A Roadmap to Socially Engineering the World Computer

Table of Contents

1.0 A Plan for Building the World Computer

1.1 Realizing the Vision

A vision as ambitious as The World Computer Project will take an enormous coordinated effort by a great many people. The effort will be separated into two broad streams – *technical development* and *community building*. The *technical development* effort will encompass the design, writing, testing, and rollout of all software required to realize the vision for the World Computer Project and its underlying distributed UnoSys operating system as articulated in the accompany documents "**UnoSys – An Overview of the Operating System Design for the World Computer**" and "**A Vision for a New Dignified World Computer Economy**" as found on The World Computer Organization website (www.WorldComputer.org). The *community building* effort will encompass all other work necessary to bring the end *product*[1] to the world, including its ultimate form factor, funding plan, management structure, and user acquisition strategy.

The *technical development* and *community building* streams of effort will progress in parallel across a set of 3 broad phases of the project lifecycle:

1. Incubation
2. Growth
3. Maturation

The rest of this document takes a detailed look at the technical development and community building endeavors for the critical *Incubation* lifecycle phase, which defines a detailed roadmap for launching a decentralized planetary-computer for everyone. The document also briefly mentions work that will take place during the *Growth* and *Maturation* lifecycle phases. However, details of these phases remain outside the scope of this document.

1.2 Incubation

The *Incubation* phase encompasses an intense start-up period of software and community development required to produce a *minimum viable product* (MVP) representing a compelling planetary scale computer for everyone. During this phase the organizational structure and management processes required for the rest of the project lifecycle will also be framed. These structures and processes will be actuated in order to obtain the necessary funding required to sustain the project during this pre-revenue stage. The final deliverable of this phase will be the launch of a version 1.0 realization of an open, inclusive, world computer providing basic but useful services to an enthusiastic community of early innovators and early adopters with a vested interest in seeing the vision succeed.

---

[1] The use of the word *product* here is not intended to infer a for-profit artifact, but rather a named concept that end users can identify with. The *UnoSys* technology as presented thus far in the accompany documents represents a distributed operating system. The *product* however will be closer aligned to the resultant *World Computer* that the technology ultimately aims to enable. This product will require a name, a persona and form factor that resonates with end-users.

This section details how the UnoSys project will get off the ground. It covers what needs to be technically developed in order to meet the requirements of a minimal 1.0 version of the World Computer. It describes how the project will be organized and managed from a management perspective. It provides a glimpse into the vision for the form factor the ultimate World Computer *product* might take on. It discusses how the initial development effort could be funded. It demonstrates how early adoption of the platform will be driven. Finally, it outlines a detailed potential technology rollout plan for releasing the project to the world.

1.2.1 Technical Development Phase

The software requirement for the World Computer version 1.0 vision is considerable. It can broadly be broken down across 2 main categories:

- the operating system proper
- main end-user product

There is almost always a vast difference between a technology and the end-user *product* form factor it ultimately manifests as. The most successful products make things simple, even though they are implemented with sophisticated and complex technology. UnoSys as it has been described in the accompanying World Computer Project documents is a sophisticated and complex technology that has been carefully thought through. Equally important, however, is the plan for the simple compelling end-user experience that hides all of that sophistication and complexity, and allows the benefits of the innovative technology to come shining through for the masses.

The operating system proper is everything required to support application development. This includes core security features of the operating system as well as critical subsystems such as streaming file and database block I/O, built on top. However, an operating system is ultimately just an enabling technology. It is meaningless for a lot of end-users who think instead in terms of specific digital experiences that they can identify with. Typical consumers do not think in terms of engines, crankshafts and axels, but rather of a car. The former is the technology that makes the latter a compelling end-user experience. Likewise, a typical person has a unique combination of individual *app* preferences on their mobile phone, but it is the collective notion of a *smart phone* as the *product* that brings them all together as a common experience that we all understand and relate to. In this same way, it is important during the technical development phase of the project to clearly articulate the ultimate product that the underlying UnoSys technology will enable.

This section describes these two major software categories as they pertain to the first release of a planetary computer for everyone.

1.2.1.1 Core OS

The architecture of the UnoSys follows the classic operating system design of *protection rings*. Protection rings can be represented by a series of concentric circles forming a hierarchy from most privileged numbered zero at the center, to least privileged with the highest ring number on the outer edge. Therefore, in the diagram below software components that make up the operating system can be

thought of as residing in a particular ring, with the most trusted components living in Ring-0 Kernel, and the trust decreasing the further away from the center the component lives.
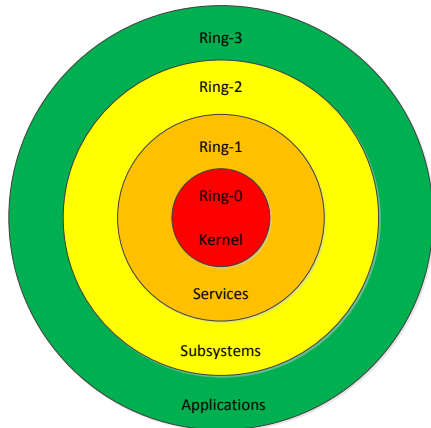
In traditional *physical* operating systems protection rings are generally hardware-enforced by some CPU architectures that provide different CPU modes at the hardware or microcode level, and Ring-0 is the level with the most privileges and interacts most directly with the physical hardware such as the CPU and memory. However, since UnoSys is ostensibly a *virtual* operating system in that it is represented as an *overlay* for a set of networked computers, its rings are implemented in software only.

Formal interfaces between rings are provided to allow an outer ring to access an inner ring's resources in a predefined manner, as opposed to allowing arbitrary usage. Correctly interfacing access between rings improves security by preventing software components residing in one ring or privilege level from misusing resources intended for software components in another. Specifically, a principal of the layered ring design is that the components residing in one ring can only access the components residing in the ring it directly contains (i.e.; in the next lowest ring), and only through formally defined interfaces. In UnoSys, this restricted interface access between adjacent rings is formally protected using the broader *Fortress* security architecture previously discussed in the [accompanying World Computer Project documents](#).

1.2.1.1.1   *Ring-0 Kernel*

Ring-0 Kernel capabilities represent the most fundamental inner workings of the operating system on which the rest of the system relies. By themselves, Ring-0 capabilities do not provide anything of interest to applications written for the operating system. In fact, applications residing in Ring-3 Application layer cannot directly access the capabilities of Ring-0 since the only consumers of Ring-0 capabilities in the layered *protection ring* architecture are the *Services* of Ring-1.

In UnoSys Ring-0 capabilities[2] include:

- Resolver – locates code for the operating to dynamically load
- Loader – loads code dynamically

---

[2] These capabilities have already been fully developed for UnoSys.

- Booter – determines the order in which code is dynamically loaded
- Listener – listens for communication from other nodes
- Security primitives

1.2.1.1.2   Ring-1 Services

Ring-1 of the operating system includes the basic *Services* that every major operating system must provide[3]:

- **Memory Manager** – manages all memory allocation requests and performs garbage collection
- **Clock Manager** – implements a monotonically increasing counter used to create the notion of time
- **Controller Manager** – responds to commands issued by the autonomous operating system
- **Consensus Manager** – provides a choice of both *strong eventual consistency* through *conflict-free replication data types* (CRDTs) or *strong consistency* using classical Paxos-based state machine replication, depending on data access use case, to provide overall system reliability in the presence of a number of faulty processes.
- **IO Manager** – manages all disk-based input and output (i/o) requests
- **Device Manager** – manages all local disk i/o.
- **Cache Manager** – implements a cache infrastructure to speed the access to frequently requested data
- **Processor Connection Manager** – manages all secure communications between peers
- Etc.,

The implementation of these *Service* components is restricted to using only software components residing in the Ring-0 Kernel layer, and/or other Service software components residing within Ring-1 itself. Furthermore, Ring-1 Service components can only be consumed by the software components that reside in the Ring-2 Subsystem layer immediately surrounding it.

1.2.1.1.3   Ring-2 Subsystems

Ring-2 of the operating system includes higher-level *Subsystem* software components that ultimately form the *application programming interface* (API) for the Ring-3 *Application* layer built on-top of it. The Subsystem software components residing at the Ring-2 level include[4]:

- **File Subsystem** – implements a modern, stream-based, block-oriented file system
- **Database Subsystem** – implements a stream-based, record-oriented NoSQL database system
- **Reputation Subsystem** – generates, submits, collects, analyzes, and aggregates the telemetry data that drives each peer, application and user reputation

---

[3] At the time of this writing the majority of these capabilities have already been developed for UnoSys.

[4] Of this list of software components, at the time of this writing only the *File Subsystem* has been completed. In addition, the *Database Subsystem, Self-Sovereign Identity Subsystem,* and the *Reputation Subsystem have been developed to* a proof-of-concept state.

- **Group Membership Subsystem** – implements the autonomous rules the UnoSys operating system uses to decide which peers are accepted for provider responsibilities and when to start using them (i.e.; manages the growth of the overall system)
- **Self-Sovereign Identity Subsystem** – provides entity registration, sign-on, authentication and authorization, claims, and profile capabilities for the entire operating system
- **Digital Rights Management Subsystem** – provides DRM policies and enforcement for how file, database, and application assets are accessed by users and applications of the operating system
- **Ledger Subsystem** – provides the integrated accounting system used by every peer, application and user to transact within the system, complete with the distributed ledger and cryptocurrency technology required to support it
- Etc.,

These higher-level Subsystem components are implemented exclusively using the Services residing in the immediately contained Ring-1 layer, and/or other Subsystem components within the same Ring-2 layer itself. Specifically, the File and Database Subsystems are critical in that most of the other Subsystems in Ring-2 themselves will be implemented with files and/or databases internal to the operating system.

1.2.1.2 Product Strategy

The average person does not care about and is therefore not interested in operating systems. Hence, while the UnoSys distributed operating system technology[5] is considerable, it is not in and off itself going to make people sit up and take notice. That is to say, the UnoSys operating system is not the *product* that that will take the world by storm.

Likewise, the envisioned *World Computer Project* is, itself, a very abstraction concept. Computers can be used for as many difference purposes as there are people using them. The vague concept of a planetary computer promoted to this point, has arguably served to provide an analogy for the scope and scale of the proposed vision, but has done little to create a concrete visualization of what the human interface to this computer would be like for the average end-user. Hence, neither an operating system, nor a world computer, can be the *product* that is the final outcome of this mission, since neither concept helps an average person understand a concrete benefit. Instead, what is required is a tangible product concept that any user at any age can easily understand and identify with, finds immediately useful, and is hopefully fun to use.

