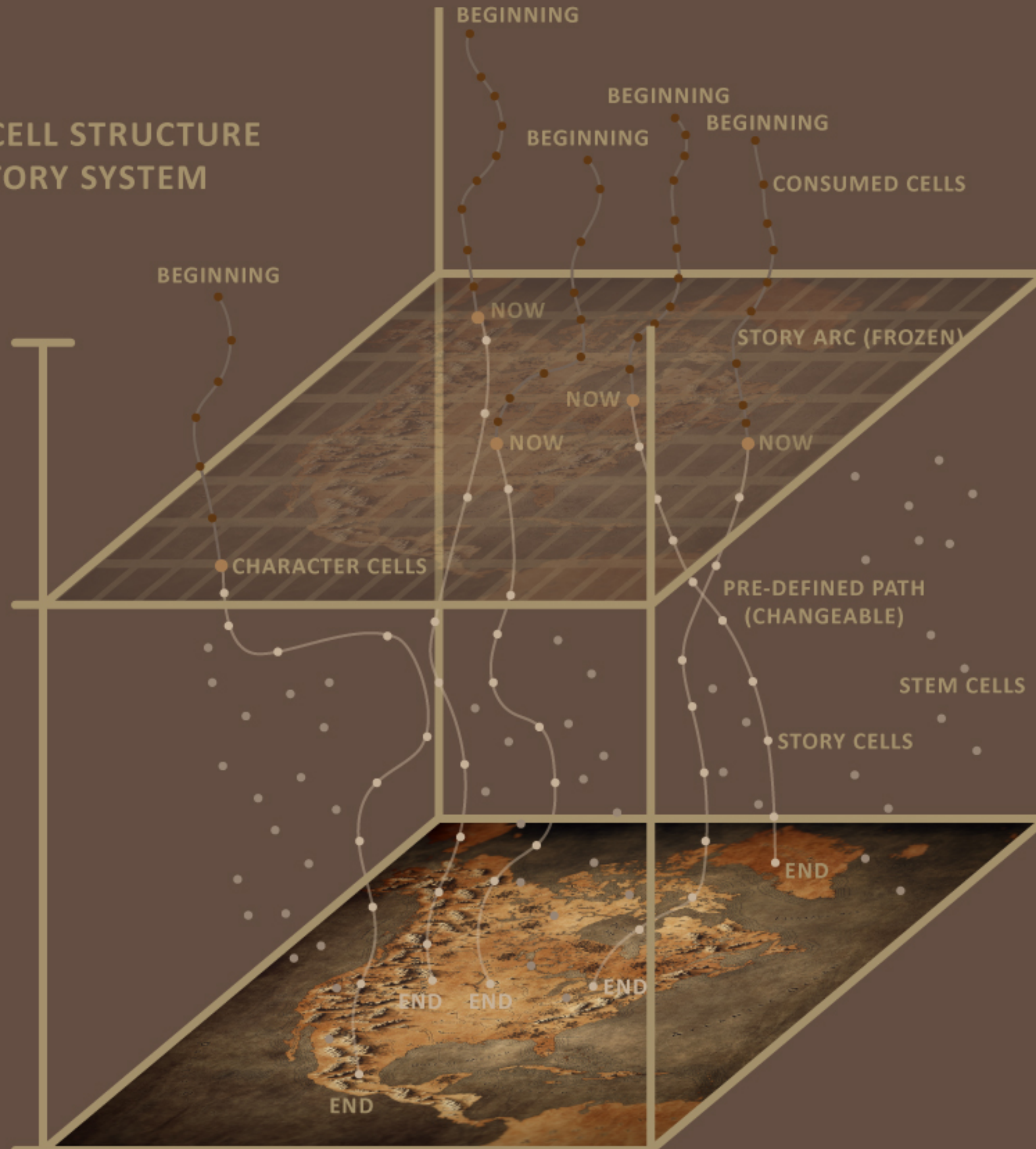## WHY THE CELL STRUCTURE STORY SYSTEM?

How to bridge the gap that exists between Player freedom and handcrafted meaningful Narrative in computer games? I propose utilising technology to achieve something that goes beyond that which even in-person collaborative storytelling can accomplish:
An organically evolving story that is out of the creator's hands.

The goal would be to take the benefits of authorship, player freedom, and computer-generated randomness and combine them in a way that maintains the importance of each.

