

GRAPEVINE WORLD - WHITEPAPER

**BREAKING DATA BARRIERS AND
BUILDING A NEW HEALTH ECONOMY
TO IMPROVE HEALTHCARE
WORLDWIDE.**

VERSION 2.3

grapevine
WORLD

EXECUTIVE SUMMARY

GRAPEVINE WORLD
ADDRESSES ONE OF THE
BIGGEST BARRIERS TO
CHANGE IN HEALTHCARE –
LACK OF DATA
INTEROPERABILITY.

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While nearly every other sector churns with rapid transformation wrought from the insights of Big Data, healthcare stagnates, stunted by a legacy of bloated, piecemeal and uncoordinated technology development.

It is a legacy present in the smallest interactions to the largest infrastructure projects. The local hospital tabulates data in a different format to the local family doctor, leading to errors in medication prescription. The traveling expat cannot access his own health data when requiring treatment away from home.

In the WHO's 2017 report⁰¹⁾, assessing progress on the UN's Sustainable Development Goals,⁰²⁾ lack of

empirical data is cited as one of the major obstacles to formulating the necessary policy to “ensure healthy lives and promote well-being for all at all ages.”

Solving the interoperability problem is a vital prerequisite for this kind of broad-scale data collection. If every health facility in Cameroon uses a proprietary IT system – unable to seamlessly exchange data with others – how can we hope to corroborate data on every case of tuberculosis?

Without this data, we do not fully understand the problem. Without a full understanding of the problem, we cannot formulate an appropriate response.

01) "<http://apps.who.int/iris/bitstream/10665/255336/1/9789241565486-eng.pdf?ua=1>", last accessed: March 16, 2018

02) "<http://www.un.org/sustainabledevelopment/sustainable-development-goals/>", last accessed: March 16, 2018

HOW GRAPEVINE WORLD SOLVES THE INTEROPERABILITY PROBLEM

Grapevine World is a decentralized, borderless ecosystem for the seamless, standardized exchange of healthcare data.

In it, health data is exchanged according to Integrating the Healthcare Enterprise (IHE) methodology⁰³⁾ – an existing set of standards that has been used in federal level projects worldwide.

Patients gain ownership of their health data.

They can access their data at any time, anywhere. They decide who to share their data with, and for what use, granting explicit consent on a case-by-case basis - with privacy assured by full data anonymization.

Every use of their data is rewarded with the blockchain based Grapevine Tokens (Gvine), that can be used in exchange for products and services – apps, gadgets, medical advice and care.

Health organizations gain access to vast troves of previously inaccessible data.

Universities, Pharma, technology companies, medical device manufacturers, public sector entities and Healthcare Provider Organizations (HPOs) can all source data - with the authorization to use it - for research, education, software development and any other conceivable health project.

The introduction of Grapevine Tokens (GVINE) creates a new health economy.

Patients gain access to a wider, borderless choice of healthcare, able to tap into a globalized expert network for consultation and care; alongside apps and gadgets.

Organizations gain entry to an entirely new market, both B2B and B2C. Within Grapevine World, organizations obtain broader access to packaged data products - the end-result of research, perhaps - as well as the services of their peers.

This ecosystem encourages and facilitates collaboration, advancing medical research and stimulating new innovations in pharmaceuticals, service delivery, software, medical devices, consumer gadgets, biotechnology and many others not known yet.

By solving the interoperability problem, Grapevine World unleashes the power of data to radically transform the delivery of healthcare.

03) "<http://www.ihe.net/>", last accessed: March 16, 2018

WE ANTICIPATE THE HEALTH DATA MARKET TO INCREASE IN VALUE FROM AN ESTIMATED \$54 BILLION TODAY TO \$123 BILLION BY 2023. THE AIM OF GRAPEVINE WORLD IS TO CAPTURE A SIGNIFICANT PROPORTION OF THIS MARKET

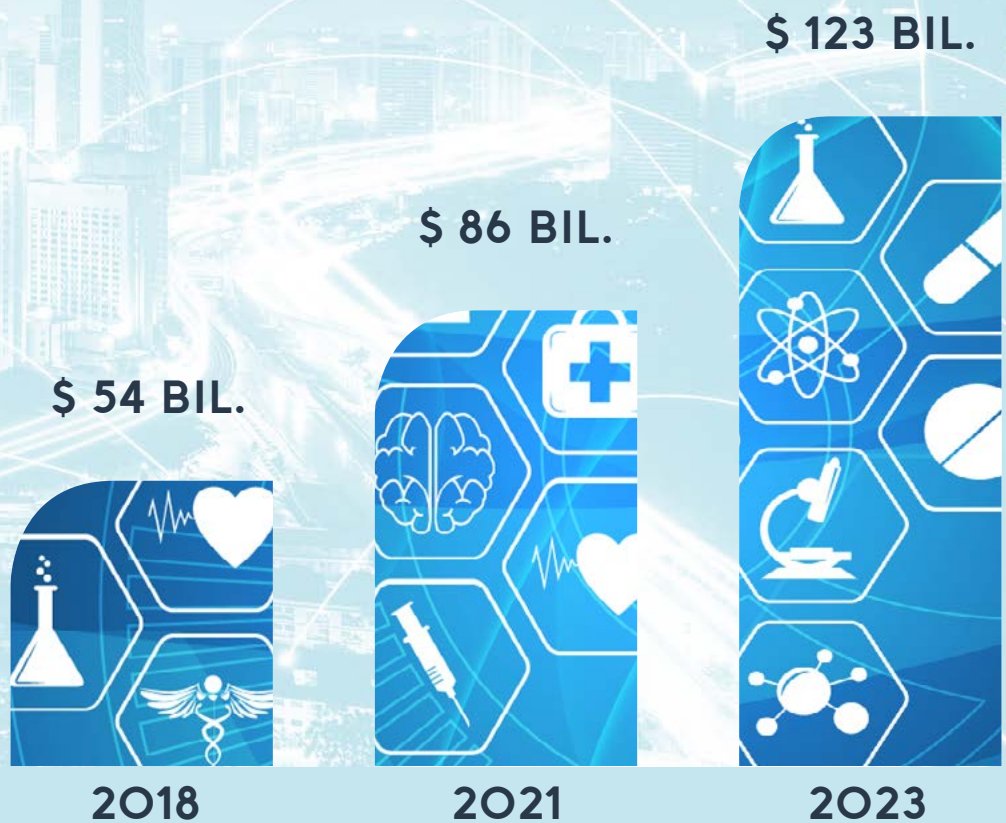


Figure 01: Market potential

Figure 02: The two pillars of Grapevine World: IHE methodology and blockchain technology



HOW GRAPEVINE WORLD IS BUILT

Grapevine World is built on two pillars:

- IHE methodology
- Blockchain technology

IHE methodology

IHE methodology rests on a proven set of data exchange standards, used for decades as the foundation for successful collaborative frameworks in the healthcare industry. The data exchange in Grapevine World (Grapevine Backbone) is based on these established principles.

The core is Integration Profiles. The IHE has a defined set of standards covering Actors, Transactions and Content. Profiles are built

by selecting the appropriate combination of standards to fulfill the necessary function, packaging content in an agreed-upon format.

By maintaining adherence to these standards, a “common language”⁰⁴⁾ is established, enabling different parts of a system - or different systems - to speak to each other.

The Grapevine World ecosystem will ensure interoperability by comprising only IHE approved vendors, applications, and architectures.

04) "https://wiki.ihe.net/index.php/PCC_TF-1/About", last accessed: March 16, 2018

Blockchain technology

The blockchain serves two purposes:

- Acting as facilitating infrastructure for the data exchange network.
- Providing incentives to participate in the network.

The blockchain provides a completely automated, decentralized system for participants in Grapevine World to enter into smart contracts with each

other. Grapevine World is facilitator only.

The Grapevine Token (GVINE) is the key, acting both as mechanism and incentive. Transactions can only take place once the requisite number of GVINE has been transferred.

For example, if a medical university wants to crowdsource data for a clinical trial, it can search for patients matching its criteria. Once patients have agreed to participate, the data

will be retrieved - but only unlocked with the transfer of GVINE.

Crucially, the system is secure-by-design. No private data is stored on the blockchain itself - only an auditable record of transactions and provenance. All patient data remains with the HPOs, preserving their existing accountability standards.

WHAT MAKES GRAPEVINE WORLD UNIQUE

WE ARE NOT THE ONLY PLAYERS BUILDING A HEALTH DATA ECOSYSTEM. HOWEVER, WE ARE UNIQUE:

// Grapevine World is more than an idea. Its constituent parts already exist.

// Our ecosystem is fully open. Global and accessible to anyone.

IHE standards have already been proven in large-scale projects across the globe. Blockchain technology is already widely used. The Grapevine World team combines decades of international experience in healthcare, technology, law and business.

Grapevine World is open. Most other solutions for health data interoperability are proprietary, which risks propagating the problem, as architectures develop in parallel silos. By contrast, we have deliberately chosen to operate as a non-profit foundation, to ensure Grapevine World remains open to all, driven only by the goal of improving health standards worldwide.

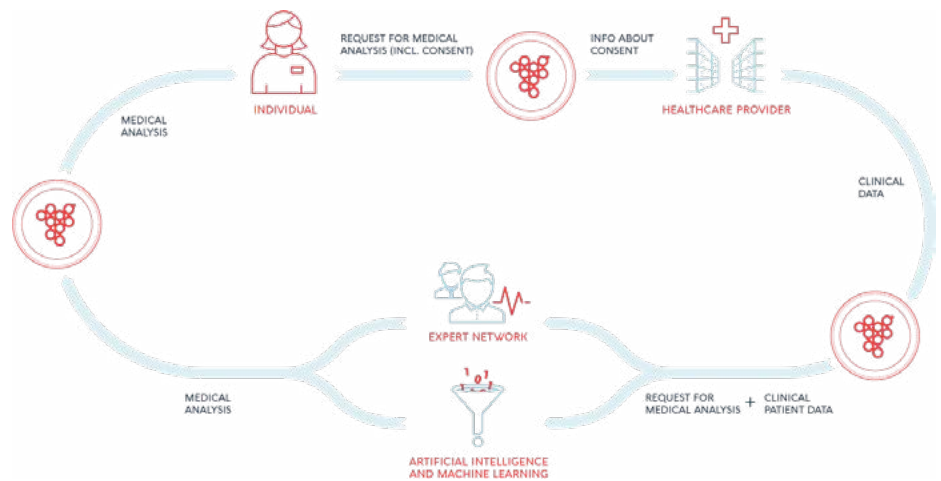
Grapevine World is designed to benefit everyone, and everyone is invited to join. The greater the diversity of participants, the healthier the ecosystem.

GRAPEVINE ELEVATES HEALTHCARE

ACCESS & MANAGE
ALL YOUR
HEALTH DATA



ACCESS HIGH-END
HEALTH SERVICES
(E.G. PERSONALIZED
MEDICAL ANALYSIS)



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Figure 03: Use case "Personalized Medical Analysis"

INTRODUCING
MEDICAL
RESEARCH 4.0

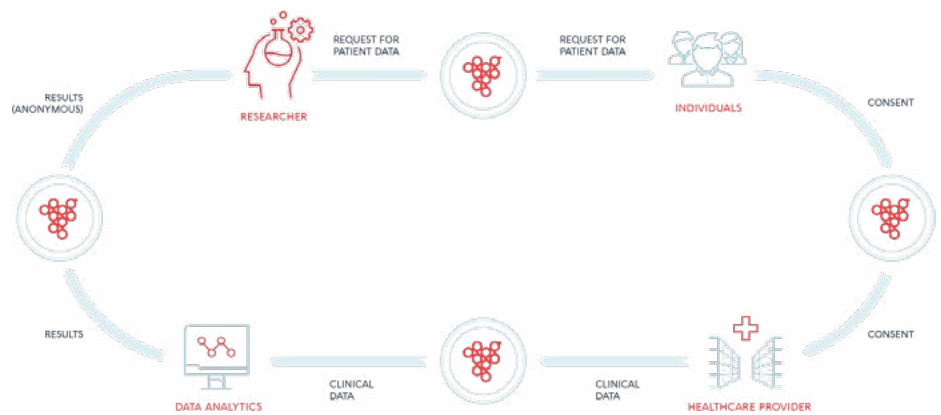


Figure 04: Use case "Medical Research"

DISTRIBUTION OF GVINE

The first GVINE will be distributed amongst early supporters and stakeholders of the existing ecosystem - non-governmental organizations (NGOs), governments, IHE, researchers, scientists, and companies.