1.2.1.2.1   Decentralized Autonomous Governing

What does virtually every person in the world have in common besides being human? They are a citizen of a country. Even the poorest people in the most underdeveloped nations have a strong sense of patriotism. National pride is a powerful force. It binds people with a common birthplace, culture and history. Likewise one of the dreams motivating the creation of a planetary computer is to unite the people of the world digitally in an open, fair and dignifying way. Therefore, it seems fitting to use the universally familiar analogy of a *virtual nation* to connect everyone digitally across the global.

---

[5] See the World Computer Project accompanying documentation for more details

Hence the single World Computer *product* described herein could be presented to the world as *a* borderless digital civilization called **Peer Republic** (as an example), open to everyone and providing dignity and equal opportunity to all its citizens.

The Peer Republic virtual (rather than terrestrial) *borderless sovereign state* will exist only on the Internet, but will otherwise operate similar to a real country. The sovereign virtual nation of Peer Republic will welcome any man, women or child on the planet wishing to *immigrate* there. The ultimate goal of World Computer Project in general, and Peer Republic in particular, is to provide an innovative new digital commons governance model at Internet scale, designed to put people first by certifying *trust* as a social contract for all.

The concept of a virtual state provides a tangible opportunity to frame the official principles on which the nation is founded, and the rules by which its citizenry are expected to behave:

- the Peer Republic Declaration of Human Digital Rights
- the Peer Republic Constitution

Peer Republic will represent the first social experiment in self-governance on a global scale in human history. The virtual Peer Republic effectively represents a new model for governance reform – one that is defined by humans, but otherwise 100% executed by democratically-consented software agent. As such it can be described as a *decentralized autonomous government* (DAG).

By design, Peer Republic completely eliminates human beings from the *executive* branch of its government, instead strictly regulating their participation to matters of *legislature* and *jurisprudence* informed by the wisdom of the citizenry crowd. In such a model *politics* is provably impossible because there are no subjective, corruptible humans within the DAG's executive branch to be lobbied. Every aspect of the Peer Republic DAG operation is therefore secure, transparent, deterministically fair in accordance with the decrees of its constitution, and most importantly, devoid of any self-interest profit motive. Hence, it is literally incorruptible.

Under this governance model the fully distributed and decentralized autonomous software that implements all Peer Republic DAG services belongs entirely to the commons. Specifically, this software must simultaneously reside everywhere and nowhere in classic P2P tradition in order to ensure that no one member (or group of members) within the population, or foreign person, group, company or government outside of it, can ever shut down or otherwise take over control of Peer Republic, or prevent it from functioning correctly. To achieve this requires extensive and sophisticated distributed computing technology – precisely the role UnoSys is designed to fulfill.

The government of Peer Republic exists only to provide essential digital infrastructure, services, and protections for its citizenry. Rather than the roads & bridges infrastructure that a terrestrial government supplies, the DAG of Peer Republic will provide critical compute, bandwidth and storage infrastructure necessary to operate the republic, in the form of a planetary-scale P2P computer available for all to use. And rather than the physical military security needed to protect a real country from

foreign invasion, Peer Republic will ensure end-to-end digital security and privacy for citizens' identity, property and livelihood.

Peer Republic will be defined by a fundamental set of principles framed by a declaration of inalienable human digital rights, and set down in a codified constitution. Furthermore, every Peer Republic citizen is granted the absolute right of self-sovereign identity, allowing them to impose exclusive personal control over their individual privacy, including the right to consent and the right to be forgotten.

Moreover, every inhabitant of Peer Republic is afforded the personal freedom, as a civil liberty, to start an online enterprise for fun or profit. In the furtherance of this basic right to digital dignity through prosperity, the Peer Republic government provides the entire infrastructure required to foster a thriving real-world economy. This support includes, the software to self-publish/deliver/promote the original content of its citizens (think eBooks, music, movies/video, broadcasts, 3D printer files, databases, blogs & other curated content, etc.,), a complete ecommerce platform, and an extensive financial infrastructure including accounting systems based on distributed ledger technology and a stable cryptocurrency as a medium of exchanged backed by a real store of value. Finally, when necessary, a system of jurisprudence using a jury of citizen peers, formally separate from the Peer Republic state, will ensure disputes of all kinds are swiftly and impartially settled.

A virtual nation metaphor also allows the vision of a world computer to be introduced in more visceral ways, through the use of [gamification](#) techniques. For example, the sense of belonging to a common group is heightened with such visual and auditory elements as:

- the Peer Republic National Flag
- the Peer Republic National Seal
- the Peer Republic National Anthem
- the Peer Republic National Newspaper
- the images on the Peer Republic National Currency Notes
- etc.,

Furthermore, the country can be given a simulated topography, such as mountains, beaches and forests that people can virtually explore, adding considerably to an immersive personal experience.

These gamification techniques combined with state-of-the-art distributed systems software, will provide an immersive online experience specifically designed to inspire people, (particularly the *unbanked* poor and children) to participate and flourish in a new, provably incorruptible global marketplace that ensures success through efficiency and fairness. In Peer Republic, self-esteem through economic empowerment is within the reach of every citizen by claiming their irrefutable right to profit from the advances of technology on an equal playing field. Peer Republic will represent the "new virtual world" that people, fed up with systemic government failure, will be drawn to in search of a hand-up, not a hand-out, to life-changing prosperity for themselves.

Through the simple but transformative idea of establishing an open and fair virtual decentralized autonomous government (DAG), the Peer Republic will set in motion a social revolution destined to

realign and rebalance the vastly lopsided digital economy we have today. This utopian DAG has been methodically designed to intercept the grossly disproportionate wealth the elite middleman oligarch extracts from the current digital economy, and redistribute it back to the very people whose online activity generates that wealth in the first place. The result will be a new, open access, and fair economy that will bring dignity through prosperity to everyone, as a fundamental civil liberty.

However, at the core of this gamification are the recognizable concepts of *citizen, business* and *government*, which have utilitarian real-world purposes within the Peer Republic experience, beyond that of mere aesthetics.

Citizens

In Peer Republic, the users are the *citizens*. Citizenship is free of monetary cost. Anyone can immigrate to Peer Republic and become a citizen by merely registering as a user without having to pay a real-world fee. Each citizen is provided government issued identification that uniquely confirms their citizenship and identifies them with implicit self-sovereign rights.

However, becoming a citizen has certain duties associated with it. For example, any citizen[6] may be called upon to participate in the equivalent of real-world jury duty, to help determine through majority digital vote by a jury of peers whether or not another citizen or business has acted inappropriately.

Each citizen of Peer Republic is also issued a bank account along with a full set of supporting accounting ledgers that the underlying UnoSys operating system will use to post verifiable transactions to using GAAP standards. In this way Peer Republic fulfills one of its major goals of ensuring that every citizen is *banked.* While the initial balance of this account is zero, each Peer Republic citizen will have several ways to earn real currency and to conduct digital transactions with it within the Peer Republic economy.

Each citizen could also be issued an equitable lot of virtual land within a simulated visual Peer Republic topology with a unique *address*. Citizens can choose the type of location they are interested in (i.e., on the beach, in the mountains, an urban settings, etc.,), and will then be provided an official deed to a standard parcel of virtual land. Furthermore, they are free to *develop* this land as they see fit (or not) to suit their aesthetic purposes. For example, they might upload a picture of a coconut tree to add to their beach front property. Alternatively, such a picture will likely be available for purchase digitally from established Peer Republic businesses for a few tokens.

Importantly, while citizen property is owned by the citizen, it is not private. Any citizen can visit the property of any other citizen. Addresses are the means by which a specific property can be located. Friends can invite other friends to visit by providing their address. Significantly, for privacy reasons, there is no *citizen directory* listing every citizen. Likewise, the identity of a citizen is never revealed when visiting a property. However, every property is publically accessible, and any citizen is free to wander the virtual Peer Republic topography of their neighborhood (or anywhere else in Peer Republic) and visit anyone else's property at random. Moreover, a citizen may choose to build a virtual home on

---

[6] This will only be asked of citizens that are of the legal adult age as defined by the Peer Republic constitution.

their property. However, this home is also open to the public at all times. Any other citizen is free to wander inside to see how it has been decorated.

As citizens explore Peer Republic in this way, they can bring formal charges against another citizen, in a 100% anonymous manner, if they believe a civic law is being broken. For example, a citizen might bring a charge that a virtual painting on a virtual wall in a virtual home on another citizen's virtual property is pornographic, which is strictly prohibited by the Peer Republic constitution.   Such charges are assessed by a random, impartial, jury of peers and a verdict ultimately rendered. If the offending citizen is found guilty he is disciplined with a fine, as set by the jury, and the accusing citizen is rewarded with a portion of that fine.   However, if the accused is not found guilty then the accusing citizen is disciplined including possibly being fined, with a portion going to the accused.

Public accountability with full transparency is a fundamental design principal within Peer Republic. It provides effective self-policing by the citizenry that delivers a powerful incentive for *all* to use the resources of Peer Republic commons as intended, and be at all times accountable to the rules set out in its constitution. Both accuser and accused need to fully understand the laws of the land, and the implications for *both* breaking them, and for bringing false accusations.

Furthermore, conflicts that inevitably arise between citizens are automatically mediated, and restitution is assessed, collected and paid in a fair and timely manner, using the autonomous and verifiable voting subsystem built into the underlying UnoSys operating system underpinning Peer Republic. Such assurances that the laws of the land are fairly and swiftly enforced by a jury of impartial peers, is a cornerstone of any successful society. But in the context of Peer Republic it provides an especially important mechanism for autonomous control over inappropriate human behavior within the reputation-based framework of a shared world computer vision.

The citizens of Peer Republic are free to participate in the economy created within the ecosystem – paying for services and/or earning income as they do so.   For example, a citizen might pay to watch a premium content movie.   They may then earn revenue for referring it to a friend who also watches it, if the movie had a digital rights management (DRM) policy that profit shares with people who promote it. This income represents real monetary value to the citizen and is automatically accounted for by built-in Peer Republic accounting software on behalf of all stakeholders in the exchange of value.

However, certain forms of income are not available to mere citizens. For example, if a user wants to herself create and profit from premium content, or earn revenue by renting unused storage on her computer with the overall community, she must officially register that intent with Peer Republic to acquire a business license.

Businesses

Each citizen has the inalienable right to register one or more businesses with Peer Republic from which to generate revenue, if he so choose. Business registration is not free. A fixed fee must be paid to acquire each business license, and the fee must be renewed on each annual anniversary of the original

date of issuance of the license, if the business is to continue to be recognized by Peer Republic and remain operational.