CONCEPTUALISATION FOR 4D STORY STRUCTURES

THE CELL STRUCTURE STORY SYSTEM

BEGINNING
BEGINNING
BEGINNING
BEGINNING
CONSUMED CELLS
BEGINNING
NOW
STORY ARC (FROZEN)
NOW
NOW
NOW
CHARACTER CELLS
PRE-DEFINED PATH (CHANGEABLE)
STEM CELLS
STORY CELLS
END
END
END
END
END

CELL STRUCTURE SYSTEM

The structure of cells seems the most appropriate way to visualise how this organic story modelling would work. Spread throughout time and untethered to the forward arrow of the Reference Framework are kernels of story data, "Story Cells", each with differing ties to the game itself. Some are environmental, tethered to an object or place, some are associated to a character, while others are free floating whims that are pushed and pulled by the attraction of numbers stored within other cells. Each carries a set of stats, requirements and instructions that can be as complex as the creator wants, or as simple as "Answer the phone". The cells interact through their contained parameters and can change one another through collisions in space and time. This looseness of structure generates emergent and reactive moments while still allowing for the creator to have a hand in shaping the story.

STORY COHESION & DEPTH

Story is cause and effect, the wiring together of at least two points in time and space, a beginning and a conclusion, and maybe the experience of everything in-between. This can be as simple as "I picked up the phone and hung it up again." or as complex as answering a phone call that leads to the discovery that the world you are in is a simulation on a computer powered by the atrophied bodies of everyone inside. Story needs cohesion to capture meaning - i.e., the two points wiring together need to make some kind of sense - and the depth of meaning is derived from the implications of what is being strung together. Picking up a bucket and putting it down again does not have the same impact as throwing a bucket of water at the wicked witch.

CELL ABSORPTION

As Story Cells collide with Character Cells, the Story Cell is absorbed to be either consumed or regurgitated, depending upon how the parameters of the two interact. Consumed cells become frozen in time, a solid event that make up a Character's Story Arc in the past. They are no longer available and cannot be absorbed again, but they can be referenced, say in the retelling of what happened to one character by another. Regurgitated Story Cells are returned into the Cell Structure, often with modified parameters, which allows that story to either repeat or the thread be continued. These can be then reabsorbed by the same Character Cell or absorbed by a different Cell altogether, but only if Cell death has not activated by certain requirements no longer existing in the game world.

CHARACTER CELLS

Within this system Characters are also considered cells, but with more complex parameters than Story Cells. By having different behaviours of the cells, each attracted by certain attributes and repelled by others, the story can be pushed and pulled in directions that even the original creator could not expect. If a Story Cell and Character Cell collide, the story cell is absorbed, and then the changes contained within are enacted in-game. Character Cells can also collide, both cells exchanging parameters that define the interaction that occurs. A Story Cell specific to a Character may even be completely missed and absorbed by another character, say, answering their friend's phone for them, changing the course of events while still maintaining context and a sense of cohesion. Given certain circumstances a Character cell can generate their own story cell that will float along the W axis until that cell dies - the circumstances required having passed - or is absorbed by another Character cell.