An Initial Coin Offering (ICO) in July 2018 will widen participation by making GVINE available to the public, in exchange for digital currency.

Token Specifications	
Token Name	Grapevine Token
Ticker Symbol	GVINE
Blockchain Token Standard	ERC20 Ethereum
ICO Token Prize	\$ 0.10 ⁰⁵⁾
ICO Soft Cap	9.642 ETH ⁰⁶⁾
ICO Hard Cap	68.939 ETH ⁰⁷⁾
Total Amount of Tokens	825,000,000
Token Sale (incl. 3% Bounty Program)	45%
Unsold Tokens will be burned.	

Table 1: Token Specifications

BONUS STRUCTURE

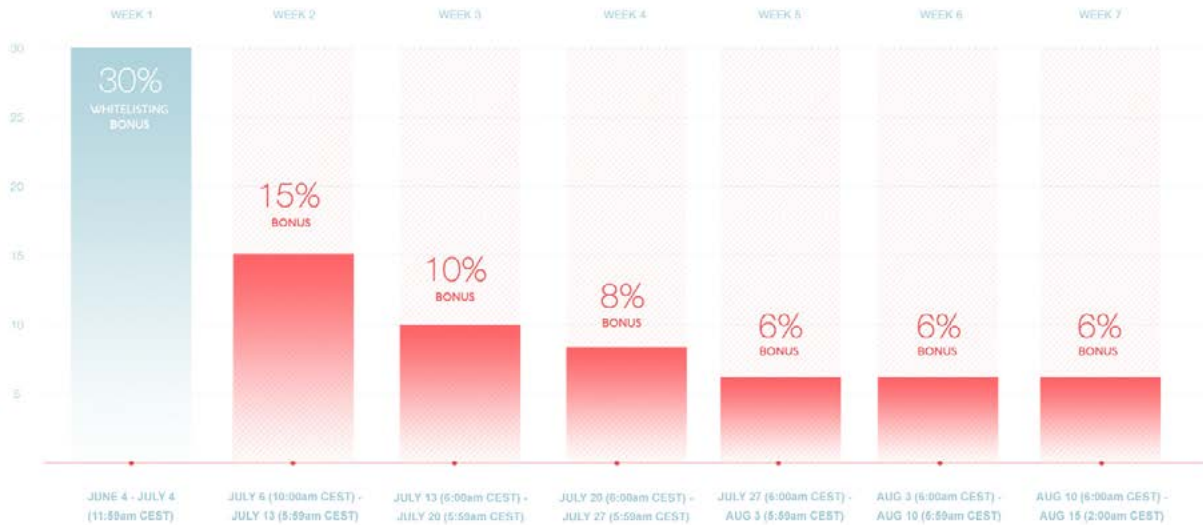


Figure 05: Bonus structure

If you have been whitelisted till July 4 you are entitled for the 30% whitelisting bonus. The whitelisting bonus is valid at any time during the ICO – but only till the soft cap is reached (USD 4,500,000). All bonuses are locked for 6 months after the end of the ICO.

05) 1 GVINE = 0,00021426122728831 ETH (USD exchange rate of date of deployment: July 4, 11am CEST)
 06) (USD 4,500,000, exchange rate of date of deployment: July 4, 11am CEST)
 07) (USD 30,000,000, exchange rate of date of deployment: July 4, 11am CEST)

ROADMAP

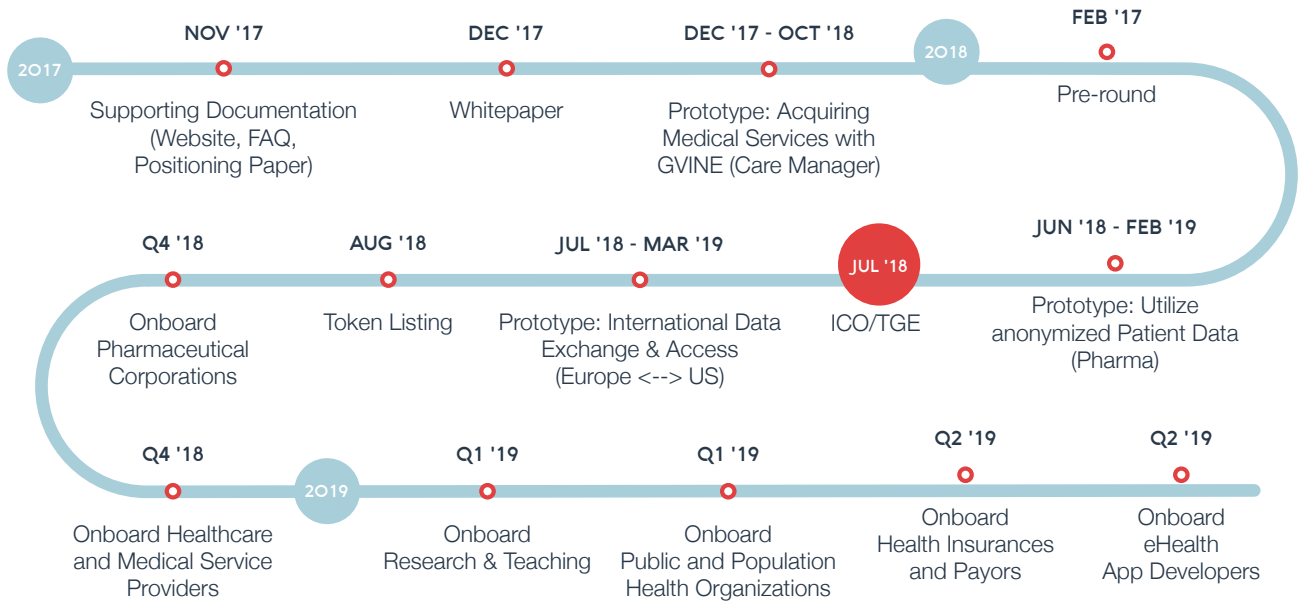


Figure 06: Roadmap

TOKEN DISTRIBUTION

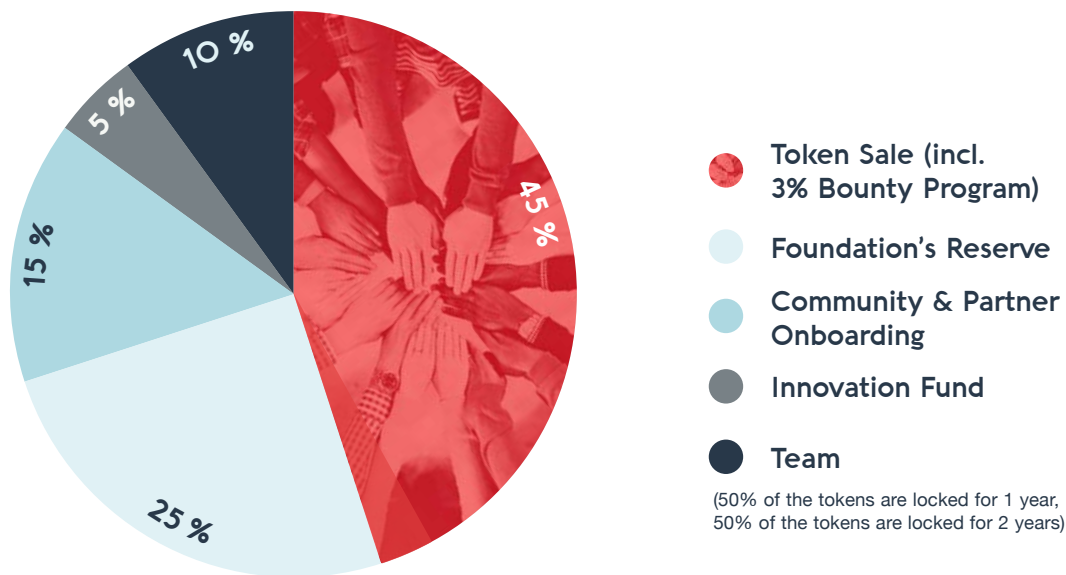
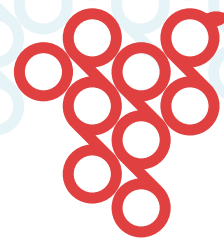


Figure 07: Token Distribution



USE OF FUNDS

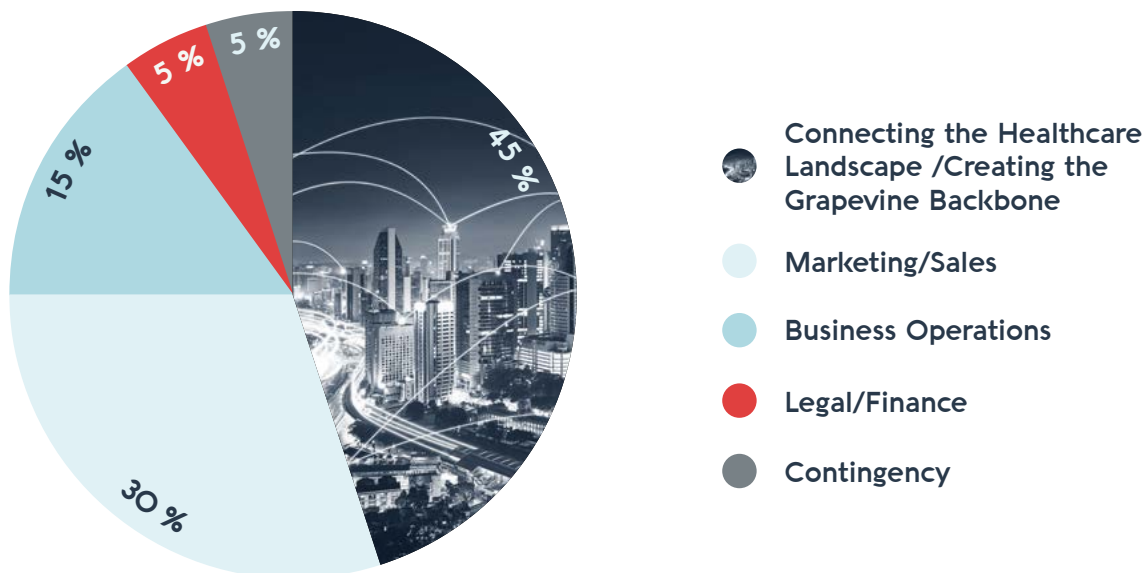


Figure 08: Use of Funds

The Grapevine Foundation will fund its development entirely from the proceeds of Grapevine Tokens.

As Grapevine World grows, the value of the ecosystem will increase in tandem, providing further funding for

future investments. This will allow the Foundation to pay for certain operational services within the ecosystem in exchange for Grapevine Tokens (GVINE).

THE GRAPEVINE ICO TEAM

TEAM



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Health Connect Partners sprl

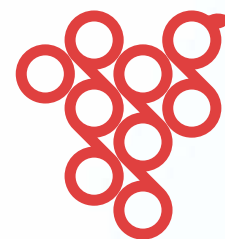


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CORE OF INTEROPERABILITY //

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INTRODUCTION

One of the greatest challenges facing healthcare today is that of interoperability. It is certainly the biggest barrier to change.