A Peer Republic business is similar to a citizen except that it represents a business entity not a person. Businesses are owned by (i.e., associated with) citizens. Each business requires its own registered business license with accompanying fee. Like a citizen, each business is allocated its own separate bank account, full set of GAAP accounting ledgers, and virtual property to be used as an optional store front for the business. Furthermore, access to other important software useful in operating an online business is automatically provided by Peer Republic, such as a virtual showroom display, and ecommerce shopping cart.

Significantly, registering a business gives citizens the right to self-publish premium digital content for potential sale in their store fronts. Only citizens with a valid business license are provided access to the previously described DRM features that play such an important role in self-publishing, self-distributing and self-promoting original content for profit. Together, this set of features provides a business owning citizen everything they need to quickly set up shop with a unique, personalized, online destination where any manner of digital and/or offline goods can be sold. A citizen also requires a business license if she wishes to become a storage provider in Peer Republic by renting spare storage space on her computer to the community for profit.

The transparency and accountability rules for businesses are similar to that of citizens.   Any citizen can visit any business store front and file anonymous charges against the business owner if they believe Peer Republic laws are being broken.   As before, such charges are swiftly adjudicated with a randomly selected jury of peers, to arrive at a timely outcome and the enforcement of disciplinary action.

Citizens can, and frequently will, own more than one business. For example, in the case of storage providers, citizens wanting to sell their spare storage space on *multiple* computers will require a separate business license for *each* computer. Peer Republic views each computer (or peer) as being its own revenue generating enterprise, requiring its own general ledger, digital wallet, etc., in order to be properly accounted for within the Peer Republic financial system[7].

Business Partnerships

Finally, just as in the real world, Peer Republic permits a business to be associated with more than one citizen. This allows two or more citizens to partner in a business, sharing income and expenses. The percentage of ownership for each citizen in the business must be declared at the time the business is registered. This percentage of ownership remains fixed thereafter for the next year, but can be re-declared at every annual business licensing renewal with consent from all partners.

---

[7] From a security mitigation perspective against Sybil attacks, it is important to require users to pay to participate in the underlying P2P UnoSys operating system as a storage provider since it prevents hackers from spinning up a large number of peers in an attempt to control the system – something that would be much easier to do if it were free to do so.

There is no additional fee to create a business partnership. As with single owner businesses (i.e., sole proprietorships), partnership business are fully supported by Peer Republic's built-in accounting system. All financial transactions involving partnership businesses will be automatically and atomically split across all partners according to the declared ownership percentages, with complete fidelity, and, as always, with no transaction fees.

In the real-world partnership agreements can be very complex.   Peer Republic avoids all complexity by offering an easy to understand agreement that every partnership uses. The most difficult thing the partners have to do is agree on their respective ownership percentages going into the partnership. The default for the agreement is an equitable ownership based on an even split of profits (and debts) among all partners. The other aspect of the agreement that warrants attention is the exit clause.

Wherever there is potential for a partnership, there is a potential for a dispute. Peer Republic deals with disputes in a simple and fair manner. It takes the position that no citizen should ever feel stuck in an unwanted partnership. Therefore, each partnership stipulates a *shotgun exit clause* which affords any partner the opportunity to amicably end their partnership by offering to buy out her partners at a declared price. The remaining partners have two choices:

1. accept the offer
2. buy the original partner out for the same price

The elegance of the shotgun structure is in the way it ensures a fair valuation for the business.   A discontented partner sets a "fair" price that she is willing to accept to break her business relationship with the existing partners. However, in any partnership "fair" is an emotionally overloaded word, and what she might think is fair the other partners might not find equitable. The shotgun structure removes much of the emotion from the exercise of disbanding a partnership as it forces the discontented partner to arrive at an evaluation for the business that she would be willing to accept if one of the other partners were discontented.

Under the structure of the agreement if her evaluation is too low, the remaining partners will buy her out for the amount proposed. And if her evaluation is two high, the remaining partners will accept the offer and she will have to pay them. With either outcome, the discontented partner has her wish and will no longer be in a business partnership with the others. The only unknown is whether she will pay the amount she proposed for proportionally more control over the business, or will receive it herself in return for exiting it. Before triggering a shotgun exit clause, then, a partner must be prepared for either outcome.

Peer Republic will autonomously and impartially preside over all shotgun induced buyout proceedings. It is able to administer the entire shotgun buyout process in an autonomous manner, replacing the need for 3rd party lawyers, etc., that are required in the real-world. As a result partner disputes are easily handled with clear rules and timelines that all parties understand and follow.

Government

Similar to any real-world country, the virtual nation of Peer Republic has a formal government. The role of the Peer Republic government, as with any government, is to provide essential services to its citizens. In this familiar metaphor, Peer Republic provides an impressive set of basic digital services that any member of the population can use as a basic civil liberty within Peer Republic. (For more information about specific services see the proposed **Peer Republic Services** section below.) These services are designed to provide every citizen an equal opportunity to participate, share in, and prosper from the real-world digital economy that Peer Republic will give rise to.

One important aspect of any government is the responsible issuance of an official currency token used to hold a store of value enabling commerce transactions, and Peer Republic is no different here. The price of the Peer Republic token will be pegged to the cost of a gigabyte of standard storage per month on the external cloud storage provider market. This "spot" price will be ascertained several times a day, but it is expected to remain very stable over time, making it an excellent basis on which to establish a store of value. The Peer Republic government will be responsible for the management of all currency supply in circulation as well as for providing an official means by which to *cash in* real-world currencies into Peer Republic tokens, and *cash out* Peer Republic tokens into real-world currencies. The former provides a means for users to fund consumption in the Peer Republic economy, and the latter provides a means to monetize profits made in the Peer Republic economy, in the real-world.

Peer Republic will support its national currency with a complete and autonomously run financial system that allows citizens and/or businesses to transact without extracting any transaction fees whatsoever. Any two citizens or businesses can exchange digital goods and services for currency tokens without an intermediary extracting a transaction fee. Alternatively, one citizen or business can transfer currency tokens to another accepting citizen or business without incurring an additional transaction fee. This guarantee of *friction-free monetary policy* will be a key contributor to one of the most important aspects of any healthy economy – the velocity of currency (i.e.; the speed with which the currency changes hands) – since it directly correlates to the number of transactions, and therefore the amount of commerce, taking place.

Perhaps the most significant difference between real-world countries and Peer Republic, however, is that Peer Republic has no heads of state. There is no president, prime minister, congress, senate, or any other political representative of any kind – real or virtual. Instead all governmental services are provided by autonomous software that is always verifiably accountable, provably incorruptible, and guaranteed fair. The software at all times executes according to a formal definition of its behavior as provided by the publically declared Peer Republic constitution.

From time-to-time it may be necessary to amend the Peer Republic constitution to effectively change the capabilities and behaviors regarding how the government functions. Any such changes require human oversight and will be conducted by population wide referendums where every interested citizen may have a say in what those changes should be, and the decision as to whether or not to accept proposed amendments to the constitution. The built-in secure Peer Republic voting system will collect

citizen ballots for any given referendum and will autonomously enforce any resultant change process transparently. With this approach, the very algorithms and code comprising the autonomous software behavior that represents the metaphor of the Peer Republic government, is in a very real sense defined by the constitution which is controlled by the citizen collective.

Importantly, the Peer Republic government has no formal political ideology. Rather its intent is to be at all times inclusive, transparent, accountable, and fair, both with respect to its constitutional framing and with respect to the influence it exerts on the ecosystem and economy it gives rise to. Out of those foundational design principals it aspires to create a healthy, digital ecosystem and economy that affords any and every self-sovereign individual the ability to earn not only an income but a profit for themselves if they so choose. To that extent, classic political labels such as liberalism, capitalism, communism, socialism, etc., can and will be applied to various aspects of Peer Republic depending on the biases of the observer. Indeed, Peer Republic is by design a blend of elements from all of these political philosophies, and others.

The utopian design principals for a perfect digital society will be methodically transcribed into laws by real people crafting the archetype Peer Republic constitution. However, what will make the Peer Republic experiment unique is its attempt to create a utopian democratic world where everyone's inalienable right to participate in fair and open markets is protected at all times by an incorruptible system of *autonomous* governance, that has no self-interested profit motive. Every aspect of this digital government's behavior will run precisely (i.e., deterministically) in accordance with the rules (i.e., codified algorithms) defined by the formal Peer Republic constitution written and maintained by the citizenry itself. Checks and balances are provided by an independent (i.e.; outside of the system), democratic judicial system based on the human oversight of the *entire* Peer Republic population, yet administered swiftly and fairly by the autonomous government as a whole.

However, where Peer Republic expects to succeed where most real-world countries fail is with the removal of fallible humans from the matter of running the government. By using autonomous open review software, vetted and maintained by the citizens as a whole to execute the business of the government, corruption of any kind becomes virtually impossible. The Peer Republic government offers every citizen services that guarantee a level economic play-field, and protect inalienable rights with swift and impartial judicial enforcement. Refreshingly, this will create a *trust* social contract leading to systemic confidence in its governance model based on a foundation of irreproachable accountability, that only deterministic, correct and infallible software running in a provably tamperproof environment can provide. The intent is that Peer Republic will be unique among places in this world where one can belong (i.e., be a citizen), and be free to prosper in a thriving digital economy, self-assured in the knowledge their civil liberties will always remain protected at all times.

There will be much more to say about citizens, businesses and the Peer Republic government in the pages that follow. For now, the main take way is the consideration that the World Computer Project vision describe hereto in this paper might be introduced to the world as *decentralized autonomous government* (DAG), representing an inclusive, virtual world where anyone and everyone is welcome to freely become a citizen with self-sovereign identity, and be empowered to take part in the ecosystem

and economy, as much or as little as they wish, as long as they abide by clear and reasonable rules laid out in the constitution and enforced by an autonomous government via a jury of human peers.