STORY CELLS

Story in this system is seen as a collection of points in time and space that hold information that can only take effect if there is a moment of cohesion. Depth is captured in how these moments interact with the overall picture. To ensure both cohesion and depth, every information kernel is a Cell that interacts with other cells closest to them within a space provided by the Reference Framework. The Reference Framework here can be seen as the bridge between Figurative Cells and an Actual Game World. The interactions of Story Cells with other cells are defined by the parameters they compare, their assigned behaviour and how they are tethered to the Reference Framework. There are seven types of Story Cell categories that define how they are tethered, three sets of behaviours, and several Cell parameters, each of which will be discussed at greater length on the following pages.
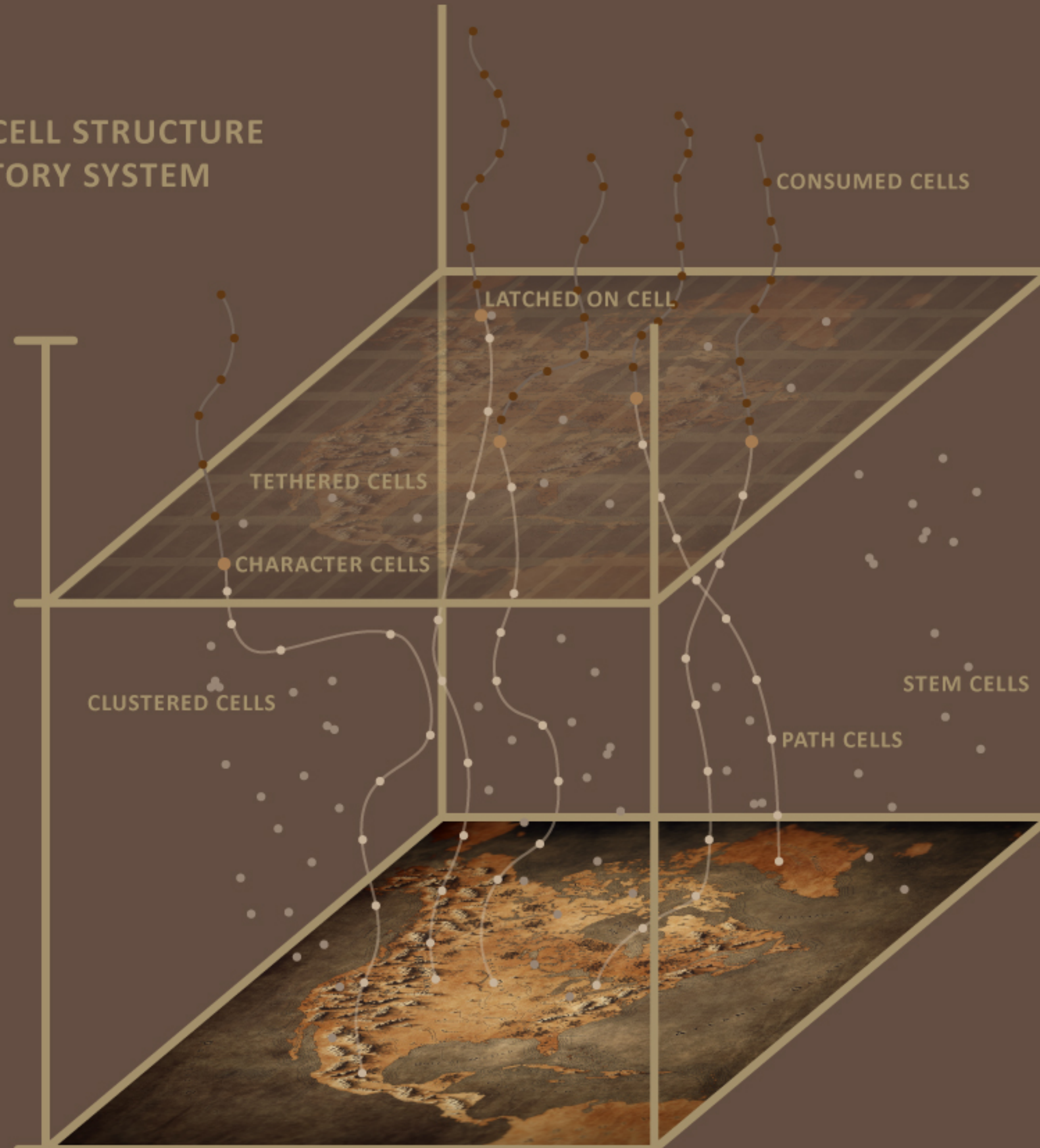
STORY ARC

All Story Cells consumed by an individual Character Cell form a connected trail behind them, a record of their progress through time and space known as their Story Arc. This path is frozen in the past, but may still hold weight in the future, so none of the information generated by previous events is thrown away. By allowing the path to retain parameters that can change present and future interactions, even beyond their influence on that specific Character, Story Cells continue to have a ripple effect through time that adds to the importance of the events themselves.

CHARACTER STORY PATH

If replicating the style of storytelling present in Groundhog Day, the order of events is important and not everything can be left up to random chaos. The day should play out the same if the player were to do nothing at all, but this seems to go against everything established so far. The solution is to have paths of Story Cells with parameters that are either strongly drawn to that specific Character or that draw the Character to them. This means that even if they are pushed off the path completely, they may find themselves drawn back at some later point. Order within Chaos.

CONCEPTUALISATION FOR 4D STORY STRUCTURES

THE CELL STRUCTURE STORY SYSTEM

CONSUMED CELLS

LATCHED ON CELL

TETHERED CELLS

CHARACTER CELLS

CLUSTERED CELLS

STEM CELLS

PATH CELLS

CHARACTER CELLULAR STRUCTURE

Character Cells are enclosed systems that hold all relevant Character information to be compared against the Parameters of Story Cells, in both external and internal processes. The potential complexity of information they hold can range from basic Cell Parameters and an Inventory to a detailed stat system that resembles that of an RPG.

STORY CELLULAR STRUCTURE

Even though Story Cells are not as complex as Character Cells, they can still carry a wide range of information that fall into categories. The first are Parameters, a set of variables that are used on both incoming and outgoing checks with other cells, the second being Modifiers, portions of information that are injected into a Character Cell when consumed. Parameters are the context required for a story to occur, whereas Modifiers form the actual story that manifests in the game world. The amount of information these Cells contain depends upon the creator's needs and the requirements for that individual story to function, but they must contain at least one Parameter and one Modifier.