In the medical sector the lack of data interoperability can be experienced on a daily basis. While the free flow of data has led to a seamless exchange process in various areas of life (from banking to social media), healthcare is left stagnant. Medical secretaries still retrieve records by fax. Simply put, health systems do not talk to each other.

The digitization of health, and the introduction of Electronic Health Records (EHR) was a disparate, piecemeal process, resulting in diverse and dis-integrated systems, with scant thought given to the use of medical data in the future.

The result is a chaotic mess of proprietary systems, and a health record standard that amounts to little more than a PDF. They arrive at doctors' offices as pages of long-form information, often filled with

irrelevancies, rarely skimmable for the salient facts.

At best, practitioners spend more time reading than they do treating – worrying that they may have missed something.⁰⁸⁾ At worst, they may in fact miss something, resulting in medical error – cited by the BMJ in 2016 as the third leading cause of death in the USA.⁰⁹⁾ 60% of nurses surveyed by the non-partisan Gary and Mary West Health Institute agreed interoperability could significantly decrease medical errors.¹⁰⁾

The problem is becoming more acute as an aging population changes the focus of healthcare from discrete visits to ongoing care between multiple providers – entailing the regular transfer of medical records.

Compounding the issue is an increasingly internationally mobile population. Low cost carriers have catalyzed air travel to grow at around 7% per year in the last decade.¹¹⁾ Approximately 4.6 million students were enrolled abroad in

2015, compared to 0.8 million in 1975.¹²⁾

This puts a growing number of patients (potential or actual) away from their home health systems, leaving healthcare providers to negotiate national and infrastructural borders to obtain medical records, before tackling the linguistic and cultural incompatibilities that arise alongside the technical ones. A doctor in Jakarta may find herself challenged by a French medical record.

Interoperability is a large problem for the daily provision of healthcare. It is perhaps an even larger problem for research and development.

The key to good science is collaboration across networks. But the lack of health data interoperability often means that petabytes of data are collected for a clinical trial, stored in a proprietary system or language, and left to collect dust in a disconnected silo, offering no further value to anyone.¹³⁾

08) "<http://www.modernhealthcare.com/article/20170429/MAGAZINE/170429871>", last accessed: March 16, 2018

09) "<http://www.bmj.com/content/353/bmj.i2139>", last accessed: March 16, 2018

10) "<http://www.healthcareitnews.com/news/interoperability-gets-blame-serious-medical-errors>", last accessed: March 16, 2018

11) "<https://www.statista.com/statistics/193533/growth-of-global-air-traffic-passenger-demand/>", last accessed: March 16, 2018

12) "<http://monitor.icef.com/2017/09/oecd-charts-slowing-international-mobility-growth/>", last accessed: March 16, 2018

13) "<https://healthitanalytics.com/news/what-you-need-to-know-about-health-data-interoperability>", last accessed: March 16, 2018

Without interoperability, large-scale data collection becomes nearly impossible. In 2015, the UN adopted 17 Sustainable Development Goals, putting the “health and well-being of all citizens” at number three. In the WHO’s 2017 progress report on these goals, a lack of empirical data is cited as a major obstacle.

If every health provider in Cameroon is using a different proprietary system, and a mismatching tableau of EHR formats – how can we be sure that we are accounting for every case of tuberculosis? Without accurate and complete data – in order to fully understand the problem – how can we hope to formulate appropriate policy in response?

With all this data left uncollected – or to rot in proprietary silos – masses of lost opportunities and potential looms on the horizon. As Big Data revolutionizes every sector from finance to marketing, health-care risks staying stagnant, locked out of technological revolutions like Artificial Intelligence (AI) and the Internet of Things (IoT).

02

THE STATE OF INTEROPERABILITY

We do not wish to say there has been no effort to introduce interoperability into healthcare. Colossal efforts have been made. But so far, the problem remains. Data exchange standards have been developed by non-profit organizations – led by Integrating the Healthcare Enterprise (IHE), with notable mentions for FHIR and HL7. These open standards have existed for more than a decade, and have been considerably road-tested.

What we lack is the technological framework within which to use them. Most current solutions for an interoperable health data exchange are driven by corporate interests, necessarily adopting a ‘winner-takes-all’ attitude (antithetical to the cooperative spirit of interoperability). But the data exchange will only truly work if it is open to every

stakeholder in health – from patients to Pharma, care providers to payors, researchers and technologists.

In the USA, billions of dollars have been spent on the digitization of healthcare - including interoperability - but beyond widespread adoption of EHRs, usually proprietary and designed for transactions rather than diagnosis, there has been little progress.

The Office of the National Coordinator for Health Information Technology (ONC) is working on introducing a prohibition of “information blocking”, in an attempt to legislate interoperable EHRs¹⁴⁾ against industry unwillingness – and counter an inertia that has just seen the deadline for complete national interoperability repeatedly shifted (it was first meant to be achieved in 2013).¹⁵⁾

14) "<http://www.modernhealthcare.com/article/20170429/MAGAZINE/170429871>", last accessed: March 16, 2018

15) "<https://www.forbes.com/sites/theapothecary/2014/09/03health-data-interoperability-a-30-billion-unicorn-hunt/#4d1812605a9b>", last accessed: March 16, 2018



"A CONFORMITY ASSESSMENT SCHEME FOR E-HEALTH IN EUROPE."

In the EU, massive pilot schemes such as the pioneering epSOS¹⁶⁾ showed encouraging progress and provide a laudable template for the future. But the union is still far from achieving interoperability, having just allocated substantial additional funding for the EURO-CAS project,¹⁷⁾ "A *conformity assessment scheme for eHealth in Europe.*"¹⁸⁾

Reviewing the current state of interoperability, it is our view that the only practical solution for an interoperable health data exchange should meet the following criteria:

- **Non-profit.** The exchange must be backed without any profit motive, so as not to introduce any artificial silos, as happened in the development of EHRs.

- **Borderless.** To fulfill the promise of interoperability, the exchange must cross borders both national and institutional.
- **Inclusive.** The exchange must be open to everyone. The greater the diversity of the ecosystem, the healthier it is.

The entire purpose of an interoperable data exchange is to create a comprehensive network. The more people involved – researchers, clinicians, patients, software developers – the more valuable the network.

Grapevine World is designed to fulfill all these criteria. For more information on the current state of health data interoperability, feel free to [watch this video](#).

16) "<http://www.epsos.eu/>", last accessed: March 16, 2018

17) "<https://ec.europa.eu/digital-single-market/en/news/eu1-million-more-interoperability-ehealth>", last accessed: March 16, 2018

18) "<https://www.euro-cas.eu/>", last accessed: March 16, 2018

BUILDING GRAPEVINE WORLD

GRAPEVINE WORLD IS A DECENTRALIZED, BORDERLESS ECOSYSTEM FOR THE SEAMLESS EXCHANGE OF HEALTH DATA. IT IS BASED ON TWO PILLARS:

// IHE Methodology

// Blockchain technology

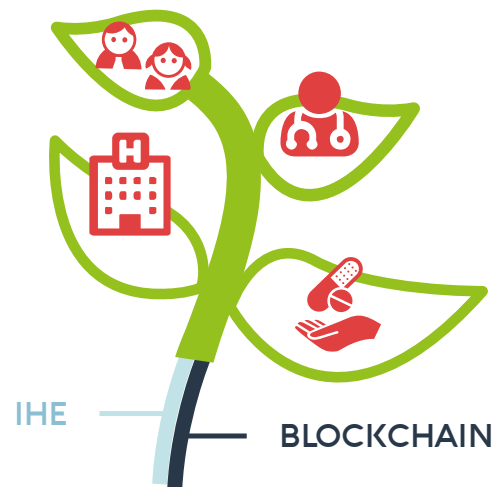


Figure 09: Grapevine World's pillars

IHE METHODOLOGY

By strictly following the IHE methodology, all data in Grapevine World will be interoperable.

The IHE process is uniquely well-established within the field of eHealth interoperability. Most national healthcare infrastructures rely on IHE profiles. The epSOS pilot project mentioned in section 2, and projects by the ONC were built on open standards following the IHE process. Testing events – called Connectathons – are held in Europe, USA and Japan.¹⁹⁾

Our team is singularly well-placed to implement the IHE process. Grapevine staff, partners, advisors and associates have been highly influential in national initiatives, and have developed several IHE profiles themselves.

19) "<http://www.iheusa.org>, <https://www.ihe-europe.net>, <https://www.ihico.jp/en/>", last accessed: March 16, 2018

INTEROPERABILITY (IHE)

Our secure and standardized data exchange layer integrates and leverages healthcare legacy systems.

BLOCKCHAIN

Stakeholders automatically receive rewards (Tokens) for sharing anonymized data and providing various services.

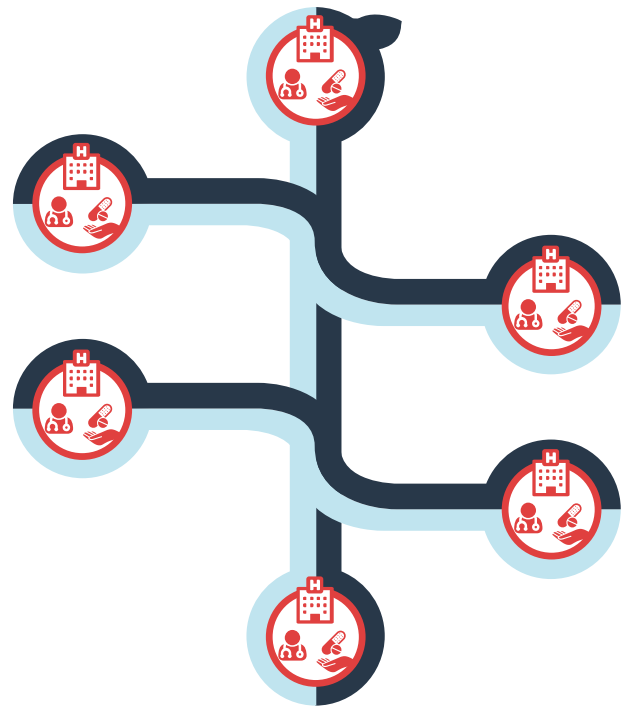


Figure 10: Grapevine World Backbone

BLOCKCHAIN TECHNOLOGY

The Ethereum blockchain provides both the infrastructure for the data exchange, and the incentive to participate.

Ethereum is specifically designed to build communities such as Grapevine World, with readily available API access and software development kits (SDKs).²⁰⁾

Further, its transition to proof-of-stake, as opposed to proof-of-work, is eliminating the inefficiency of mining for currency (Ether), making Ethereum the most efficient blockchain solution for building Grapevine World. The foundation is there, we just need to build on it.

Administratively, the blockchain tracks all transactions, providing a permanent log for accounting purposes, and a provenance record for a verifiable document of the data's origin. No health data is stored in the blockchain itself.

The lubricant for the entire system is the Grapevine Token, or GVINE, which can be exchanged for products or services in Grapevine World.

In real terms: individuals receive Grapevine Tokens in exchange for their anonymized health and fitness

data – with case-by-case consent for it to be used. The Grapevine Tokens (GVINE) can then be exchanged for products and services; anything from fitness apps to surgery.

The organizations can also use GVINE to pay for products and services on a B2B basis. Research data, consultation or IT infrastructure services, for example.

Broadly speaking, as more people participate in Grapevine World, the value of the entire ecosystem – and Grapevine Tokens along with it – will increase, thus providing incentive to participate in the ecosystem.

Grapevine Tokens also perform an important function in enabling “smart contracts”, the automated transactions by which data and services are transferred. These are described in more detail in section 4.

The entire system is automated and designed to meet the highest privacy and security standards, with regards to high scalability and low transaction costs.

Grapevine's central environment, the Grapevine Orchestration Engine (GOE, see [page 27](#)), has been designed to be reactive, thus maximizing the throughput of GOE transactions per unit of time (e.g. seconds).