1.2.1.3 Peer Republic Services

The overarching purpose of the DAG is to provide users (citizens) access to useful software they can use to participate in its ecosystem and economy.   Together, these seamlessly integrated services provide a holistic online experience for the user within the virtual world. The following list of applications will be government-provided services as part of World Computer version 1.0[8] [9]:

- **uAtHome**– provides the default start point for users for their personal oriented interactions within Peer Republic
- **uAtWork** – provides the default start point for users for their business-oriented interactions within Peer Republic – only available to registered businesses
- **uRemember** – provides a place for users to store all manner of personal digital content such as music, video, books, photos, documents, etc., and allows them to be easily found and retrieved. Also includes a calendar and scheduling capability.
- **uAssociate** – allows users with common interests to organize themselves into arbitrary *associations* and hold meetings.
- **uConfidential** – allows users to maintain all aspects of their personal and confidential self-sovereign identity and profile, including which associations they belong to
- **uConnect** – allows users to communicate with each other both synchronously and asynchronously using the familiar modalities of voice, video, instant messaging and email, including the innovative *attention worth* concept[10].
- **uPublish** – allows users to self-publish, self-distribute and self-promote the content they create to other users, with full control over their DRM policies – only available to registered businesses
- **uPlay** – allows users to consume personal, public domain, or premium purchased media content such as games, books, video, music, podcasts, broadcasts, etc.,
- **uOutReach** – allows for the creation and management of messaging campaigns with assigned *attention value* that Peer Republic will administer with full confidentially and consent of the target end-users
- **uCurator** – allows for the creation of insightful reports drawn from linked disparate data sets owned and/or controlled by other users and/or businesses
- **uBank** – allows users access and management over their digital Peer Republic tokens – including the ability to *cash in* (exchange) real-world currencies for tokens, *cash out* (exchange) tokens for real-world currencies, or send tokens to other users within Peer Republic

---

[8] The prefixing 'u' for each service acts a short form representing 'you', meant to instill the notion that every citizen is in fact in control of their own destiny within Peer Republic. As well, the 'u' accredits the fact that the service is made possible by the underlying distributed UnoSys operation system.

[9] Not all services are freely available to every citizen. Specifically, certain services, such as uAtWork, uPublish and uLend, are only available to citizens who have acquired a for-fee Peer Republic business license

[10] See the World Computer Project accompanying documentation for more details

- **uAccount** – allows users access and management over all detailed transactions that affect their digital wallet balances
- **uBroadcast** – allows users to publish live voice and/or video streams to an audience of unlimited size directly from their computers, by simply turning on their microphone and/or webcam
- **uLend** – allows users to make short term, interest bearing loans of their accrued Peer Republic tokens to other users – only available to registered businesses
- **uSearch** – allows users to quickly find content they are looking for across all Peer Republic citizens and businesses, subject to the content's individually determined consent and privacy policies
- **uVote** – a general purpose survey creation and voting application that can be used to measure citizenry sentiment on a particular subject, provide suggestions and feedback, register formal complaints about end-user content/behavior, or conduct official government referendums on constitutional amendment proposals.
- **uSponsor** – allows users to create new Peer Republic instances that will automatically designate them as sponsors for other new users (see the **Sponsorship** section later in this paper for more detailed information)
- **uCharter** – allows users read-only access to the complete source code of Peer Republic (including the underlying UnoSys operating system and the above listed service applications)
- Other – (e.g., Calculator, Weather, Clock, Alarm, Games, etc.,)

While this list might appear ambitious for a version 1.0 release of the project, it is worth reminding the reader that developing a service (i.e., application) for Peer Republic (i.e.; the UnoSys operating system) is much easier then developing the equivalent application for the web, because there is no *network* (i.e., client/server programming paradigm) to complicate the endeavor. Using powerful UnoSys Subsystem APIs from the UnoSys SDK (see the **SDK** section later in this document), many of the above applications can be developed in just a few hundred lines of code using the easy to reason about single-computer programming model that makes UnoSys so unique. This initial set of services that ship with Peer Republic version 1.0, complete with source code, will therefore act as inspiring examples for what can easily be achieved with the distributed yet unified single computer abstraction that UnoSys makes possible.

1.2.2 Community Development Phase

Any non-trivial software project requires a well thought through, viable plan for how it will be realized. The majority of open source projects are abandoned long before they are completed because the well intentioned developer leads miscalculate the amount of effort required for the project, the amount of time they could devote to the project, or both.   And since effort is largely measured in time, determining an accurate timeframe in which the development can be completed is critical to the success of any software project.

The previous section outlined in broad terms the scope for the first release of the World Computer Project (version 1.0) software (i.e., UnoSys + Peer Republic), and will provide critical input to developing a formal project Gantt chart and therefore development timeline for the effort, and by extension a

relatively accurate estimate of overall development cost. Moreover, beyond a software engineering project plan, a clear and viable strategy for user-acquisition must also be articulated. A field-of-dreams mantra of "build it and they will come" will not be enough to convince potential investors of the project's viability. Only with both an engineering and user-acquisition blueprint clearly provided, can the subject of funding be approached.

This section outlines the corporate structure that will be setup to manage the World Computer Project, the details of how an initial population for Peer Republic will be bootstrapped, and the project funding strategy that will be pursued.

1.2.2.1 Corporate Organization

A Canadian Federal NFP (not-for-profit) business named **The World Computer Organization** (www.WorldComputer.org) has been established to manage the affairs of the World Computer Project during its entire lifecycle. For tax purposes an NFP[11] organization is defined as a club, society, or association that is operated solely for one or more of the following purposes:

- social welfare
- civic improvement
- pleasure or recreation
- any other purpose except profit

In general terms, **social welfare** means that which provides assistance for disadvantaged groups or for the common good and general welfare of the people of the community. **Civic improvement** includes the enhancement in value or quality of community or civic life. An example would be an association that works for the advancement of a community by encouraging the establishment of new industries, parks, museums, etc. Under the categories of social welfare and civic improvement, care must be taken to ensure that the purposes of the association are not those of a charity. **Pleasure or recreation** means that which provides a state of gratification or a means of refreshment or diversion. Examples include social clubs, golf clubs, curling clubs, badminton clubs and so on that are organized and operated to provide recreational facilities for the enjoyment of members and their families. The phrase **any other purpose except profit** is interpreted as a catch-all for other associations that are organized and operated for other than commercial or financial reasons[12]. The World Computer Organization is clearly considered an NFP under this interpretation.

While NFP organizations are generally required to file annual tax returns, they are typically exempt from provincial and federal income tax as long as they operate in accordance with one of the above mentioned primary purposes. To maintain this tax exempt status, no part of the income of an NFP organization can be payable to or available for the personal benefit of any proprietor, member, or

---

[11] It is possible for an NFP organization to also be a *charity*, but it has been deemed unnecessary for the World Computer Organization at this time

[12] As Interpreted by the Canadian Revenue Agency (https://www.canada.ca/en/revenue-agency/services/forms-publications/publications/it496r/archived-non-profit-organizations.html)

shareholder. This, however, does not preclude reasonable salaries and other expenses being paid to employees of the NFP during the course of carrying out those intended non-profit purposes.

The World Computer Organization expects to operate as an otherwise regular software development business. Its role will be critical in the *Incubation* phase of the project as it will be solely responsible for delivering version 1.0 of the envisioned world computer directed by a clearly defined project plan, socially engineered by a large contributing community with a vested interested in the project's success. Thereafter, however, the organization's role will be reduced to delivering software updates and enhancements that have been majority approved by the community, as well as other important administrative tasks such as managing the exchange of real-world currencies into/out of tokens, and investigating community complaints.

The World Computer Organization will create a relatively small number of shares (e.g.; 500-1000) and issue them only as commemorative tokens of appreciation to key individuals who play pivotal roles in helping to realize the Peer Republic vision. These shares will have no intrinsic value because, by definition, the organization will be designed to operate at all times at a breakeven level. Any income generated exceeding that which is needed to maintain the World Computer Organization will be redirected to charitable organizations as proposed by the board of directors and ultimately voted on by the community as a whole.

Finally, the executive officers and board of directors of the World Computer Organization will be carefully chosen to lead the company toward achieving its egalitarian mission. As a condition of accepting the role they will agree to full transparency to the community regarding their remuneration packages. Further, all financial transactions involving the World Computer Organization will be transparently reported at each fiscal year end, for community review.   As the steward for the World Computer Project, the World Computer Organization, will, at all times, serve the wishes of the community, transparently and in keeping with a corporate non-profit mission statement.

1.2.2.2 Attracting Provocative Attention

The key to raising awareness for the World Computer Project lies in attracting early innovators and adopters – those technology enthusiast and visionaries with whom the dream of an inclusive, ubiquitous, and secure planetary computer will resonate with most. Fortunately, thanks to the enthusiasm that Blockchain[13] has engendered over the last decade, a large and vibrant community has emerged supporting a broader curiosity for distributed ledger technology (DLT), spanning real-world technologists, entrepreneurs, investors, enterprises, government agencies, and consumers alike. Much of this community maintains a general sense and belief that distributed technology has the potential to disrupt many existing business models and completely transform our lives (technically and otherwise).

Yet, that grand promise – like those similarly being made about Artificial General Intelligence (AGI), the Internet of Things (IoT), and Automation – has gone, to date, unrealized by any objective metric. However, even if the technology is not yet mainstream (and in some cases nowhere close), at least the *enthusiasm* is. It is a powerful force with an inertia all of its own. It first attracts attention, which leads

---

[13] And its first and best known application of the technology - Bitcoin

to maturation in taxonomy and education around the subject matter. It then attracts the financial investment required for the very research and development that will make progress toward it becoming real. Enthusiasm can therefore become its own, powerful, self-fulfilling prophecy, helping to create the very outcomes it evangelizes.   The communities that materialize around these promising technologies *want to believe* in a new and better world. Peer Republic – itself a promise of digital economic transformation and disruption – will thus tap into this preexisting desire for change.

Addressing Credibility

From the onset, given its sheer size and scope, the World Computer Project will need to address credibility concerns related to its viability, if it is to be taken seriously. It is therefore vital that an articulate and in depth blueprint be provided that demonstrates a thorough understanding of the significant challenges to be faced, along with a viable plan to solving them. However, documents alone will not be enough to create genuine interest and attention on its own.

Technology whitepapers and roadmaps are little more than fantasy until working software can be demonstrated to support their claims. The original Bitcoin white paper was successful as a catalyst for the modern day Blockchain movement, impart, because it was published along with a software code base that demonstrated its underlying claims. In a similar fashion, The World Computer Project must be introduced to the world with working software. A minimal software version for the project must be freely available for download that can be used by the curious to better understand how it works and what its eventual promise can be. The early availability of a comprehensive, thoughtful blueprint *and* an installable, working (if only minimally) proof-of-concept software will be critical to capturing the attention and imagination of an early following and starting a groundswell of support around the project vision.