CELL SIGNALLING

Cells send and receive signals from one another across the Reference Framework, some of it dependent upon proximity through time and space, but others can be unrestrained, with their checks passing between the past and the future. These external checks are made by both Story Cells and Character Cells, forming the push and pull of the Web of Influence. Conversely, internal comparisons are only made by Character Cells against the Story Cells they have consumed and not vice versa, hence their comparative complexity.

CELL PARAMETERS

The foundational components of Cells, Parameters are the tethers that hold together the Web of Influence across time and space, drawing or repelling Cells to and from one another. Living Story Cells search Character Cells for matching Parameters and, if found, the corresponding variables are compared to one another. This comparison then triggers a behaviour from either the Character Cell or Story, or both, depending upon the Cell Type of the instigating Story Cell and how they are tethered to the Reference Framework. Some Story Cells have Parameters that interact with other Story Cells, and, if assigned, will modify that Cells behaviour to search through other Story Cells, otherwise this feature remains dormant by default.

CELL ATTACHMENT

To summarise, this conceptual structure functions through establishing a system of coordinates – The Reference Framework – that are not just geographical (XY) but across a specific timeframe (Z). It then takes the current coordinates of smaller enclosed systems (Cells) and the relational data (The Cell Structure) they generate when comparing variables (their Parameters) to calculate their movement across the Reference Frame. Where these Cells meet and manifest direct effects in the game world is the Simultaneity Point (W coordinate for the individual Cells), also known as The Web of Influence as a whole (W Plane). How all of this is held together is through the relational data and the push-pull it generates when the behaviour of each Cell is affected, in a way that is reminiscent of gravity.

TETHERING

Tethering is when a Cell is either restricted to a specific coordinate along one or more axes or their movement across these axes is tied to the movement of an object in the game world. They are unaffected by Cell Attraction, but what a Cell is Tethered to may change by a shift in their own Parameters.
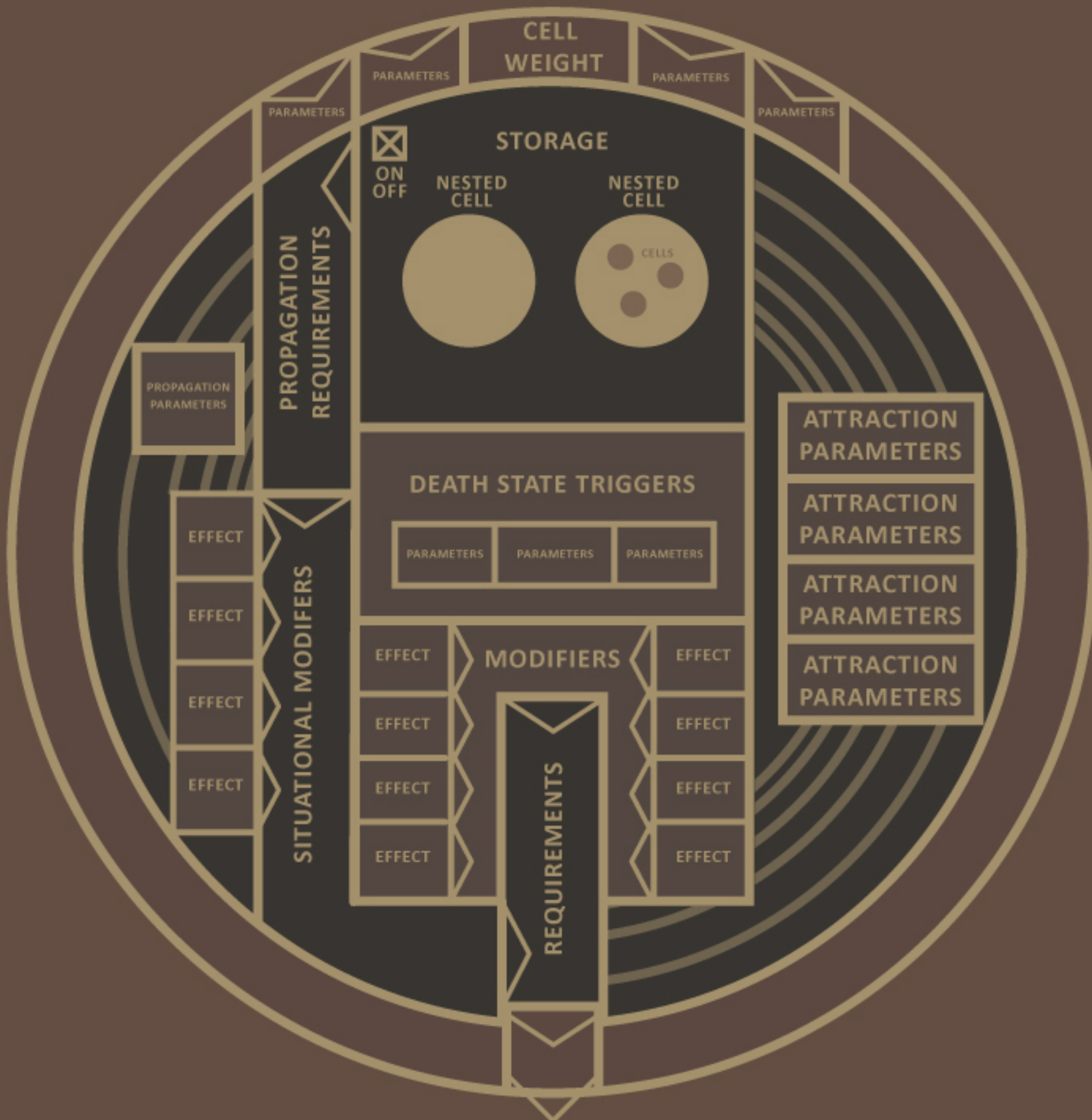
LATCHING ON