20) "https://ethereum.org/", last accessed: March 16, 2018

THE GRAPEVINE ECOSYSTEM

Combining the open standards based Grapevine data exchange, with the Ethereum blockchain based crypto-token and smart contracts, Grapevine World generates an entirely new health data ecosystem.

Individuals accessing Grapevine via the mobile app or desktop Portal will be able to access their health data at any time – self-reported vital signs, fitness data taken from apps like Runtastic, and medical information provided by their Healthcare Provider Organizations (HPOs).

Push notifications will inform users about requests to utilize the respective data for example for clin-

ical trials, research projects, statistical collection, software development. Users will be able to grant their consent on a case-by-case basis, receiving Grapevine Tokens in return.

They can then search the Grapevine Database for vendors supplying anything from care consultation to health software and fitness gadgets, which can be exchanged for Grapevine Tokens.

Health organizations – research and teaching institutions, Pharma, insurers, hospitals, government, NGOs – can use the Grapevine Portal to similarly search for other vendors in the ecosystem, or to find matching patients for their requirements, exchanging their data for

Grapevine Tokens. Thereby, it becomes easy to crowdsource data for any number of uses. Organizations can simply define the criteria for participants, and Grapevine will find them, notify them of the request, and return their data upon its receipt – along with the required number of Grapevine Tokens.

Grapevine’s ecosystem represents both a solution to the problem of interoperability in healthcare and the generation of an entirely new community – facilitating new connections, collaborations and innovations, and creating significant business opportunities, while widening access to healthcare, and ultimately lowering the cost of its delivery.

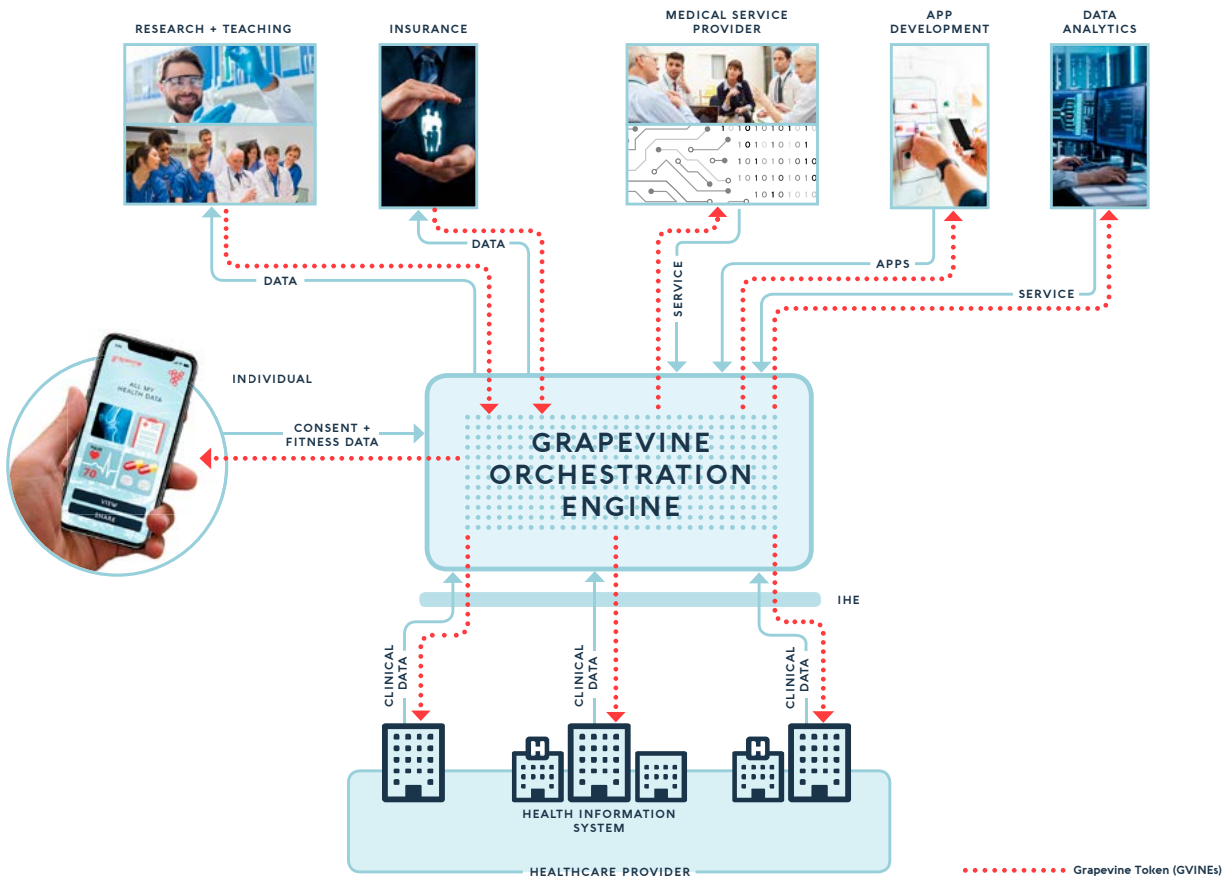


Figure 11: Grapevine World Ecosystem

WHAT MAKES GRAPEVINE WORLD UNIQUE

What makes Grapevine World different to any previous or current attempts at making health data interoperable?

Firstly, all its constituent parts exist. The IHE methodology and Ethereum blockchain are widely used. Add our combined expertise – decades of international health-care, technology and business experience – and you have something that is more than just an idea.

Secondly, it is open. Its decentralized design makes it independent of any single vendor or developer. This makes it both sustainable and immune to the creation of the kind of proprietary barriers that have hindered interoperability thus far.

Thirdly, as a consequence of the prior aspects and by virtue of its lack of borders, Grapevine World involves all stakeholder groups. In contrast to previously proposed solutions, we see the involvement of all stakeholders as a necessity for a sustainable, interoperable health data exchange.

If you would like to participate in any way, please contact us at office@grapevineworldtoken.io and we will find a way for you to contribute.

THE TECHNOLOGY OF GRAPEVINE

Now that we have a broad view of Grapevine World, let's take a closer look at the processes and technology behind it.

4.1. IHE METHODOLOGY

The process hinges on the creation of IHE Profiles, in which a set of actors and transactions are defined to solve specific use cases. Individual profiles can be combined with others to construct complex software systems. By interconnecting IHE profiles in this way, software

architects “emerge” their software architecture.

Completed systems are tested at Connectathons, events where interoperability and conformance tests are performed. Successful vendors (and their products) are listed in a public registry, searchable

by health buyers and project coordinators, to find implementations compliant with their own profiles.

Allowing only IHE approved vendors and solutions ensures the interoperability of Grapevine World.

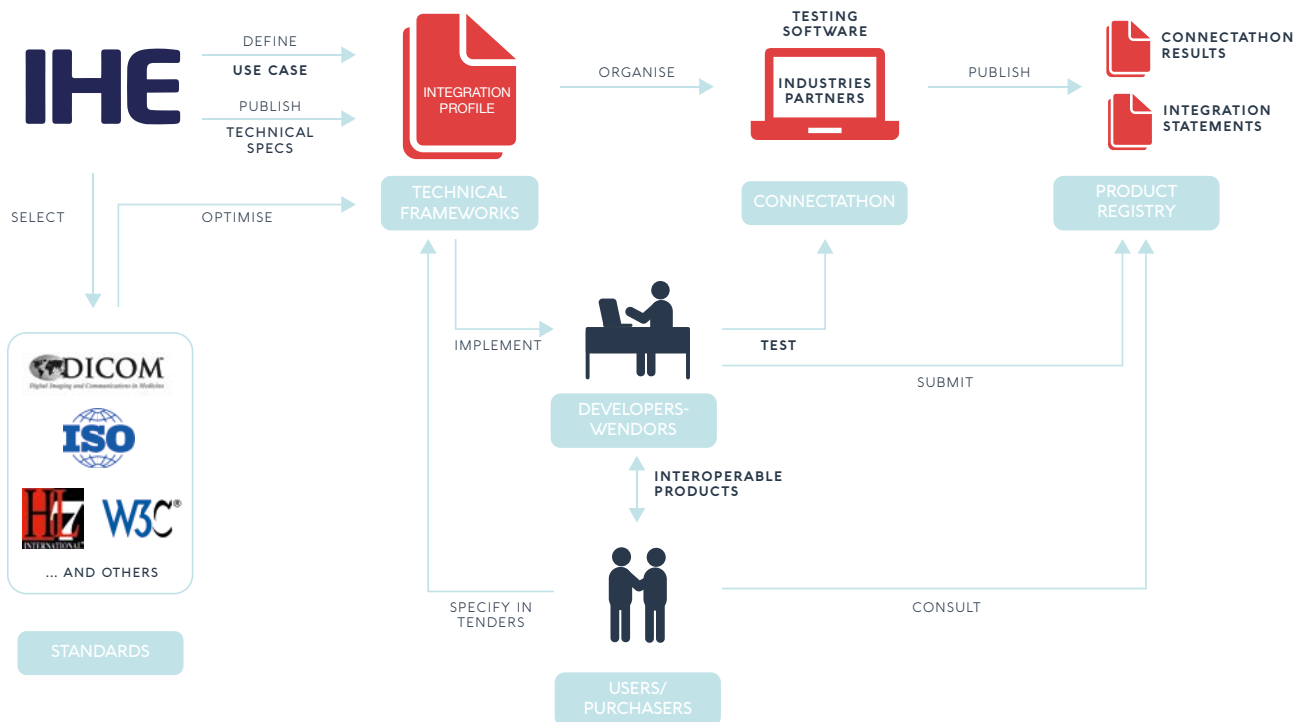


Figure 12: The IHE process explained (image courtesy of IHE.net)

WHY FOLLOW THE IHE METHODOLOGY

IHE has proven its effectiveness in several worldwide initiatives. Beyond underpinning national health infrastructures, IHE profiles have formed the basis for three major US and European initiatives to facilitate health data exchange.

The US Office of the National Coordinator for Health IT (ONC) promotes a project named Sequoia.²¹⁾ The project provides an IHE-based national healthcare information network to connect hospitals with general practitioners.

Two pilot pan-European professional health networks are in place: epSOS²²⁾ and e-SENS.²³⁾ Operated by the European Commission's eHealth Digital Service Infrastructure²⁴⁾ for the cross-border exchange of healthcare data, they are used to exchange patient summaries and electronic prescriptions.

As a result, IHE profiles are recognized by the European Commission as having "potential to increase interoperability of eHealth services... to the benefit of patients and medical community"²⁵⁾ and are now eligible for referencing in EU public procurement.

BUILDING A BROADER ARCHITECTURE

The IHE process is not an architecture itself but rather has to be integrated into a broader structure. Real-world implementation examples are provided in the following paragraph.

Two European models have integrated the IHE process into a TOGAF architecture²⁶⁾ – often used in Large Scale Pilots and continent-wide deployments.

The e-SENS project includes the IHE process in a TOGAF Metamodel²⁷⁾: the European Interoperability Reference Architecture (EIRA²⁸⁾). It provides the building blocks for the European Digital Single Market.

The Integrating the Energy Systems (IES) project reuses the IHE process for the energy sector, following the Smart Grid Architecture Model (SGAM), which embraces TOGAF.

IES is researching how the IHE process would benefit from the SGAM approach (and vice versa), following a similar approach to the e-SENS project.

More recently, HL7 – a non-profit standards development organization – has promoted the use of Fast Healthcare Interoperability Resources (FHIR²⁹⁾).

Quickly gaining recognition in the eHealth sector, the IHE has adopted FHIR for RESTful transactions, and promotes the standard for both infrastructure and mobile access to eHealth data.

Grapevine relies on both FHIR and IHE services for data transfer.