People *want* to believe that building human colonies on Mars is possible in the near future. Likewise, people will want to believe that a new secure planetary-scale computer with a novel, fair, digital economy that levels the playing field for all, can be built, and just as importantly, made approachable by and useful for everyday people using the familiar metaphor of a virtual nation. Presenting a credible plan for an audacious idea will be a successful strategy for attracting attention from the world's most influential media outlets that look to cover such bold initiatives.   Key to attracting early media attention to the World Computer project is laying out a viable blueprint for its construction, along with providing an actual version of the continuously self-updating software that anyone can download and that shows steady progress toward the full vision, from the very start. With this strategy the world *will* not only sit up and take notice of World Computer Project, but become personally vested in its vision and progress. This is the recipe the World Computer Organization will follow to create an early, loyal, passionate, and influential fan base.

1.2.2.3 *Driving Exponential User Growth*
Attention – if you are lucky enough to draw it – is fleeting, as any Internet start-up who has had a journalist call them to conduct an interview, will attest.   News, by definition, is about novelty. So unless you are doing a lot of new and exciting things *continuously*, sustaining positive media attention is hard.

No doubt, the best way to remain interesting to the media is to be able to show the hockey stick graph demonstrating exponential user-participation growth up and to the right. Yet, the two are mutually exclusive. All the media attention in the world does not help ensure new users will sign up.

In the final analysis, to achieve exponential growth a product requires *both* an extremely compelling value proposition *and* network effect characteristics such that the more new users sign up and use the product, the better the *entire* product becomes for everyone – i.e., it provides measurably more utility to *all* users. However, as many a tech start-up company knows well, such products are rare – unicorn rare.

Any software project targeting a consumer audience has to eventually address the question of where users will come from. This question becomes especially important when contemplating a two-sided market platform that attempts to connect producers with consumers. The question is analogous to the age old chicken-or-egg problem. Which comes first – the producers or the consumers? The difficulty lies in defining a user-acquisition growth strategy that explains how you will attract producers before there are enough consumers or how you will attract consumers before there are enough producers.

The Peer Republic project faces the same basic issue. Fundamentally, within Peer Republic *citizens* represent consumers and *businesses* represent producers. The citizen consumers create free user accounts within the platform and can use the public domain services and content available to them without cost. However, they must pay to consume *premium* content provided by businesses.

Businesses are producers because they are owned by citizens that are intentional about generating revenue within the Peer Republic economy by selling some digital good or service including the spare storage space on their computers. To do this they must pay a real-world yearly subscription fee in the form of a Peer Republic business license. This license entitles them to exclusive access to powerful real-world income generating services that Peer Republic provides such as the self-publishing, self-distributing and self-promoting capabilities enabled by its seamlessly integrated digital rights management DRM capabilities.

The challenge is that few people will expend the energy required to create and maintain a thriving digital business in Peer Republic if there isn't a large enough citizen population to patron it. Correspondingly, citizens will quickly grow bored of Peer Republic if there isn't a constant new source of interesting and novel business generated content and services to consume.

The following section discusses in detail the strategy Peer Republic will use to address this challenge in order to foster exponential membership growth.

1.2.2.3.1 Sponsorship

In the case of Peer Republic, citizens (consumers) are a necessary condition to being a business owner (producer), so the question of which comes first, consumers or producers, is technically a moot one – i.e., consumers (citizens) literally come first. Therefore a novel strategy is required to encourage aggressive citizen immigration to Peer Republic. To achieve this Peer Republic will use a process of formal *sponsorship*.

By now the reader is becoming inherently aware of the core ideology upon which the vision for a World Computer that is human first rests – *equality*. Not only are all citizens and businesses equal within the context of the constitution, but everyone is guaranteed an equal opportunity to prosper in the Peer Republic economy by starting with the same set of base government services designed for that very purpose. From paying citizens for their attention, to ensuring storage providers receive an equitably share in premium content creators' profit, to rewarding people for their recommendations[14] – every aspect of the rules of engagement within Peer Republic is designed to ensure that all participants of the chain-of-value exchange are compensated proportionally for the value they contribute.

Consider the last great web service you discovered on the internet. How many people did you recommend it to? Were you ever compensated for your referral? Chances are, no. Online companies like Facebook, Google, Uber, Spotify, Netflix, etc., as well as offline companies such as Verizon, Walmart, Ford, Apple, etc., all benefit immensely every time one of their customers recommends their products or services to another person. These recommendations have significant tangible value for these corporations (i.e., reduced customer acquisition costs, leading to increased customer lifetime value – CLTV). However, being growth-driven, the companies and their investors reap all the benefits of that incremental value. This isn't equitable because the customers that originally recommended the products, and who were the catalyst for creating that value in the first place, do not share in any of it.

Peer Republic, in keeping with its core tenant of sharing generated value proportionally among those responsible for it, is socially engineered to be different – to be human first. In fact the system provides not one, but two ways existing citizens can benefit substantially monetarily by encouraging their family, friends, and acquaintance to immigrate to Peer Republic.

Sponsor Affiliate Revenue

Peer Republic will require every citizen that joins the virtual nation to declare a *sponsor*. A sponsor is simply defined as any other citizen in good standing within Peer Republic. In the event that a person discovers Peer Republic on their own and knows no one who is already a citizen, then the Peer Republic government will act as a *proxy sponsor*. Hence, Peer Republic remains open and inclusive since any honest person wanting to become a citizen will never be denied.

The sponsor should somehow benefit from sponsoring another user. This is exactly the scenario that Peer Republic is attempting to socially engineer – namely to incentivize citizens to go out and recruit new people to immigrate to Peer Republic. The difficulty here is that the new user does not pay anything to join Peer Republic, so the question remains – how does the sponsor receive monetary remuneration from recruiting new Peer Republic citizens?

Peer Republic wants every citizen to eventually register for a business license if possible. This is good for citizens because they can now participate to the fullest extent in the digital economy (e.g.; self-publish, self-distribute and self-promote premium content, or rent their spare computer storage space, etc., for profit). This is also good for Peer Republic because the annual required business registration fee

---

[14] See the World Computer Project accompanying documentation for more details

maintaining a valid business license represents one of only two sources of income that the government relies on to sustain itself[15]. Finally, it is also good for the Peer Republic ecosystem as a whole, because more businesses (producers of goods and services) bring more citizens (consumers of goods and services) creating more transactions of value, which in turn drives more prosperity through network-effect economic growth. However, business licenses are always entirely optional and no citizen is required to obtain one.

Nonetheless, if/when a citizen does acquire such a business license, demonstrable monetary value is generated for Peer Republic in the form of the aforementioned annual business license fee. However, that value would not be possible if the sponsor of the citizen acquiring the business license never referred Peer Republic in the first place. Therefore, *fairness* dictates that the sponsor should share in the monetary value being injected into the Peer Republic ecosystem since he was the new value catalyst when they recruited the new citizen through word-of-mouth. Hence, consistent with its ideology, the Peer Republic government awards 100% of the value it receives on every *new*[16] business license registration, to the sponsor of the citizen registering the business.

However, in the spirit of being truly equitable, the new citizen's *parent* sponsor does not get to keep the entire 100% of the license fee, because there exists a *grand* sponsor (from the perspective of the new citizen) – the parent of the parent sponsor – and the income would not have been possible if the grand sponsor had not introduced the parent sponsor to Peer Republic. Therefore, the parent sponsor shares 50% of its proceeds with this *grand* sponsor. But the grand sponsor itself has a sponsor – the *great-grand* sponsor – and so must in turn share 50% of his income from this transaction with him. This income splitting continues up the ancestor tree of sponsors until a sponsor that is itself the proxy Peer Republic government is found, or until there is nothing left to split[17].

Importantly, this complex transaction is correctly accounted for automatically by the built-in Peer Republic accounting subsystem, atomically across all citizens in the entire chain-of-value exchange. This ensures that every citizen immediately receives their proportional share of the *value creation event* – in this case a citizen registering for a business license – at the very moment it is realized within the system.

Moreover, Peer Republic never forgets the provenance of sponsorship. It might, for example, take many years after a citizen immigrates to Peer Republic before they are decide to pay for a business license in order to participate more fully in its digital economy. However, Peer Republic still remembers the entire

---

[15] The other is annual fees collected from citizens who pay for a special *developer license* in order to develop applications that operate within the Peer Republic environment that they can then optionally self-publish as premium content.

[16] Only the fee associated with the *original* business license registration is shared. Annual renewal revenue is not shared.

[17] This fee splitting process is calculated with real-world currency (i.e.; dollars converted to cents) of which one cent is the smallest unit of currency. To ensure accurate accounting down to the whole penny, if the proceeds splitting process attempts to split an odd number of cents (e.g.; $1.25) exactly in half, it will split it three ways (e.g.; 62-62-1) and allocate the 1 penny that could not be split to the Peer Republic government treasury to be allocated for either maintenance and upkeep of the digital ecosystem or for disbursement to various charitable causes as decided by the commons.

ancestral sponsorship tree of that person, and ensures all citizens are equitably remunerated for the delayed value they were ultimately responsible for. This creates interesting and potentially lucrative digital economic dynamics within the Peer Republic ecosystem, when you consider that some citizens will register for business licenses eventually, and others may never.   In this way Peer Republic fosters a human-first approach to a socially engineered digital dignity that balances every citizen's opportunity and right to participate in a prosperous new peer-to-peer economy, with the opportunity and right not to if they so choose.

A Sponsor Affiliate Revenue Example

Consider an example involving three friends, Mary, Brian and Jack. Mary discovers Peer Republic and registers as a citizen using the government as her proxy sponsor. She finds it interesting and tells Brian about it. Brian registers as a citizen declaring Mary as his sponsor. Brian in turn tells Jack about Peer Republic who also registers as a citizen declaring Brian as his sponsor.

Jack is a digital photographer and considers if there is a market for his photos within the Peer Republic digital economy. After a week of research Jack decides to give it a try and registers for a business licensing paying a fee of $20[18]. In return he receives access to all of the government services need to set up a digital store front from which to promote and sell his original photographs.

The next time Brian and Mary log into their Peer Republic accounts they discover that they magically have the equivalent of $10 and $5 in Peer Republic tokens in their digital wallets, respectively. Even though neither Brian nor Mary have shown an interest in becoming a *producer* (i.e., starting a formal business) within the Peer Republic ecosystem, as Jack has, they nonetheless generated income for themselves simply by recommending the platform to just one other person. For the value it provides Peer Republic itself received $5 in the transaction, income it will use to continually maintain and enhance the government services it provides all of its citizens and businesses. In this case Peer Republic equitably shared 75% of Jack's business registration fee with two other citizens.

Continuing the example, Brian is impressed with how easy it was to generate income in Peer Republic. He decides to look for ways to spend his new found win-fall within the ecosystem and decides to use the **uPlay** application that is built into Peer Republic to watch two indie extreme sports documentary films that have been self-published by other citizens within the community. This costs him the equivalent of $1.25 and $2.00 respectively which he pays for directly from this digital wallet leaving a $6.75 balance. Mary, on the other hand chooses not to spend any of her tokens.