Latching On is when a Cell's movement across the Reference Frame is directly tied to another Cell of a different type due to their proximity and attraction overpowering that of other Cells. This can be temporary, and only occurs if Cell Absorption cannot happen due to some incompatibility, be it because specific requirements have not been met or because both Cells are Story Cells. The power of proximity can be broken if an external force is strong enough to draw the Cell away, or if the other Cell loses the power of Attraction through changes to its Parameters. Latching In is only a behaviour of untethered Cells, such as Stem Cells.

CLUSTERING

Tethering is when a Cell is either restricted to a specific coordinate along one or more axes or their movement across these axes is tied to the movement of an object in the game world. They are unaffected by Cell Attraction, but what a Cell is Tethered to may change by a shift in their own Parameters.

STORY CELLULAR STRUCTURE

Diagram labels:

CELL WEIGHT

PARAMETERS · PARAMETERS · PARAMETERS · PARAMETERS

STORAGE

ON OFF

NESTED CELL · NESTED CELL

CELLS

PROPAGATION REQUIREMENTS

PROPAGATION PARAMETERS

ATTRACTION PARAMETERS

ATTRACTION PARAMETERS

ATTRACTION PARAMETERS

ATTRACTION PARAMETERS

SITUATIONAL MODIFERS

DEATH STATE TRIGGERS

PARAMETERS · PARAMETERS · PARAMETERS

EFFECT (multiple)

MODIFIERS

REQUIREMENTS

ATTRACTION

Here the creator can define what specific Parameters attracts a Cell to other Cells, the strength of that attraction and even if there is anything that repels it. By comparing Attraction strength to the range of assigned Parameters, while subtracting the distance of the target, the Cell can calculate the strongest pull at any given time, moving through the Framework towards it with increasing speed. This Attraction can be interrupted if a stronger source is found due to a change in distance to or the Parameters of other Cells.

CELL WEIGHT

The density of a cell defines its overall impact upon the Web of Influence and how much pull it has when drawing other Cells to itself. Cell Weight is only a feature in Tethered and Path Cells. Smaller stories have less likelihood of occurring than larger ones because they produce less rippling within the Framework, meaning that Characters and the Player are less likely to get caught up in things with little context to them. Parameters can be set for a Cell's weight to shift depending upon events in the game, capturing the sense of increasing or decreasing context.

MODIFIERS

Every effect a Story Cell has when absorbed by a Character Cell, the instruction that are read and how those instructions manifest in the game world are defined under Modifiers. These can be lines of dialogue to be interpreted through the Character's Lens, changes to the Cell's Parameters, changes to their State – Mood, Awareness, Fear etc. – actions they will interpret, or a whole range of things. These are to be defined in later work centred on Character Cells.

REQUIREMENTS

Being attracted to another Cell does not necessarily mean a Story is initiated. Sometimes certain requirements for that Story to have proper context may not have been met yet. When this occurs the Story Cell will latch onto the other Cell until the assigned requirements are met or a more viable Cell is found. Requirements could be a specific situation, a certain time or place, an item, an object, another Character, or even a certain mood (Parameters in the Character Cell being changed by an outside Cell). If there are requirements that can be met if the Character where to go somewhere or do something present in the current iteration of the world, the two Cells can become drawn to that location, the Story Cell pulling the Character Cell along with it.