21) "<http://sequoiaproject.org>", last accessed: March 16, 2018

22) "<http://www.epsos.eu>", last accessed: March 16, 2018

23) "<http://www.esens.eu>", last accessed: March 16, 2018

24) "<https://ec.europa.eu/cefdigital/wiki/display/EHOPERATIONS/eHealth+DSI+Operations+Home>", last accessed: March 16, 2018

25) "http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:JOL_2015_199_R_0011", last accessed: March 16, 2018

26) "<http://www.opengroup.org/architecture/togaf/>", last accessed: March 16, 2018

27) "<https://www.esens.eu/wp5>", last accessed: March 16, 2018

28) "https://ec.europa.eu/isa2/solutions/eira_en", last accessed: March 16, 2018

29) "<http://hl7.org/fhir>", last accessed: March 16, 2018

THE PROVENANCE CHALLENGE

Establishing provenance is important, both for accounting purposes and so data requestors can judge the quality of the data based on its origins.

The Grapevine team is part of the Hyper e-Health team, working together with the University of Southampton (UK) and individuals from the USA to research the role of blockchain in eHealth.

The team is one of the winners

of the first phase of “Oh, the Place Data Goes: Health Data Provenance Challenge”, which aims to provide the permissioned blockchain (based on Hyperledger Fabric³⁰⁾ with smart contracts.

The outcome of this research will be a solution for storing health data provenance documents on the blockchain - exploiting its immutability and non-repudiation - written in W3C PROV.³¹⁾

30) "<https://www.hyperledger.org/projects/fabric>", last accessed: March 16, 2018

31) "<https://www.cccinnovationcenter.com/challenges/provenance-challenge/>", last accessed: March 20, 2018

4.2. THE ETHEREUM BLOCKCHAIN

Data exchanges are facilitated by decentralized blockchains, to allow for actor-to-actor transactions that are automatically logged for accounting purposes (public blockchain) and provenance (private blockchain), whilst ensuring

the privacy of patients’ health data.

The diagram below explains why we intend to use blockchain, rather than merely offer access to the Grapevine ecosystem via an established Fiat currency.

All transactions will occur

directly between participants of the network using smart contracts, which can be entered into with Grapevine Tokens - GVINE.

For further detail on how transactions and smart contracts operate, refer to section 5.

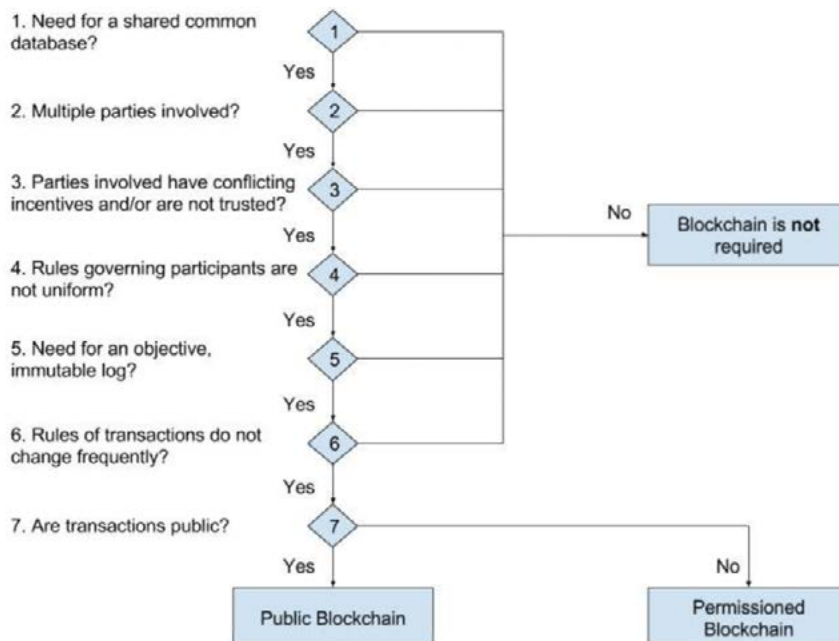


Figure 13: Reasons for Blockchain technology



4.3. TECHNICAL SOLUTION ARCHITECTURE

The proposed architecture is fairly common in existing international eHealth projects, using software components and architectural decisions that have already proven to be successful.

It is intended to be a Vendor Neutral Architecture (VNA). That is, independent of any single vendor

or developer, persisting of its own accord. It is the only way to ensure a truly sustainable system.

Grapevine acts solely as a clinical and fitness data broker, providing the link between patients, professionals, healthcare organizations, developers, enthusiasts and government bodies.

Patient data is protected by design, merging industry best practice with the security inherent in blockchain technology, based on the enforcement of the “CIA” data security triad: Confidentiality/Integrity/Availability.³²⁾ Interoperability is considered an aspect of Availability.

THE PILLARS OF GRAPEVINE ARCHITECTURE

The Grapevine World architecture rests on the following pillars:

- Data is fully decentralized. Grapevine does not store any patient data, acting only as facilitator to connect patients, health professionals, providers, governmental bodies, and data analysts.
- Incoming and outgoing connections are entirely based on open standards, enabling data access to providers from various vendors. If an organization’s systems are not IHE/FHIR-compliant, Grapevine is able to provide gateways or adapters that allow the organization to share data (utilizing the Grapevine Façade).
- Healthcare Data is fully anonymized by design. If an out-of-band contract is made between the data requestor and the data provider, Grapevine may still be used as non-anonymized data broker.
- Grapevine only stores the logical link between the user and its related patient identifier for each facility in which patient data exists.
- The blockchain technology does not store any healthcare data, it is used to facilitate and incentivize the use of such data. Key management will be entirely managed by the users. Grapevine creates ephemeral keys to implement a Petri net-like firing mechanism.³³⁾

32) As defined in the ISO 27000 publications

33) "https://en.wikipedia.org/wiki/Petri_net", last accessed: March 16, 2018

HOW THE ARCHITECTURE OPERATES

Having established the principles on which the Grapevine architecture is built, let us run through an example of how it would operate in fact, by following the steps of a data request. The same process operates in reverse when a patient is seeking healthcare. The patient finds a caregiver on the Grapevine database, and exchanges Grapevine Tokens (GVINE) for healthcare services.

STEP 1: REGISTRATION

Patients register via the Grapevine Application or Portal, with the ability to login with their OpenID accounts. (Facebook, Google etc.). During this process, demographic information, fitness data and self-reported vital signs can be collected. To provide medical data, patients must contact their HCP.

HPOs and Caregivers (HCP) also register through the Portal.

STEP 2: DATA REQUEST

When an organization or analyst requires health data, they must submit their request to the Grapevine Data Broker.

Having analyzed the security requirements of the request and established compliance, the Broker interfaces with the *Grapevine Orchestration Engine (GOE)* to find a list of patients that potentially match the request.

STEP 3: OBTAINING DATA & CONSENT

Potential matching patients receive a push notification. The app requests their consent to share their data.

If provided, consent is stored in the Order Archive DB and Grapevine contacts the HPOs listed by the patient as holders of their data.

Once obtained, the patient's data is sent to Grapevine for anonymization, structured, and forwarded to the data requestors.

Nota bene: Each HPO may use its own software from any vendor whose product is listed in the IHE product registry³⁴⁾ and Grapevine marketplace³⁵⁾.

34) "<https://gazelle.ihe.net/content/product-registry>", last accessed: March 16, 2018

35) "<https://www.grapevineworld.com/marketplace-en>", last accessed: March 16, 2018

STEP 4: DISTRIBUTION OF GRAPEVINE TOKENS AND DATA

When the Data Requestor sends a request to the Grapevine Data Broker, the number of Grapevine Tokens required is calculated based on a number of factors: chiefly the amount of data requested, but also e.g. discounts.

Grapevine then acts as an intermediary. Having received the required Grapevine Tokens from the requestor, it distributes the data (to the requestor) and Grapevine Tokens (to the provider, and everyone else involved in the transaction) in parallel.

Because the data is accessed using existing IHE transactions, the Grapevine process fits into existing hospital workflows, conforming to existing rules. As such, Grapevine requests are treated with the same security, and necessarily include freely given patient informed consent and patient consent by design.

The data requestor may have a data provenance record for each document or part of a document, in a form of W3C Prov.

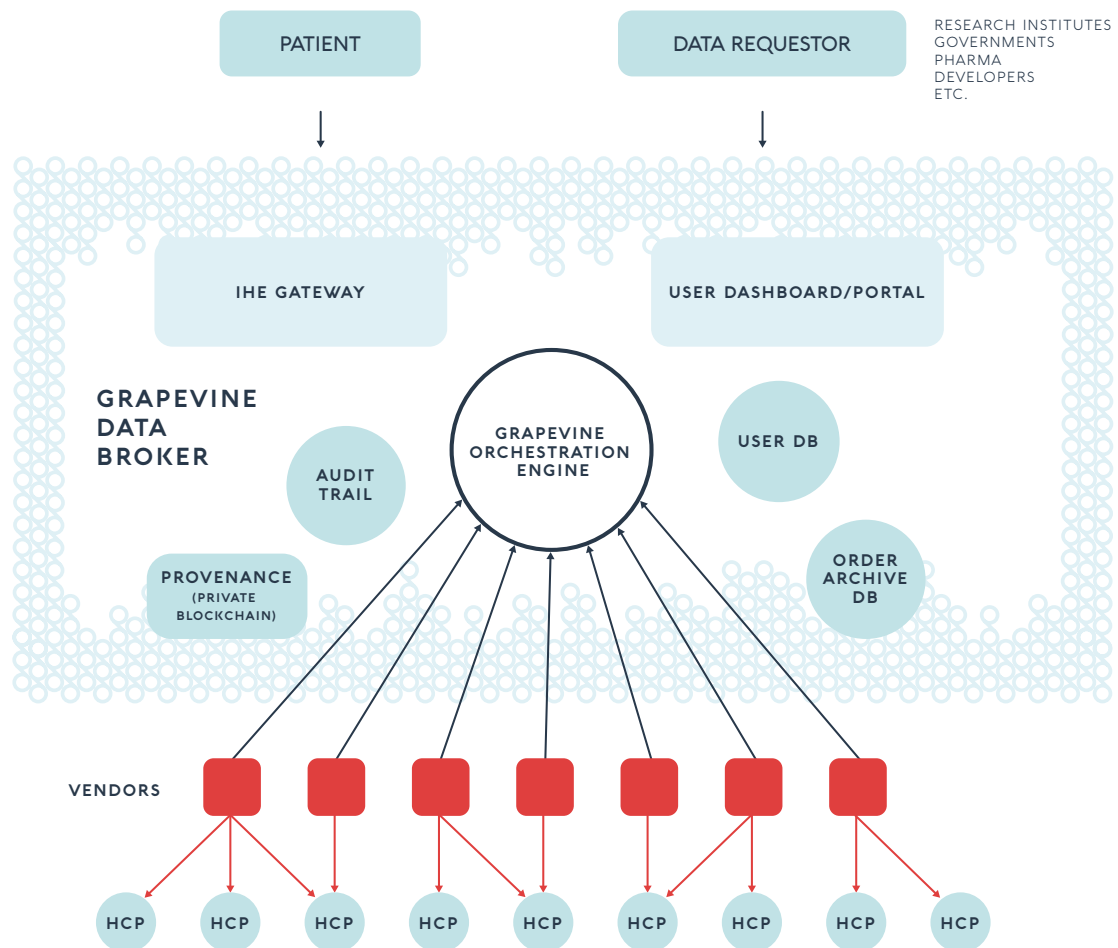


Figure 14: Grapevine High-Level Architecture

4.4. THE ACTORS

The architecture comprises the following actors, which will be released under Apache License Version 2.0, and is available on [GitHub](#).

THE GRAPEVINE DATA BROKER

The Grapevine Data Broker is the overarching structure. It is a logical component that intercepts all incoming/outgoing transactions and handles internal flow. It acts as a container for the portals, databases and all services for the Grapevine Orchestration Engine.