Fast forward 2 months. Mary, having forgotten about Peer Republic after her initial curiosity, decides to log back in again. She is pleasantly surprised to find the equivalent of $273 in her digital wallet. It turns out Brian has been telling everyone he knows about Peer Republic for weeks. Each of those people have become citizens of Peer Republic claiming Brian as their sponsor, and have gone on to in turn tell their

---

[18] $20 is just an example fee in this case. The actual business license fee has not been determined yet, but is expected to be a nominal amount (with respect to the revenue generating potential it provides) measured in the tens of dollars per year.

family and friends, and so on and so on. The result is that 100s of new citizens have joined Peer Republic and all because of Mary's original introduction. Furthermore, among those 100s of new citizens, a portion of them have decided to be among the first to set up a business within Peer Republic. Each time that happened, both Mary and Brian were proportionally remunerated for the value creation they indirectly caused by their original endorsement of Peer Republic.

In fact Brian, who after the first two weeks had earned an additional $26 through his word-of-mouth sponsorship referrals, decided to pay the $20 to acquire a business license himself. He then set up his virtual store front to sell the 3D Printer plans for printing his original remix of a toy Rubber Band Gatling Gun that can fire 300 rubber bands in under 60 seconds. He self-publishes, self-distributes and self-promotes his product using the business software Peer Republic provides as consideration for his business license fee.

Over the next few weeks he sells 60 copies of the plans for $3 each, to people all over the world. This has earned him $180 – 25% = $135, with the other $45 being equitably profit-shared with the storage providers that served up his files to his customers. On top of this he earned an additional $480 the same way Mary did – i.e., his share of income from the business license fees collected from all of the entrepreneurial people within the tree of citizens that his word-of-mouth brought to Peer Republic, both directly and indirectly.

Where things get very interesting is that in the above scenario Mary and Brian are children – friends at school – and Jack is Brian's father. Consider that Mary, a 12 year old girl, has now legally earned the equivalent of $273 of disposable income for doing, from her perspective, nothing.   Brian, also 12, has worked a little harder (it was really actually fun from his perspective) with better results to show for his efforts, having earned $480 + $135 - $20 for his business license - $0.47 (47 cents) in storage expenses paid to storage providers for storing his 3D plan files – for a grand total of $620.53 in profit.

Since Mary and Brian are both too young to have a credit card, they do not have their own PayPal account, and therefore have no way to cash out their tokens for real-world money. Mary decides to show her Mom Peer Republic and receives her permission to use her PayPal account to cash out Mary's $273 in tokens, receiving $264.90 where the remaining 3% goes to PayPal. In contrast, Brian is having way too much fun and chooses to leave his money inside of Peer Republic and looks for cool new ways to spend it directly within the economy, while he dreams up more ways to shoot rubber bands in even greater numbers.

As the world of retail awakens to the knowledge that children (a large percentage of Peer Republic's expected early adopter audience) in particular have significant disposable income within Peer Republic, classic online businesses will quickly move to set up shop within the platform to provide products and services to compete for citizens' new found riches, including, importantly *physical* goods shipped directly to their door. This will mark the tipping point, ushering the growth phase for this new digital economy as the business world wakes up to the idea that it is possible to participate in an equitable peer-to-peer digital economy that puts people first, ensuring a dignified digital future for everyone.

Sponsor General Income Sharing

Technically speaking a user does not contributed any *monetary* value directly to the Peer Republic government[19] when they first register to become a new citizen – again because they pay nothing to do so.   However, it is entirely possible for this new citizen to nonetheless immediately start earning income for himself through channels such as being paid to view advertisements, or referring premium content, or through sponsorship affiliate revenue[20]. Once again, in the spirt of equitable profit sharing, it seems only fair that a portion of that income be shared with the sponsor that ultimately contributed to making it possible by introducing the new user to the Peer Republic in the first place. Therefore, Peer Republic will also evenly share any income the new citizen derives from participating in the Peer Republic economy equally with his parent sponsor at a rate of 50%.

But just as we saw in the previous section, the parent sponsor of the citizen earning the income is not solely responsible for the citizen immigrating to Peer Republic. In deed the parent sponsor's own parent sponsor (the *grand* sponsor from the perspective of the new citizen in this example) played a proportionally important part, by introducing the parent sponsor to Peer Republic. And so the profit earned by the citizen is split equally up the sponsorship ancestry tree, just as before, until either the Peer Republic government proxy sponsor is reached or there is nothing left to split. Also as before, the built-in Peer Republic accounting system takes care of the general ledger details, autonomously posting the correct journal entries making up the multi-party transaction atomically across all parties in a correct, transparent and secure manner according to GAAP. In this, way, once again all parties participating in the chain-of-value exchange are rewarded proportionally for their role in the creation of value in the transaction.

However, there is a big difference between *sponsor general income sharing* that is being described here and the *sponsor affiliate revenue* scenario in the previous section. In the previous section there was a specific <u>one-time</u> event – the registration of a business license – triggering a fixed amount of income sharing of the business licensing fee.[21] In contrast, the general income sharing described in this section is thus far described as on-going. While fairness would seem to suggest that a sponsor deserves some incoming sharing from the citizens it sponsors, this needs to be tempered. It is intuitively unfair for a citizen exerting great personal effort to derive an income, to have to pay 50% of it to a parent sponsor in *perpetuity*, in return for a mere introduction to Peer Republic.   Such a relationship would be the digital equivalent of indentured servitude.

Therefore, Peer Republic requires that a new citizen share 50% of its income until such time as *either* the citizen registers for a business license, *or* 6 months have passed since the citizen originally registered with Peer Republic, whichever comes first. If the citizen elects to register a business, all income sharing

---

[19] Here we are talking about monetary value to the Peer Republic government specifically, not the broader Peer Republic economy. It is entirely possible that the new citizen contributes to the digital economy by, for example, immediately paying to watch a premium movie. However, because the Peer Republic government does not extract transaction fees for that transaction, the government itself does not see any of the value of the transaction.

[20] See the World Computer Project accompanying documents for more details

[21] Recall the sponsor does not share in business license *renewal fees*, only in the *initial* business registration fee

with his sponsor then permanently seizes[22]. If a new citizen chooses not to register a business then any income generated within the first 6 months is equally shared with his sponsor, after which time all further income sharing permanently seizes. This strategy encourages citizens who are earning an income to explore other revenue generating aspects of the Peer Republic economy that a business license introduces, so as to limit income-sharing with his parent sponsor. At the same time it attempts to create a benefit for the sponsor without being overly burdensome on citizens generating small side income but who have not yet developed an interest in formally creating a business within the platform.

Making Sponsorship Easy

Citizens of Peer Republic will want to encourage everyone they know to join the platform, first hopefully because they believe in a human-first vision of a World Computer, and second because it will be potentially lucrative for them to do so as the examples above demonstrate.   Peer Republic will help make this easy.

As has been mentioned, every citizen immigrating to Peer Republic requires a sponsor. They also have to obtain the World Computer installation software from somewhere[23]. Moreover, every user that has already installed and is running the World Computer node software on their computer has the important ability to manufacture further cryptographically unique World Computer installation packages for other peers to install and run. This empowers each World Computer node the ability to self-replicate but with unique DNA each and every time, allowing the computer to grow itself (i.e.; be spread to more node computers), but only through human oversight.

Peer Republic conveniently combines the notions of sponsorship and replication using the included **uSponsor** application mentioned earlier to *burn* the identity of any citizen that runs it, into a brand new and unique World Computer installation package, designating them as the sponsor.   This installation package can then be provided to another person out-of-band from the World Computer platform (i.e.; on a USB stick, as a traditional email attachment, as a download link from a web connected server, etc.,). Regardless how this other person obtains the installation package, they need only copy it to their computer, execute it to install the World Computer node software, complete with UnoSys and Peer Republic, and then complete the registration process to become a new citizen of Peer Republic. Simultaneously, this act of registering will trigger UnoSys to automatically capture and remember the provenance of the sponsorship accordingly.

Alternatively, instead of pre-creating a World Computer installation package, any citizen can use the above mentioned **uSponsor** application to send another potential new user a time sensitive web URL link via email. The other person can then click on the link to automatically download and install a dynamically generated World Computer installation package from the World Computer Organization (www.WorldComputer.org) website, that is pre-configured to suitably credit the sponsoring citizen.

---

[22] The parent sponsor is still entitled to receive the one-time affiliate revenue representing its proportional share of the business license fee.

[23] The World Computer is technically just a series of applications built on-top of the UnoSys P2P distributed operating system, with Peer Republic being the main "shell" application analogous to, for example, the Windows desktop. Peer Republic and UnoSys will be installed when the World Computer is installed.

Finally, people are always free to obtain their installation packages directly from the public www.WorldComputer.org website, in which case the Peer Republic DAG itself will be their automatically declared proxy sponsor.

1.2.2.4 Funding

Silicon Valley venture capitalist (VC) investors seek early involvement in tech *unicorns* – high risk software startup ventures that eventually attain billion dollar evaluations. These investments are generally *equity* investments – where they acquire shares (i.e.; ownership) in the companies in exchange for early rounds of investment along with proportional managerial control over the company. However, this avenue of funding is not open to the World Computer Project because its vision is not (and cannot) be driven by profit – i.e.; The World Computer Organization is a not-for-profit company in which equity is not for sale.

Importantly, the World Computer Project *does* eventually expect to be an engine for significant revenue generation. Beyond the new digital economy it will usher in that will generate lucrative new revenue streams for its community, The World Computer Organization stands to generate substantial revenue and profit from the annual subscription fees it will collect for each *business license* and *developer license* acquired by the community. Unlike *in-economy transactions* that take place between members (e.g., creators, consumers and providers) in the currency of Peer Republic *tokens*, these annual fees take place outside of the Peer Republic digital economy, between registered users and The World Computer Organization itself, in real-world currency.

In contrast to large tech companies that have data centers to staff, The World Computer Organization will have no data center and therefore expects to operate with a minimal staff.   Even the fulltime core development team is expected to remain small – largely limited to senior software architects – with a preference to employing short term contractors and summer students early on to actually construct the individual components of the software to a well-defined specification.

Therefore, as the Peer Republic ecosystem reaches maturation, it is fully expected that this subscription revenue will eventually be more than enough to maintain the modest financial needs of the organization. The expected residual profit will be allocated to philanthropic programs as directed by the board of directors and voted on by the community, in order to ensure each World Computer Organization fiscal yearend is breakeven.