When it comes to Tethered Cells drawing Character Cells in, some will also have requirements that need to be met before initiating. With the roles reversed here, the Character is drawn to wherever they need to be and will initiate an idle state until the Requirements are met, another with a stronger pull comes along, if that Cell is consumed by another or dies.

CELL DEATH

When thinking about the future, we can determine that what was once a potential event or action is no longer possible, everything required for it to occur no longer present, and its time now gone. To replicate this within the system, Cells rely on outside factors to stay viable; if these fail then the cell is removed. When defining the Cell Parameters for a specific Cell, a Death State trigger must be set, unless automatically set by it being a Stem Cell. This trigger can be time dependant, the breaking of a tether - such as the death of a key Character – or the removal of anything required for context - say if a car is in the event, but no cars remain in game. Once the Trigger is activated, the Cell is removed, and it no longer has any influence within the Reference Frame.

STORAGE

Aside from holding Parameters, Story Cells have a Storage space that can be activated when created so that they can carry the building blocks of other Cells within them. This allows for stories to grow and continue after the initial even through the process of Cell Propagation. By assigning storage space to a Cell, new Cells can be created within through the same process as other Story Cells, but situational Parameters can also be defined for the new Cells to adopt when the Propagation process is initiated. These are like genetic markers that can be passed on dependent upon how the Propagation occurred, shaping the new story code to adopt context of the previous events.

CELL PROPAGATION

When creating a Cell with this feature, not only do the contents need to be defined, but also the requirements of initialisation for that Cells propagation. The simplest method is that it occurs when the containing Cell is Consumed or Regurgitated, the propagator expelling this new Cell, with its own Parameters and Requirements, upon exiting the Character Cell. However, some Cells may initiate Propagation well before being consumed if certain Parameters are found within the Reference Framework.
This process of nesting stories within stories can function like a virus, spreading the effects of a specific event well beyond the initial Character, a process that can be expanded by further nesting Cells within Cells within Cells. And there can be more than one Cell in each layer of nesting, and these Cells can be Cluster if required, layering down and outward of potential stories that may or may not come into existence.

CELL BEHAVIOURS

The Cell Types fall into three different Behaviour sets that define how they move through and are situated in the Reference Framework.

PATH CELLS

Exclusive to Plot Cells, Path behaviour is the most concrete and rigid form of Cell, used by the story's creator to establish structure to the game. Path Cells pave the way for the flow of story and define what happens if the player were never to get involved in the world. To maintain this, they are not attracted to other Cells, unless they are predefined part of the plot, only attracting other Cells to themselves. But time was meant to be broken. To accommodate for the ripples in time and space created by the player's involvement, there remains flexibility within the otherwise rigid behaviour that allows for the necessary shifts that will occur. They can be expedited or delayed on the Z axis, and if Tethered to a specific Character or Object, will move along the XY.

TETHERED CELLS

With a direct connection to what is or will be happening in the game world, Tethered Cells like Event, Interaction and Environmental Cells establish the cause and effect of the Web of Influence by drawing Character Cells together and to themselves. Most Tethered Cells are moved across the Reference Framework only if what they are tied to or Latched onto moves, except for Interaction Clusters that sit at the median point between at least two Characters. Unless tied to a specific time, Tethered Cells are situated in the Web of Influence until Consumed or reaching a state of Cell Death. They often propagate other Tethered Cells to create a system of cause and effect for their specific scenarios, continuing to ripple out across the W axis.

STEM CELLS

Untethered Character modifiers, Stem Cells like Inspiration, Mood and Chaos Cells, float through the Reference Frame, pushed and pulled by the Web of Influence until they are drawn in by the closest viable Cell. Their purpose is to change outcomes by changing Characters in a more organic, random way, untied to the specificity of events in the game world. Unconsumed Stem Cells pass through the Web of Influence with little resistance and face rapid Cell Death on the other side.