THE GRAPEVINE ORCHESTRATION ENGINE

The Grapevine Orchestration Engine (GOE) handles the back-end mechanics of the system. That is, when a request arrives at the Data Broker, the GOE is employed to execute the orchestration workflow.

As stated in the previous example, it is the GOE that provides the list of patients matching the query, executes distributed XDS queries, checks for Grapevine Token balances, obtains documents and distributes Grapevine Tokens.

It is envisioned as a Java Service operating workflows using a machine language (e.g. WS-Human-Task). This component is to be implemented.

THE GRAPEVINE APP

The Grapevine App is the primary way patients interact with the Grapevine Data Broker. It collects the necessary information to provide potential matches with requests, fitness data from various sources (e.g. Runtastic, Endomondo, Strava) and shows the actual balance of Grapevine Tokens.

It is also the interface by which patients can search for and obtain professional health services in exchange for Grapevine Tokens (GVINE). It will be available on both iOS and Android.

THE PORTALS

There are two portals, accessible from any device. The *User Dashboard* and the *HPO Dashboard*. The former shares the same functionality as The Grapevine App.³⁶⁾ The latter is how HPOs interact with the Grapevine Data Broker and manage their account.

As with the app, users can use any OpenID-based login to enroll into the system. Both components are yet to be implemented.

THE DATABASES

Three databases persist data in the central data broker, which are only necessary for legal purposes:

- **The IHE ATNA Audit Trail.**
Required by the IHE ATNA profile, which provides evidence to Grapevine and HPOs that data access has taken place for a specific patient request. This component is based on the Tiani Spirit audit record repository.
- **The User Database.**
Containing information on registered users.
- **The Order History Database.**
Containing information about orders (from/to Pharma, Government, and HPOs) for VAT purposes, if needed.

THE GRAPEVINE FAÇADE

The Grapevine Façade allows virtually any HPO to access the Grapevine ecosystem. Based on an existing Tiani Spirit component, it exposes both a RESTful and Web Service Software Development Kit (SDK) that – thanks to its foundation on open, IHE-based standards – any IT vendor can use to enable their existing healthcare information exchange software to participate in the Grapevine ecosystem.

ONBOARDING

The onboarding process will be defined for users (patients), HPOs and Pharma, to guarantee the system is both secure and easy to use.

Patients can create credentials on the system at any time, and make their own fitness data available. To share clinical data, their HPOs will need to register the

respective patient identifier and create an association with the user, using a “low” authentication assurance level.³⁷⁾ This can be defined by each HPO individually, with no strict mandate from Grapevine, but could require, for example, an in-person encounter.

Pharma, Governments, and HPOs should be able to register

themselves by following a specific on-boarding thin procedure, which includes checking for eligibility (according to relevant legislation), performing accesses to the Grapevine test instance, and then going live. The Grapevine Foundation will produce and review the on-boarding process.

36) In fact, they share the same RESTful interface

37) The “low” level could be, for example, assimilated to the (EU) 2015/1502

4.5. SECURITY

Achieving the appropriate balance between security, usability and costs is a challenging task. However, by following established best practice, we can achieve a practical security model that guarantees data security whilst providing a comfortable user experience.

As with any security model, there are two parts: threat assessment and counter-measures.

Grapevine's team is aware of the European Union Agency for Network and Information Security (ENISA) paper "*Distributed Ledger Technology & Cybersecurity – Improving Information Security in the Financial Sector*³⁸⁾" and implements the orchestration services according to it, where applicable.

ENISA identifies two categories of threat to blockchain based coins and tokens:

- **Traditional challenges.** Key Management, Cryptography, Privacy, Code Review.
- **Blockchain specific.** Consensus Hijack, Exploiting Permissioned Blockchains, DDoS, Wallet Management, Scalability, Smart Contract Management, Interoperability, Governance Controls, and Anti-fraud.

In constructing our security architecture, we follow the ISO27002 definition of **security zones**, defined by a classification of data. As all data in Grapevine World has the potential to be Private Healthcare Information (PHI), our proposed architecture is divided into four different zones:

1. The **Inner Zone** incorporates the Grapevine Data Broker, which includes the Portal, the GOE, and the databases. This component acts as a **Data Processor**, managing the blockchain identity keys, user credentials and transaction information. As such, industry best practice will be strictly adhered to. All data will be anonymized and hosted in a ISO27001 certified data-center. Source code will be subjected to regular penetration testing and reviews by third party companies. Blockchain keys will be regularly backed up.³⁹⁾
2. The **HPO Zone** includes the data controllers and the Grapevine Façade. The usual security measures to protect healthcare data are assumed to already be in place and will not be specified further.
3. The **Grapevine App**. No data is stored and usual Multi-Factor authentication including PIN, user-name and password, is in place.
4. The public Internet. The application of mutual TLS channel and message-level encryption is implemented.

4.6. DATA EXCHANGE TECHNOLOGY

The core data exchange technology will come from one of Grapevine World's technology vendor, Tiani Spirit, whose data exchange and interoperability software is already in use worldwide.

One example is the Smart Medical Information Technology for Healthcare (SMITH) project⁴⁰⁾, in which the university hospitals of Aachen, Jena and Leipzig are

working to develop a structure for cross-institutional connectivity.

Tiani Spirit is providing the interoperability, integration and access control layer, with support from the Medical Informatics Funding Scheme of the German Federal Ministry of Education and Research (BMBF)⁴¹⁾.

38) "<https://www.enisa.europa.eu/publications/blockchain-security>", last accessed: March 16, 2018

39) Static analysis and penetration testing will be performed using e.g. ISECOM OSSTMM. The blockchain code (Dapp, and smart contracts) written in the Solidity language, will also follow an auditing procedure.

40) "<http://www.smith.care/?lang=en>", last accessed: March 16, 2018

41) "https://www.gesundheitsforschung-bmbf.de/files/Medical_Informatics_Funding_Scheme.pdf", last accessed: March 16, 2018

THE TECHNOLOGY OF GRAPEVINE

During this project, the IT infrastructure at all three sites will be advanced and harmonized, to enable data exchange between information systems for healthcare and research. Data integration centers will be established to:

Support structured medical and study documentations in clinical and research IT.

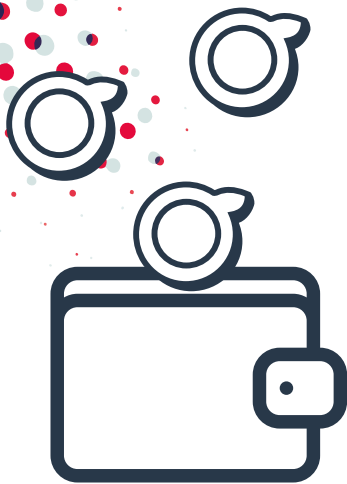
Store data and documents in internationally standardized formats (HL7 CDA, HL7 FHIR etc.) for curation and analysis.

Exchange these by means of internationally standardized communication and security procedures.

Three use cases (antibiotic stewardship, algorithmic surveillance of intensive care patients, and a phenotyping platform) will serve as demonstrators for the data exchange and the functional capability and effectiveness of the data integration centers.

For a future outlook, this [video](#) explains how Grapevine World's platform and community can further address and resolve existing problems in exchanging and utilizing healthcare data.

THE BLOCKCHAIN BASED GRAPEVINE TOKEN (GVINE)



// To participate in the Grapevine World – whether individual or institution – you need Grapevine Tokens (GVINE).

// Grapevine Tokens act as an incentive to participate. As representations of value they allow people to utilize their health information, able to later exchange Grapevine Tokens for health services and products.

// Grapevine Tokens verify all transactions. Every transaction that takes place within the Data Broker is linked to an Ethereum Distributed App (DApp), ensuring that every single transaction is not only processed, but permanently logged.

// Grapevine Tokens control the data flow. More than mere reward, they are the lubricant that moves the system's parts. Without them, the system is immobile.

5.1. GRAPEVINE TOKEN PURPOSE STATEMENT

GVINE represent the right of their holder to participate in transactions within Grapevine World.

They ensure all participants in a data exchange are reimbursed. Since the usage of data in secondary markets was recently prohibited, the introduction of Grapevine World creates an entirely new market. Transactions are governed by smart contracts - represented by GVINE. Smart contracts are entered into by participants them-

selves, with no need for third party involvement.

By design, smart contracts guarantee that the transfer of data ownership is verifiable, and ensure the buyer obtains exactly the data requested, in the form it is requested in.

Residing the smart contracts on a blockchain, all transactions are automatic and a full history is stored. This allows the ability to, for example, make payments in instalments, escrow or conditionally, based on the quality of data or ser-

vices received.

GVINE holders are free to use, sell or transfer the token - the value of which is closely related to the value generated by everyone on the platform.

Contributing data adds value. Processing data sets, enabling machine learning or simply offering time adds value: building apps, designing, delivering and advertising services.

Everyone can add value to the ecosystem. The more value added, the greater the value of GVINE.

5.2. HOW THE GRAPEVINE TOKEN CONTROLS THE DATA FLOW

The structure is similar to a Petri net firing mechanism. GVINE are markers and the incoming/outgoing transactions are transactions – enabled only when the required number of GVINE are transferred.

The whole system is then modeled with a modifiable configuration of transaction markers and arc multiplicity, which is variable depending on the value of the GVINE.

To illustrate, Figure 4 shows three simple examples.

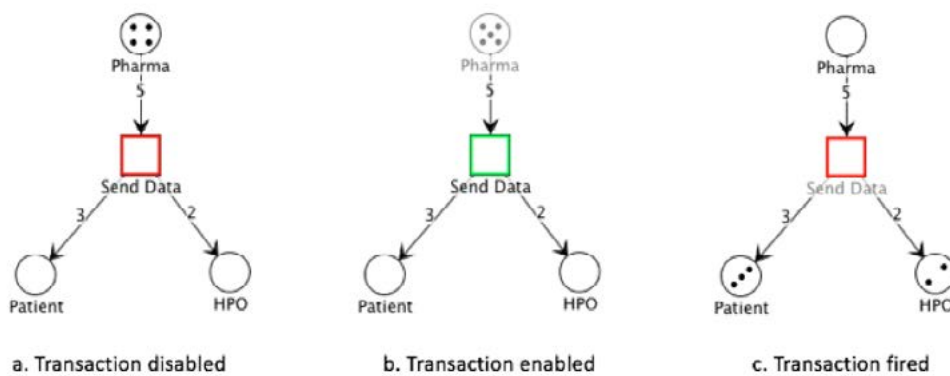


Figure 15: Transaction state

In a) the transaction is disabled. This is because the transaction “Send Data to Pharma” required five GVINE, but Pharma only sent four.

In b) the transaction is enabled. The required number of GVINE were sent. This allows the tokens and data to be distributed as depicted in c).

Configurations can change over time and are encoded in publicly accessible, digitally signed workflow scripts.

5.3. TOKEN ECONOMICS

To show the potential for the growth of Grapevine World we first need to look at the existing addressable market.

THE BLOCKCHAIN BASED TOKENS: GVINE

Existing Addressable Market

The table below outlines existing market segments that stand to make efficiency gains by participating in the Grapevine World.

The relevance per market indicates how large those

gains are. As such, it also indirectly indicates how large Grapevine world's market share could be in this segment.

The total addressable market described below amounts to USD 111.15 billion.