However, like all other startups, until self-sustainability is reached, alternative means to fund the effort must be found.

1.2.2.4.1   An Open Investment Opportunity

As a not-for-profit, The World Computer Organization will not sell equity (i.e., shares in the company). Furthermore, it will not participate in an initial coin offering (ICO) despite having a cryptocurrency built

into the system[24][25.] Therefore, the startup will need to rely on alternative funding sources such as direct donations and/or loans to The World Computer Organization, and/or crowdfunding.

Donations

As a NFP organization with a compelling mission and vision for the betterment of the global digital economy, The World Computer Organization executives will work tirelessly to locate and engage with philanthropic foundations that are sympathetic to its cause for the purposes of soliciting donations.

Loans

The World Computer Organization, despite being not-for-profit – fully understands the need for healthy economies that induce profits, and the role investment plays in them. Therefore, the organization might choose to sell debt to interested lenders at up to the highest legal interest rates permitted by law. In these historically low interest rate times, returns of 10%+ APR are bound to attract individuals who are already resonate with the World Computer mission and are excited about profiting from an opportunity to support its cause. Inclusivity is a founding principal of the World Computer vision and so loans of any amount could be accepted, allowing individuals of every means to participate in the opportunity.

The loans would be structured to give The World Computer Organization a *maximal* fixed time frame (e.g., 3 years) before having to start paying back the debt. This will provide the organization the time required to reach self-sustainability.   After the maximum fixed time frame has expired, the organization will issue minimum monthly payments to all lenders, while interest will continue to accrue on the balance for as long as the loan takes to be re-paid.   However, the organization would pay back loans earlier in full, if/when possible, in the order they received them.

This approach to loan structuring would be consistent with the premise that The World Computer Organization will eventually reach sustainability and will be able to repay the full principal of the loan with the stated stellar rates of return. It also asks the lender for patience while the organization systematically develops the platform in realistic time frames, in order to ensure those stellar rates of return.

Crowdfunding

Crowdfunding is an established approach to alternative financing for all manner of projects. It essentially leverages crowdsourcing to raise funds for an initiative.

There are 3 main types of crowdfunding:

- donation-based
- rewards-based
- equity-based

---

[24] The World Computer Organization seeks to avoid an ICO because of concerns over opinions that a coin in an ICO can be interpreted as a symbol of ownership interest in an enterprise—a digital stock certificate. If this interpretation is upheld their sale in an ICO are likely to be one day subject to regulation as securities in the U.S. under the Howey test.

[25] The UnoSys cryptocurrency token exists exclusively for utilitarian purposes as a means for trade within the economy. It is not designed, and will not be promoted, as a speculative asset to be traded in and of itself.

In the context of raising funds for The World Computer Organization, only *donation-based* and *rewards-based* crowdfunding programs will be considered. *Equity-based* crowdfunding is not an option because the organization is NFP and offers no equity for sale.

Crowdfunding on popular websites such as [Indiegogo](), [Kickstarter]() and [Fundable]() have generated billions of dollars in fundraising over the last several years. Some of the benefits to utilizing these donation-based and rewards-based crowdfunding platforms are:

- **Efficiency** – an online crowdfunding platform enables centralization and streamlining of fundraising efforts.
- **Presentation** – online crowdfunding platforms force the invaluable process of describing the offering —its history, traction, offerings, addressable market, value proposition, and more— boiling it down into a polished, easily digestible package.
- **Reach** – crowdfunding platforms have access to thousands of people who can see, interact with, and share your fundraising campaign.
- **PR & Marketing** – crowdfunding platforms help share and promote fundraising campaigns through social media, email newsletters, and other online marketing tactics spreading awareness and driving interest in the project.
- **Validation of Concept** – crowdfunding platforms afford excellent opportunities to validate and refine project ideas. As people begin to express interest and ask questions, invaluable feedback is generated which helps steer project direction and drive quality.
- **NFP Friendly** – donation-based and rewards-based crowdfunding platforms do *not* require the selling of equity or the selling of debt

Any crowdfunding initiatives considered for the World Computer Project will favor several small, well-defined campaigns focused on funding a particular *feature* of the overall product, rather than attempting to fund the entire initiative in a single campaign.   Multiple, smaller *feature-oriented* campaigns that focus on specific aspects of the project have many advantages. First, smaller campaigns can be executed with lower fundraising goals in a shorter amount of time.

All of the popular crowdfunding platforms require the declaration of the fundraising goal (e.g., $50,000), and the campaign duration (e.g., 30 days) in which to raise those funds, to be declared before launching the campaign. If by the end of the campaign duration the *entire* fundraising goal has not been realized, the campaign fails and no funds are provided. If, however, the fundraising goal is achieved or exceeded by the end of the campaign, the campaign succeeds and the entire amount raised is available for the development effort. Therefore, in this all-or-nothing model, it becomes critical to choose the campaign fundraising goal and duration carefully such that success can be achieved. Having many small campaigns oriented around easy to understand critical *features* of the World Computer Project will help ensure that campaign scope and fundraising goals remain credible and therefore more likely to be met.

Second, multiple mutually exclusive feature campaigns can be launched in parallel, increasing positive optics for the overall project. As potential funders begin to notice several related funding campaigns

running simultaneously, they begin to understand the breadth of scope for the overall World Computer Project initiative, and how the individual features combine to deliver on it.

Moreover, overtime as a string of feature campaigns begin to complete in quick succession, brand awareness for The World Computer Organization and world changing project it has stewardship over will quickly begin to develop within the crowdfunding platforms. People for whom The World Computer Project vision resonates and who helped successfully fund one feature campaign, will feel vested in the movement and will be more likely to look for other feature campaigns to help fund.

Third, the overall World Computer Project *vision context* description required to frame the purpose of an individual feature campaign can be reused across all other similar feature campaigns, and only the individual *feature* description itself need be unique to each campaign. Once again, from an optics perspective, seeing many successfully completed and ongoing feature campaigns all clearly and consistently describing not only their purpose, but also the individual role they play in the global vision of a planetary computer, will instill a sense of growing momentum and therefore confidence for the initiative as a whole.

Fourth, should one of the specific feature campaigns fail to achieve its stated fundraising goal in the allotted time, the failure is less likely to negatively impact the progress perceptions of all other ongoing feature campaigns. In the spirit of "you can't win them all", an individual feature campaign failure can be constructively interpreted as a validation that the particular feature is not deemed important to the crowd (at least for the time being) ultimately representing the target end-user. This invaluable feedback in turn informs software engineering design for the overall project, driving future feature development priority, and improving the quality of the final deliverable.

However, due to the consumer-oriented audience of popular crowdfunding platforms, only specific aspects of the overall World Computer project will be suitable for potential crowdsource fundraising. In general, low-level UnoSys operating system features that mainly reside invisibly under the hood, such as those listed in the *Core OS* section above, are not well suited to crowdsource funding, since they are too complex for most consumers to understand. Instead, The World Computer Organization will consider candidate crowdfunding campaigns around individual features listed in the **Peer Republic Services** sections above. Features involved in delivering these "end-user" services will resonate with the crowd in a likely more visceral way since their functionality and benefit will be more familiar.

Rewards for crowdfunding campaign contributions will span a spectrum from the intangible to the tangible. Depending on the feature and the contribution level, funders will receive any or all of the following:

- The World Computer Organization's formal gratitude having their name published (with their consent) on the organization's Wall of Fame listing those critical early visionary supporters that helped make the World Computer vision possible
- Early access to private beta releases of the delivered features
- A gift of Peer Republic currency tokens useable within the platform
- Issuance of an actual single commemorative *share* in The World Computer Organization.

Strategically undertaken crowdfunding represents a viable plan for The World Computer Organization to incrementally raise critical early funding for its development effort. However, crowdfunding will not be a successful strategy *until* some progress and groundswell for The World Computer initiative can already be demonstrated. Hence, it will be imperative that initial funding efforts be first obtained through donations and/or loans as detailed above, and that those funds are used to demonstrate tractable progress in the form of incremental software "beta" version releases, on a consistent and frequent cadence.

1.2.3 Technology Rollout

Knowing what needs to be developed for a software project is only part of the story. Executing the World Computer Project vision requires many technology pieces to be specified, developed and integrated. This becomes a major *software engineering* exercise – which is much more than a programming effort, as it involves significant management and logistics. The dependency order of these activities is critical especially if the entire endeavor is to be achieved on a credible fixed-price and fixed-timeline.

The technology making up a planetary-scale computer cannot all be written at once. There is no *big bang* for this size of project. Instead it has to be incrementally evolved. The trick is to make sure that each major step (i.e., public software release) in the evolution of the final result can stand on its own and is incrementally better than the previous. This section proposes the general order in which the significant technology making up the World Computer vision (i.e.; UnoSys and the Peer Republic DAG) might be rollout in.

1.2.3.1 Stealth OS Development

A global operating system is foundational for the World Computer Project and is therefore the obvious first software to be developed. However, even an OS is made of layers (rings) that have a dependency hierarchy which dictate the order in which they are materialized. At the time of this writing much of the UnoSys OS has already been written and is functional. However, there is still more work to be done.

Any operating system is built as a set of standalone kernel object components working together in an integrated fashion. The challenge for UnoSys is how to make that integrated whole work in a decentralized manner. Decentralization is a destination. You don't get there from the beginning. Rather you evolve – or more accurately *bootstrap* – to it. And the first step along the way to a fully *decentralized* operating system is to first build a *distributed* operating system.

Distributed functionality is all about ensuring the end-user data persistently stored by the operating system, such as the blocks of a file or the records of a database are stored redundantly across multiple peers in the P2P operating system network. In contrast, d*ecentralized functionality* concerns itself with distributing the metadata about the data, such as the *file access table* (FAT) that keeps track of names of the files and directories, across multiple peers in the same P2P network. The development process separates the "features" of *distributed* and *decentralized* across separate software releases. This section describes the releases in terms of their feature set, and broadly whether they are implemented in a centralized or decentralized manner.

1.2.3.2 First Release

The very first publically available release of the UnoSys operating system will be distributed but not decentralized.   It will have support for the following high-level capabilities:

- Installing UnoSys.Node.exe peer software on World Computer participating computers
- Support for automatically and dynamically joining/exiting a peer to the World Computer network whenever the UnoSys.Node.exe is started/stopped
- Support for *sponsored* user registration creating a self-sovereign identity along with her private profile
- Support for user login
- Support for a distributed (but centralized) transaction log for tracking peer telemetry
- Support for *access control permissions* for internally securing File System files and directories
- Support for in-place software updates without requiring reinstallation

This first version of the World Computer will be extremely limited and yet will represent a major milestone for the project.   It will allow the first early adopters to begin participating in the World Computer vision by installing a small, non-intrusive piece of software (UnoSys.Node.exe) and create their self-sovereign identity. Furthermore, it will allow one user to sponsor another user. Moreover, in sponsoring another user the system will keep track of the sponsorship ancestor tree for each user so that appropriate sponsor affiliate revenue profit sharing as described previously can be fully credited in a future release when DAG business licenses revenue is supported/created. This is critical in order to incentivize word-of-mouth referrals from the very first release of the software.