CONCEPTUALISATION FOR 4D STORY STRUCTURES

TYPES OF STORY CELLS
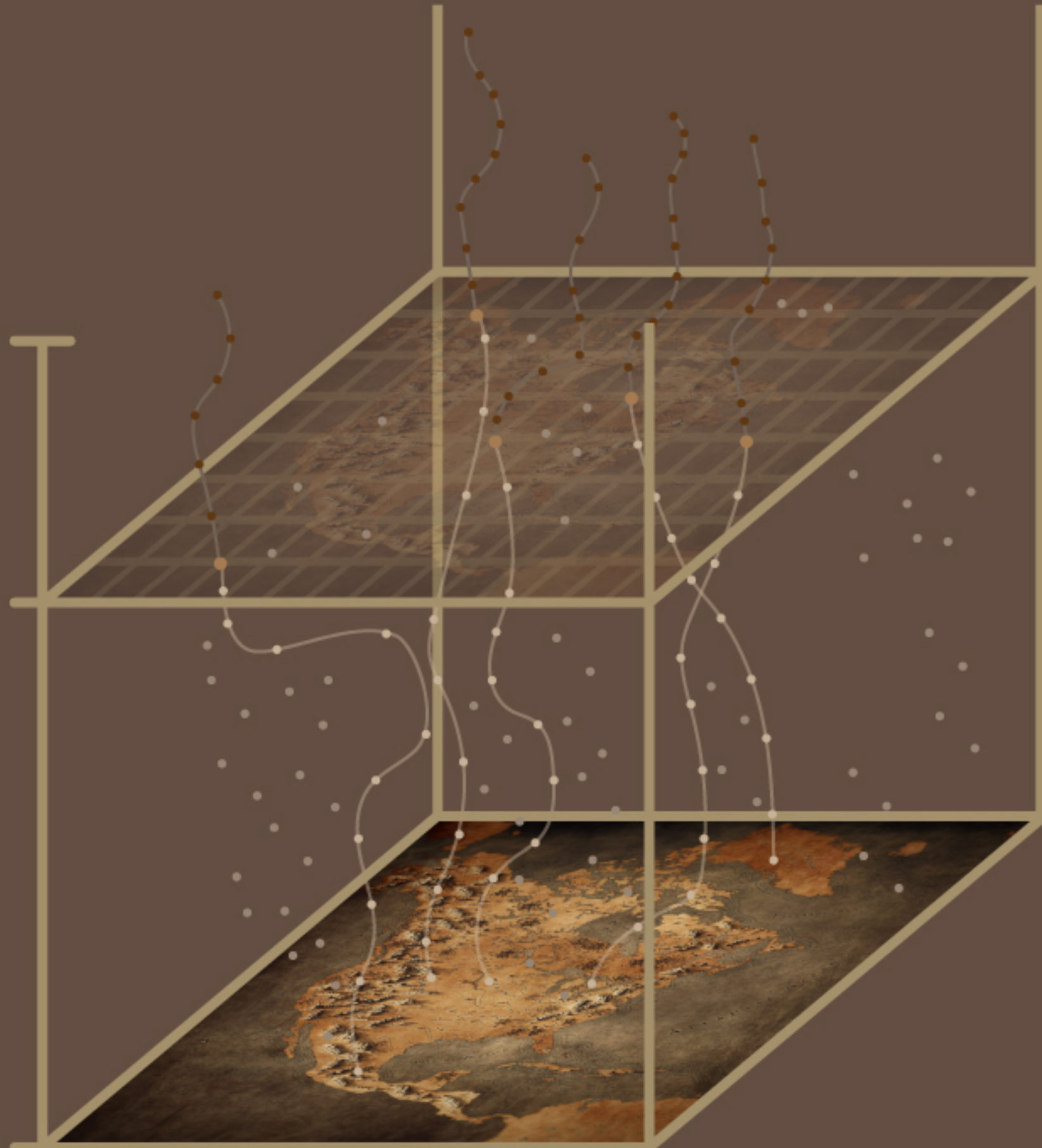
CELL TYPES

Though their content may vary widely even amongst those of the same category, Story Cells are classified into seven distinct Types by their main function, their purpose in the system and how they are tethered to the Reference Framework.

EVENT CELLS

The most common and broadest Type of Story Cell, Event Cells operate much like Plot Cells, but are not tethered to a particular Character. Instead, they are Tethered to specific circumstances and situations, often hovering around the W axis until consumed or reaching a Cell Death State. Though not necessary to their operation, Event Cells can be clustered, drawing multiple characters to a single spot, and are often Regurgitated in a modified state to build ongoing subplots in the Reference Frame. Event Cells are not larger environmental events that change the landscape of the game world, that is more in line with the function of Plot Cells, but they can still have a massive impact on the story overall. They can also Latch onto Character Cells if required. An example of this would be a Character driving around the streets at night, an Event Cell containing a hit and run subplot Latches onto them and draws someone nearby to cross the street without looking. When hit, the injured Character's Cell absorbs the Event, changes states, Regurgitates it in a modified state to be consumed by the driver's Character Cell and generates an entirely new Event Cell that latches onto the Character Cell of the victim, waiting for a passer-by. This moment was not planned but has a massive impact upon the flow of the overall game that continues to ripple out. Event Cells can also be timed by being Tethered to a specific timeframe that contains other events, a requirement that can be shifted forward or back in time depending upon whether the prerequisite moments are delayed or expedited.