Market segment	Definition	Market size in 2022 (bln)	Relevance	Use Cases
Health Information Exchange	<p>This segment describes the global expenditure for data and information exchange between different individuals and organizations within the healthcare industry.</p> <p>This includes data exchange in both the private and public healthcare sector, comprising individuals, organizations and governments e.g. healthcare providers, public health agencies, medical research institutions, doctors and private patients. (Source: Mordor Intelligence Report)⁴²⁾</p>	1.36	High	UC1 UC2 UC4 UC5 UC6 UC7 Future UC1
Healthcare Data Utilization	<p>This segment refers to the analysis of large amounts of healthcare data to extract value, whether monetary or not.</p> <p>Participants in this market are hospitals, payors (organizations or individuals), Accountable Care Organizations (ACOs) and third-party administrators.</p> <p>The growth of this market is mainly driven by factors such as increasing initiatives to enhance EHR adoption, rising pressure to lower health-care spending while improving patient outcomes, the availability of big data in healthcare, rising investments in venture capital, and technological advancements. (Source: MarketsandMarkets Report)⁴³⁾</p>	31.15	High	UC1 UC2 UC3 UC4 UC6
Contract Research Organizations (CRO)	<p>Contract Research Organizations (CROs) provide support to the pharmaceutical, biotechnology, and medical device industries in form of research services outsourced on a contract basis. These may include biopharmaceutical development, biologic assay development, commercialization, preclinical research, clinical research, clinical trials management, and pharmacovigilance.</p>	36.16	Medium	UC1

Table 2: Market segments

42) "<https://www.mordorintelligence.com/industry-reports/global-healthcare-information-exchange-market-industry>", last accessed: March 16, 2018

43) "<https://www.marketsandmarkets.com/PressReleases/healthcare-data-analytics.asp>", last accessed: March 16, 2018

THE BLOCKCHAIN BASED TOKENS: GVINE

Market segment	Definition	Market size in 2022 (bln)	Relevance	Use Cases
Population/ Public Health	Population health management is the analysis of macro-level patient data to identify care gaps in the healthcare delivery system. Patient data is collected from various and diverse health IT resources, to give clinicians real-time insight into financial, operational and clinical outcomes. Using this information, they can improve the quality, safety, efficiency and cost-effectiveness of care, minimizing expensive interventions. In this use case, we consider only the data used for previously mentioned scenarios. (Source: MarketsandMarkets Report) ⁴⁴⁾	26.67	Medium	UC2
Second Opinion	Medical second opinion refers to a patient's act of requesting or seeking evaluation of her health condition by another physician or specialist to verify the diagnosis and treatment prescribed by the previous physician, or to discover an alternative treatment plan. (Source: Market Intel Reports) ⁴⁵⁾	4.75	High	UC3
TOTAL		100.09		

New Use Cases

New use cases and various innovations will develop within Grapevine World stimulated by the interoperability of data exchange and the economic possibility of (micro) transactions with a great number of participants.

Although these new uses can not be safely predicted, they might include crowdsourcing, machine-to-machine communication and affordable 'micro healthcare data services' encompassing a wide range of health data, products, software and services. By creating an automated and easy to use

ecosystem, we anticipate a broader participation in Grapevine World than in the current healthcare sector – such as individuals providing fitness data for research – which will only grow over time as engagement increases. Initially, these new uses will start at a relatively low level. But Grapevine World will have

a high market share (close to 100%) early on, given the lack of similar platforms.

As Grapevine World matures, we anticipate these new uses to become a major factor in the Grapevine economy. Our projections for this segment's growth are below:

In bln USD	2018	2019	2020	2021	2022	2023	2024	2025
Market	0.01	0.04	0.29	0,87	2.18	3.92	6.07	7.89

Table 3: Market Growth New Use Cases

44) "<https://www.marketsandmarkets.com/PressReleases/population-health-management.asp>", last accessed: March 16, 2018

45) "<https://www.openpr.com/news/381799/Medical-Second-Opinion-Market-Set-to-Grow-3-4-Billion-USD-By-2020.html>", last accessed: March 16, 2018

THE BLOCKCHAIN BASED TOKENS: GVINE

Combined with existing use cases, this leads to a total addressable market of USD 113.33 billion by 2021 (USD 111.15 billion for existing use cases and USD 2.18 billion for new).

Further, we anticipate that the Grapevine Backbone will be adapted for use in sectors other than healthcare, expanding Grapevine World's standardized data exchange into new markets such as agriculture, automotive, energy, education, e-government, finance and justice.

Projected Growth

In recent years, the Global Healthcare Expenditure Market grew by an average of 4.56% per year. We expect to be part of this growth, as governments and other stakeholders endorse the fully connected and interoperable software landscape we are building.

However, as a self-fulfilling ecosystem, we anticipate the new use case segment to grow much faster than the market average, and will do everything we can to stimulate this growth by lowering the entry and access barriers.

Referring to the calculation in the section "Token Generation Process", the total addressable market and Grapevine World's market share will develop as shown in the graphic below.

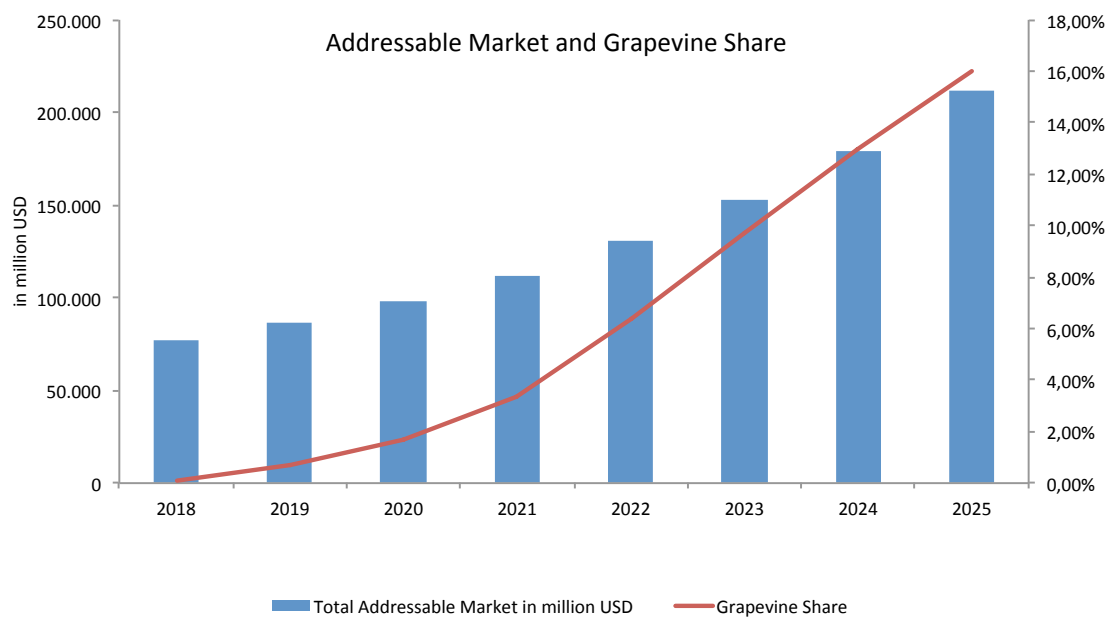


Figure 16: Addressable Market and Grapevine Share

Monetary Policy: Token Generation Process and Distribution

GVINE will initially be distributed by a pre-sale followed by an Initial Coin Offering (ICO).

We aim for the first distributions to provide a fair chance for all members of the global healthcare community to access GVINE, based on

their participation in, and commitment to, Grapevine World.

The pre-round in Q1 '18 will involve early supporters and leading industry experts. This distribution will account for only 1,75% of the total amount (with no lock-up

period). The Grapevine ecosystem will then be established. The first transactions will be settled and price points for various services and contributions will be validated.

In Q2 '18 the ICO will issue 45% of all available GVINE.

THE BLOCKCHAIN BASED TOKENS: GVINE

It will address the global blockchain community, broad healthcare industry (medical research, insurance companies, MDs, hospitals), telecommunications and software

companies, and individual early adopter prosumers.

We expect the value of each GVINE to increase rapidly, in line with the exponential growth of the

global Grapevine community – precipitating a corresponding growth in transactions.

The following table shows the estimated Grapevine token economics:

MARKET DATA	Unit	2018	2019	2020	2021	2022	2023	2024	2025
Health Information Exchange (DATA)	USD	898.460.903	996.752.526	1.105.797.252	1.226.771.471	1.360.980.270	1.509.871.512	1.675.051.455	1.858.302.084
Grapevine market share	%	0,20%	0,50%	1,00%	2,25%	4,50%	7,00%	10,00%	12,50%
Healthcare Data Utilization (Data)	USD	11.938.108.990	15.173.336.526	19.285.310.725	24.511.629.931	31.154.281.643	39.597.091.968	50.327.903.891	63.966.765.846
Grapevine market share	%	0,09%	0,30%	0,70%	1,90%	3,75%	5,50%	8,00%	10,00%
Data for Clinical Research (CRO)	USD	27.947.379.126	29.806.633.002	31.789.577.367	33.904.440.972	36.160.000.000	38.565.614.490	41.131.267.173	43.867.604.902
Grapevine market share	%	0,00%	0,05%	0,03%	1,20%	3,00%	4,50%	6,25%	7,50%
Population/Public Health (Data)	USD	10.854.965.200	13.590.416.430	17.015.201.371	21.303.032.116	26.671.396.210	33.392.588.054	41.807.520.244	52.343.015.346
Grapevine market share	%	0,00%	0,03%	0,20%	0,70%	2,00%	3,00%	4,00%	5,00%
Second Opinion	USD	2.433.570.678	2.876.480.541	3.400.000.000	4.018.800.000	4.750.221.600	5.614.761.931	6.636.648.603	7.844.518.648
Grapevine market share	%	0,00%	0,03%	0,20%	0,80%	2,25%	3,25%	4,75%	5,50%
New Use Cases	USD	10.000.000	40.000.000	290.000.000	870.000.000	2.175.000.000	3.915.000.000	6.068.250.000	7.888.725.000
Grapevine market share	%	80,00%	75,00%	70,00%	67,00%	65,00%	63,00%	61,00%	60,00%

TOKEN ECONOMICS	Unit	2018	2019	2020	2021	2022	2023	2024	2025
Total Addressable Market	USD	54.082.484.897	62.483.619.026	72.885.886.715	85.834.674.491	102.271.879.723	122.594.927.955	147.646.641.366	177.768.931.826
Grapevine Transaction Volume EQ	USD	19.944.314	99.523.813	399.422.424	1.664.348.243	4.368.387.584	7.669.691.120	12.453.615.774	17.700.869.006
Grapevine share	%	0,037%	0,159%	0,548%	1,939%	4,271%	6,256%	8,435%	9,957%
Total amount of tokens	#	825.000.000							
Tokens in circulation	#	618.750.000	618.750.000	618.750.000	618.750.000	618.750.000	618.750.000	618.750.000	618.750.000
Speculative Position	%	50%	48,00%	22,00%	18,00%	15,00%	13,00%	12,00%	10,00%
Speculative Position Tokens	#	309.375.000	297.000.000	136.125.000	111.375.000	92.812.500	80.437.500	74.250.000	61.875.000
Available Tokens for Transaksions	#	309.375.000	321.750.000	482.625.000	507.375.000	525.937.500	538.312.500	544.500.000	556.875.000
Token Turnover	#	154.687.500	321.750.000	965.250.000	2.536.875.000	4.207.500.000	5.383.125.000	6.261.750.000	6.960.937.500
Token velocity (excl. spec. pos.)	1/#	0,50	1,00	2,00	5,00	8,00	10,00	11,50	12,50
Price Equilibrium Forecast	USD/Token	0,128933	0,309320	0,413802	0,656062	1,038238	1,424766	1,988840	2,542886