The dynamic code delivery aspect of the Fortress Security design of UnoSys (as described in the *Unosys paper*) means the user should never have to reinstall the UnoSys.Node.exe again. Rather, new end-user features and the new UnoSys kernel functionality required to support them simply dynamically appear over time.   This will engender a feeling of progressive evolution and self-improvement among users as the World Computer slowly and incrementally transitions to a fully autonomous state.

Early adopters of the first release will be able to track in real-time the growth of the World Computer (in terms of node count) since all of the telemetry data reported back from each node will be summarized and made available to the community in a World Computer dashboard. This will allow everyone to watch as the project spreads around the world due to their world-of-mouth.

Finally, since this software will be collecting basic telemetry information about the nodes they are running on in order to compute their *fair play* and *capabilities* reputation score[26] over time, these early adopters will have a head start in their probationary period on the way to being able to fully participation in World Computer as revenue generating providers in a future version, should they choose to.

---

[26] See the World Computer Project accompany document "***A Vision for a New Dignified World Computer Economy***" for more details

1.2.3.3 Second Release

The second release will introduce early adopters to the Peer Republic DAG. Peer Republic will act as the main "shell" for the World Computer, similar in utility to Windows Desktop of the Windows operating system for example, containing the follow initial applications:

- Ability for user to login and manage their profile – **uAtHome** application
- Ability to create a sponsored UnoSys.Processor installation package – **uSponsor** application
- Ability to review the source code to UnoSys – **uCharter** application
- Ability to provide feedback through surveys and votes – **uVote** application
- Ability to play back early (i.e., sample) public domain *media* content stored in Peer Republic – **uPlay** application

All computers making up the storage provider network (i.e., the nodes that actually store the early telemetry and other system data/content collected/used by the system) will be provided entirely by The World Computer Organization (i.e.; centralized). That is, the peers joining the network will not be used to store system data. Furthermore, the organization provided storage array will be fixed in size, in that the dynamically resizable storage cluster group membership logic will not initially be provided. This isn't anticipated as an issue since this initial version is restricted to collecting only small amounts of telemetry data about each node as part of node assessment/evaluation described previously, and end user data creation will not be possible with this 2nd version.

1.2.3.4 Subsequent Releases

With the ability to incrementally update the UnoSys.Node.exe software in-place, it will now be easier to add features to the World Computer in quick succession and in parallel across development teams. Major new features will be brought online as a steady stream of new capabilities light up for all existing users at the same time:

- direct end-user exposure to the File System
- direct end-user exposure to the Database System
- the UnoSys SDK
- consumer and producer capabilities within Peer Republic
- gamification of the Peer Republic interface
- the built in financial system and cryptocurrency
- ability to earn revenue from the environment
- dynamic storage array membership growth
- etc.,

Releases will be managed carefully so as not to break existing functionality. This will be facilitated by allocating a portion of the registered nodes to running separate "Development" and "Test" computers in addition to the *live* "World Computer" proper. Changes will be developed in the "Development" computer, and tested in the "Test" computer, before being promoted to the World Computer.

1.2.3.4.1 Bootstrapping Public Domain Content

1.2.3.5 UnoSys SDK

Of course an operating system wouldn't be very useful without applications to run on top of it. As mentioned, Peer Republic will ship with a rich set of base applications out of the box. However, the number and novelty of the distributed applications the *community* itself builds out of the generative environment Peer Republic fosters will be the ultimate measure of the World Computer Project's success. Hence it is vital that a UnoSys *software development kit* (SDK) be made available early to the community, since innovative application opportunity/content will drive adoption, just as it has in every major platform in the past (e.g.; PC, mobile, Blockchain, etc.,).

Any application, written with *any* modern development stack can be used within Peer Republic simply by using the UnoSys SDK *application programmer interface* (API). It is fully expected that the UnoSys operating system will be widely embraced for the speed and simplicity its single computer programming paradigm provides developers, since applications can be written with no complicating notion of a client-server network. Eventually, citizens of Peer Republic will be spoiled for choice with respect to 10,000s of applications a large and open community of developers will offer them, for fun and profit.

To kick start this new age of pervasive distributed application development, Peer Republic will provide several useful, built-in applications that users can consume freely[27]. Each easy-to-use and understand application will act as a posterchild for inclusive, next-generation, distribute applications that unify the digital experience through a single world computer model, without asking the user to give up their privacy. The common refrain of all these applications is to place the user in complete control of everything they do, with no dependency on 3rd party intermediaries.

Applications that end-user developers create for the UnoSys operating system reside in Ring-3 (see Core OS section above). These communicate exclusively with Subsystems exposed in Ring-2 via an API. This API is exposed by the UnoSys SDK that programmers use to take advantage of the world-class distributed capabilities of the UnoSys operating system.

The SDK is made of 3 main parts:

- documentation
- language bindings
- productivity tools

This section describes these three aspects of the SDK in further detail.

1.2.3.5.1 Documentation

The UnoSys SDK documentation will provide developers with detailed descriptions of the [representational state transfer](#) (REST)-based HTTP calls available to program each of the operating

---

[27] While there will never be a cost to consume (i.e., run) any application that ships with the operating system, applications such as **uPlay** that can optionally consume 3rd party *premium* content will collect consumption charges from the user on behalf of the content creator.

system's major Ring-2 Subsystems. Since virtually all modern development languages have an HTTP stack and can make REST-based calls over HTTP, this documentation is all that is required for any developer to write applications that utilize the state-of-the-art distributed capabilities of UnoSys.

In addition the same API surface area will also be exposed as a more efficient TCP/IP sockets interface. This will provide clients with socket capabilities a more efficient API with which to consume UnoSys operating services. However, it will not provide any additional functionality beyond that which the REST-based API surface area described above does.

Included with the documentation will be many examples demonstrating how the Ring-2 Subsystems can be used to create exciting new distributed applications for the UnoSys Computer.   In addition, the source code to each of the official applications that ship as part of Peer Republic will be provided for developer reference and study.

1.2.3.5.2 Language Bindings

Language bindings are more traditional object-oriented and/or function-based software libraries written in a particular language, which themselves encapsulate the REST/Socket-based UnoSys API. Such libraries are conveniences which allow programmers to use the libraries directly from their favorite programming languages without having to deal with low-level HTTP or socket calls[28]. This ability to encapsulate the API in language-specific libraries allows for powerful (e.g., object-oriented) levels of abstraction to be created over the low-level API, which can translate into major productivity for developers. Thus, a developer working with a particular development language can use a UnoSys SDK language binding library written in that language to develop his UnoSys application, rather than having to consume a low-level HTTP REST or socket interface.

Initially, the only language binding that will be provided with UnoSys will be for the C# language. This is because, UnoSys itself is written in C# and so exposing its Subsystems as a C# API will be the easiest language binding to develop. It is expected, however, that as UnoSys grows in popularity, the community will develop their own open-source language binding libraries in order to more efficiently access the UnoSys operating system from their language of choice.

1.2.3.5.3 Tools

SDKs often come with tools that increase developer productivity.   The tools are software applications themselves, but designed to be used by developers not end-users, for the purpose of helping them to build applications.

---

[28] Note that even though UnoSys exposes both an HTTP REST and a socket interface, it will *not* support calls to either from applications *not* running on the same machine.   That is, the HTTP REST and socket interfaces were chosen for their ubiquity in today's modern developer tool set, and not because calls need to be made over a network. Therefore, all calls to the UnoSys API across either of these interfaces from client applications will be local (i.e., using localhost or the loopback network adapter). That is, all calls to the UnoSys API will be local inter-process communication (IPC) calls from a client running on the *same* computer as the UnoSys.Node.exe peer software. This is entirely in keeping with the design paradigm that there is no "network" anymore – the *single* UnoSys planetary computer is *local* to every consuming client.

At a minimum, initially UnoSys anticipates the need for the following 2 tools:

- **Database Manager** – a tool used to create/import, and maintain database schemas for the Database Subsystem
- **Simulator** – a tool used to simulate an entire multi-node UnoSys computer on a single machine for testing purposes

Conspicuous by their absence are development tools that are often associated with a platform SDK, such as integrated development environments (IDEs) and/or plug-ins, custom languages and language compilers/linkers, etc.,. The UnoSys platform is completely open from a platform (e.g., Linux, Windows or Mac), language, and development tool chain perspective, and application developers are free to use whichever platform, IDE and language they are most comfortable with, as long they can consume HTTP REST or socket endpoints, or have access to a UnoSys API language binding library.

1.3 Growth Phase

The *Growth* phase is entered into at the precise moment in time that the World Computer is effectively *born.* This birth event literally brings into existence a global, open, inclusive planetary computer as its own living, breathing entity, operating autonomously. It also simultaneously triggers a formal transformation of the World Computer's governance model, away from the necessarily more centralized control the development team had during the Incubation phase, to one based entirely on democratic human oversight by the community as a whole. It represents more than just a new software release, but rather a turning on of a computer that can henceforth never be turned off without majority consensus from the commons.

From a management perspective, this phase will encapsulate a stabilization period where software bugs are discovered and eliminated, and scale is reached. Financial support will likely continue to be required during this revenue-generating phase until such time as the platform crosses the point of self-sustainability and begins to generate a surplus of revenue. The result of this phase will be a fully operational world computer, experiencing network-effect growth, both in terms of capacity and user account membership, drawn largely from the early majority consumer public and the early innovator and early adopter tech business sector.

1.4 Maturation Phase

The Maturation phase of the project lifecycle begins when the World Computer reaches a sustainable equilibrium, and can begin to pay back its early financial sponsors with consistent generated revenues. By this phase the Peer Republic DAG has proven itself as a reliable, secure and globally scalable computing resource and begins to garner rapid interest from the late majority consumer public and early majority enterprises and government organizations, as they begin to deliberate on how best to take advantage of the new emerging digital economy the technology gives rise to. The ultimate result of this phase will be a complete realignment of the digital economy with generative new business models, brought about by a reliable, secure, permissionless, peer-to-peer World Computer run by the people for the people, providing digital dignity for all.