INTERACTION CELLS

A Cluster of Story Cells that requires at least two Character Cells to activate, Interaction Cells draw Character Cell with matching Parameters together. This story can be as innocuous as a brief chat, or can result in conflict and even murder, though the interaction must be one of intent and not a random accident (see Event Cells & Chaos Cells). The individual Cells contained within a cluster can have the same Parameters – for example two people with common interests talking – or they can vary widely – one defining the perpetrator and the other the victim of a crime for instance. Though most often made up of only two cells, a Cluster can have any number of cells if required and does not even need a minimum beyond the first two to be triggered – say a timed explosion of anger from a gathering mob. Interactions can also be modified by other Story Cells once triggered, changing the direction of the initial encounter; this could be a friendly drunken conversation that turns into a brawl when one of the involved Character Cells is hit by an Inspiration or Chaos Cell. Interaction Cell Clusters are often held at the centre point of Influence on the XY coordinates between the closest Character Cells with matching Parameters, drawing them together until all vectors meet.

ENVIRONMENTAL CELLS

Tethered to either an object or a place, Environmental Cells do not move along the X and Y axis, but rather draw Character Cells to themselves along the W axis. These can be timed occurrences, say for instance a motel room phone starts ringing twenty minutes in. In other instances, the Cell can stay active on the W axis from the very beginning until either the game, the occurrence ends (Cell Death), or the Cell is Consumed, denoting places of interest on the game map.

INSPIRATION CELLS

The idea that comes to someone seemingly out of nowhere, Inspiration Cells are a type of Stem Cell that can cause a drastic change to a Character's narrative direction, a piece of their inner puzzle falling into place or a moment of unexpected decision. Where Mood Cells are drawn to people with matching Behaviour Parameters, Inspiration Cells can change a Character Cell's mood entirely, flipping their anger into understanding and vice versa. Character Cells can be written to have a piece or pieces of information missing that can only be filled once a type of Inspiration Cell is consumed. An example would be an Inspiration Cell that if consumed by a detective's Cell they realise something about a case they are working on and call their partner, but that same Inspiration Cell can trigger a man watching TV to remember the roast in the oven before he burns down his apartment. Being a Stem Cell means that Inspiration Cells float untethered and are drawn to nearby Character Cells, but do not draw Character Cells to themselves. These will die on the point of passing through the W axis if not consumed.

MOOD CELLS

Another Stem Cell, Mood Cells float through the Reference Frame untethered, pulled to the closest Character Cell with matching Behaviour Parameters. These are the moments when a person acts upon their feelings, when a person kisses their date, a man punches another man, a woman decides to leave, a security guard follows their suspicions. These Behaviours are set Parameters in the Character Cells, but they will not be acted out if a Mood Cell is missed and never consumed by them, the tipping point of feelings into actions never reached.

CHAOS CELLS

No matter how definable the trajectory of cause and effect may seem, there are somethings that are so out of nowhere that no one could predict what happened. People do strange things, objects break out of nowhere, freak events occur, and each time we are left to wonder how it all happened at the worst or best possible moment. The sole purpose of Chaos Cells is to generate emergent, unpredictable moments like this, with these kernels of modifiers floating through the Reference Framework untethered from everything and drawn to any Character Cell that happens to be nearest without Parameter checks, or even latching onto other Story Cells to change their outcome upon Absorption. This behaviour may mean strangeness can happen out of nowhere, but it also means that sometimes the impact it has is not great enough to have any real effect on the overall game. That is the nature of chaos, I guess.

PLOT CELLS

Where Chaos Cells are the randomness of existence, Plot Cells are the order. Tethered to specific points relative to one another, these Cells make up a Character Cell's Story Path and hold the strongest attraction to that Character. That does not mean that they are cemented into a Character's future though because a Plot Cell can be missed, which triggers the Cell Death of other Plot Cells that require it, or even be consumed by a different Character Cell entirely if their Parameters line-up. A man setting out to light a fire could be interrupted and run off before lighting the petrol, but an absentminded security guard throws their cigarette away, triggering the fire plot anyway. Even if the Character Cell is pushed off course by events, it will still be drawn to the remaining Plot Cells and can fall back onto the original Story Path. Where other Cell Types hold a specific range of content, Plot Cells can be anything, triggering a change of mood or intent, instigating an event or interaction, or even having a larger environmental effect, such as the fire example.