Table 4: Grapevine token economics

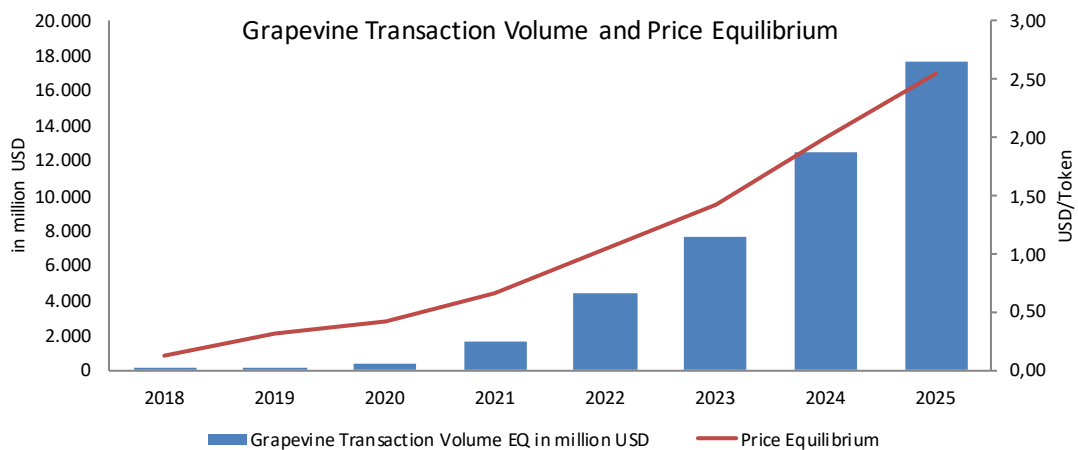


Figure 17: Grapevine Transaction Volume and Price Equilibrium

5.4. METHODOLOGY FOR TOKEN DISTRIBUTION

TOKEN DISTRIBUTION

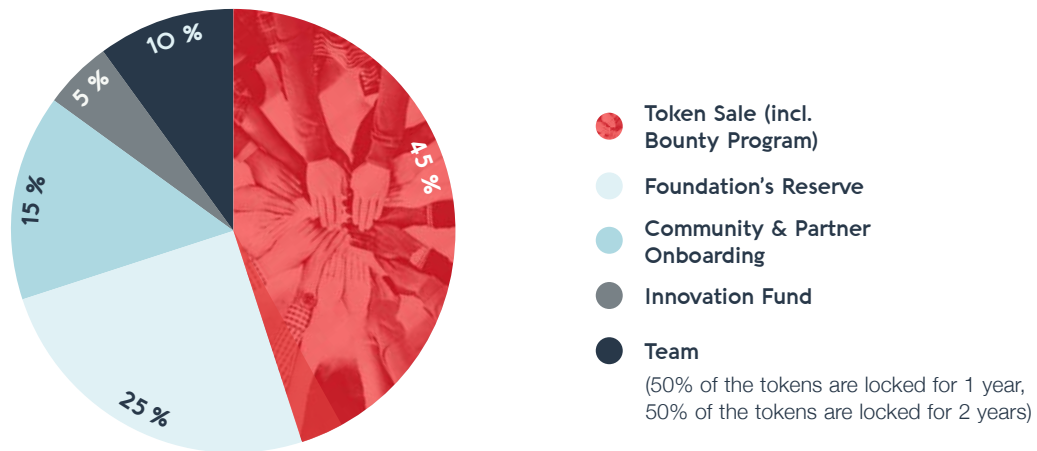


Figure 18: Token Distribution methodology

SETTING THE INITIAL PRICE OF GVINE

Three components combine to determine the price of GVINE

- The overall market size and use of GVINE in exchange for data, products and services.
- The decision of forward-looking supporters to buy GVINE.
- The elements that drive consumer adoption and merchant acceptance of GVINE, concurrent with a general acceptance of Grapevine World as the gold standard for incentivizing data exchange.

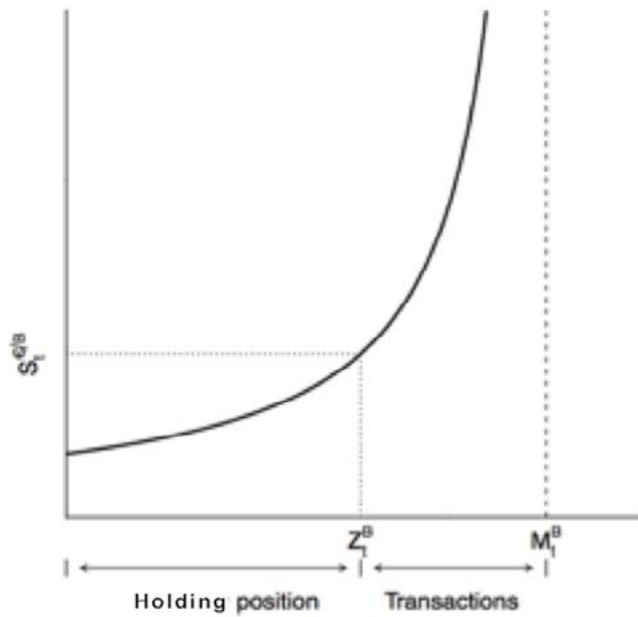
The price setting mechanics can best be described with the following formula (where T = Tokens i.e. GVINE):

$$S_t^{\text{€}/B} = \frac{T_t^{B^*}}{(M_t^B - Z_t^B)V_t^{B^*}}$$

Figure 19: Price Setting GVINE

The equation describes the effects of the most fundamental factors affecting the exchange rate of a token (the same as fiat money). The exchange rate:

- Increases concurrently with the volume of transactions for goods and services paid for with tokens (TB^*).
- Decreases concurrently with the velocity of tokens (VtB^*) and/or the total quantity of tokens (MtB).
- Increases inversely with the quantity of tokens held in the speculative position (ZtB), as this effectively reduces the quantity of virtual currency available.



The Z_t^B point on the curve corresponds to the case in which all units of tokens are used in exchange for real goods and services. In the presence of speculation, the exchange rate is higher because fewer tokens are available to facilitate transactions. In other words, scarcity on the supply-side with constant demand leads to increased token prices.

Figure 20: Fundamental factors affecting the exchange rate

5.5. USE OF ICO PROCEEDS

The total cost to develop, promote, grow and operate the Grapevine World over the next three years will amount to \$30M and will be solely funded by proceeds from Grapevine Tokens (GVINE).

A detailed budget has been developed, but some flexibility will be factored into planned expenditures to enable us to respond to evolving requirements.

The costs described below encompass costs incurred by the Grapevine Foundation itself, as well as affiliated entities involved in operating the business and/or the Grapevine Backbone.

USE OF FUNDS

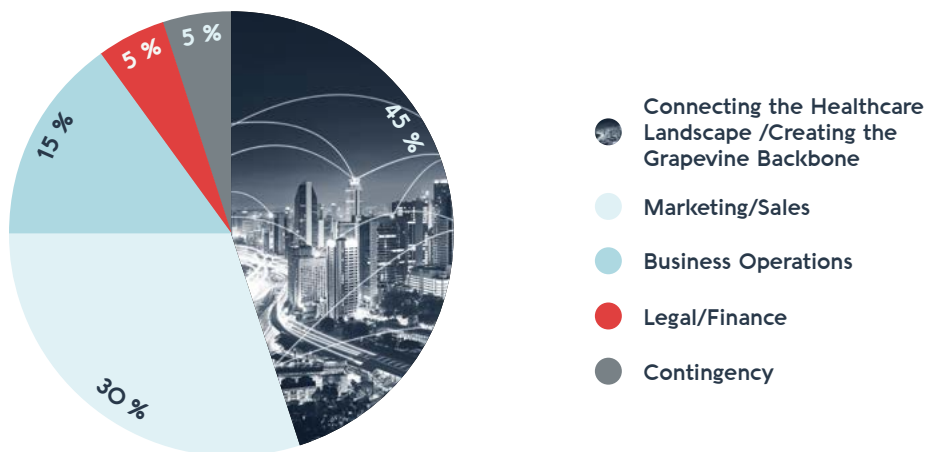


Figure 21: Token Distribution methodology

Allocation of ICO proceeds

a. **Development of the Grapevine Backbone (45%)**

The core investment is the development of the Grapevine Backbone, particularly the purchase of IHE compatible technology to secure fully standardized interoperability.

b. **Business Operations (15%)**

Business Operations will be focused on identifying and forming partnerships with new customers, and leveraging existing partnerships across the globe. It will also ensure that internal administrative processes are executed with efficiency and best practice. Operating the Grapevine Backbone is part of this cost center.

c. **Sales & Marketing (30%)**

The focus of Sales & Marketing is on international B2B and B2C marketing, channel partner management, sales and regional growth.

Marketing will primarily focus on creating new use cases and promoting them. The marketing team is also tasked with public and token holder relations delivering publicity activities, advertising and customer interaction.

d. **Legal, Compliance & Finance (5%)**

Legal counsel and tax advisory is necessary in both existing and new jurisdictions to ascertain the laws and regulations of each sovereign country to ensure that the Grapevine Backbone adheres to requirements and remains compliant.

e. **Contingency Costs (5%)**

This segment allows for unforeseen business expenses.

The future may provide opportunities for the Grapevine Backbone to be used in other sectors.

Such uses could clearly – and advantageously – expand the use of the Grapevine Backbone across other verticals, but would require additional investment. This investment is not accounted for in the above and any such investment would need to be addressed separately.

5.6. ROADMAP

The initial phase involves prototyping and establishing the core infrastructure for the Grapevine World and the underlying Grapevine Backbone.

The Grapevine Foundation will be established, the Grapevine World will be built and the Grapevine Token (GVINE) introduced as the exchange token of the marketplace.

After the ICO the smart contract structure will be launched, including protocols for interfacing the order orchestration to the decentralized partner modules (data archives, analytic modules, cloud resources, service modules etc.)

Strengthened marketing and promotion efforts will aim to attract new community members and increase acceptance in the industry.

As part of this, an innovation fund will be established to help start-ups and SMEs build services enriching the Grapevine ecosystem.

Below is a more detailed timeline:

The Roadmap	
Supporting Documentation (Website, FAQ, Positioning Paper)	Nov '17
Whitepaper	Dec '17
Pre-round	Feb '18
Prototype 1: International Data Exchange & Access (Europe <--> US)	Jul '18-Mar '19
Prototype 2: Utilize anonymized Patient Data (Pharma)	Jun '18-Feb '19
Prototype 3: Acquiring Medical Services with GVINE (Care Manager)	Dec '17 - Oct '18
ICO/TGE	Jul '18 - Aug '18
Token Listing	Aug '18
Onboard Pharmaceutical Corporations	Q4 '18
Onboard Healthcare and Medical Service Providers	Q4 '18
Onboard Research & Teaching	Q1 '19
Onboard Public and Population Health Organizations	Q1 '19
Onboard Health Insurances and Payors	Q2 '19
Onboard eHealth App Developers	Q2 '19

Table 5: Roadmap



06

USE CASES

To better understand how Grapevine World will be used, and the technology will operate, let us examine some use cases. As the first use case provides a detailed technology flow that other use cases will be variations of, it will be described most extensively. This use case is essentially a more complete description of the use case from section 4.3.

Steps given together occur at least partially in parallel.

To fully understand the use cases, let us refresh our memories as to the different parts of the Grapevine system.

The Grapevine Backbone is composed of:

- **The Grapevine App** (for iOS and Android)
Receives notifications about new data requests from external entities and lets patients provide informed consent to share.
- **The HPO/Vendor Façade**
An IHE-based application that allows connections from the Grapevine Data Broker to the Healthcare Information System.
- **The User Dashboard**
A portal solution in which the users (patients and providers) register, receive notifications of new data requests and modify their consent preferences.
- **The Grapevine Data Broker**
Receives requests for data, broadcasts such requests to the matching users (patients and providers), verifies payments and triggers the distribution of Grapevine Tokens.
- **The Ethereum DApp**
The smart contract which manages the distribution of tokens and is executed in the Ethereum blockchain.

HEALTHCARE DATA UTILIZATION

USE CASE 1: MEDICAL RESEARCH

In this case, a Pharmaceutical company requires data for a trial, and uses the Grapevine Backbone to request it.

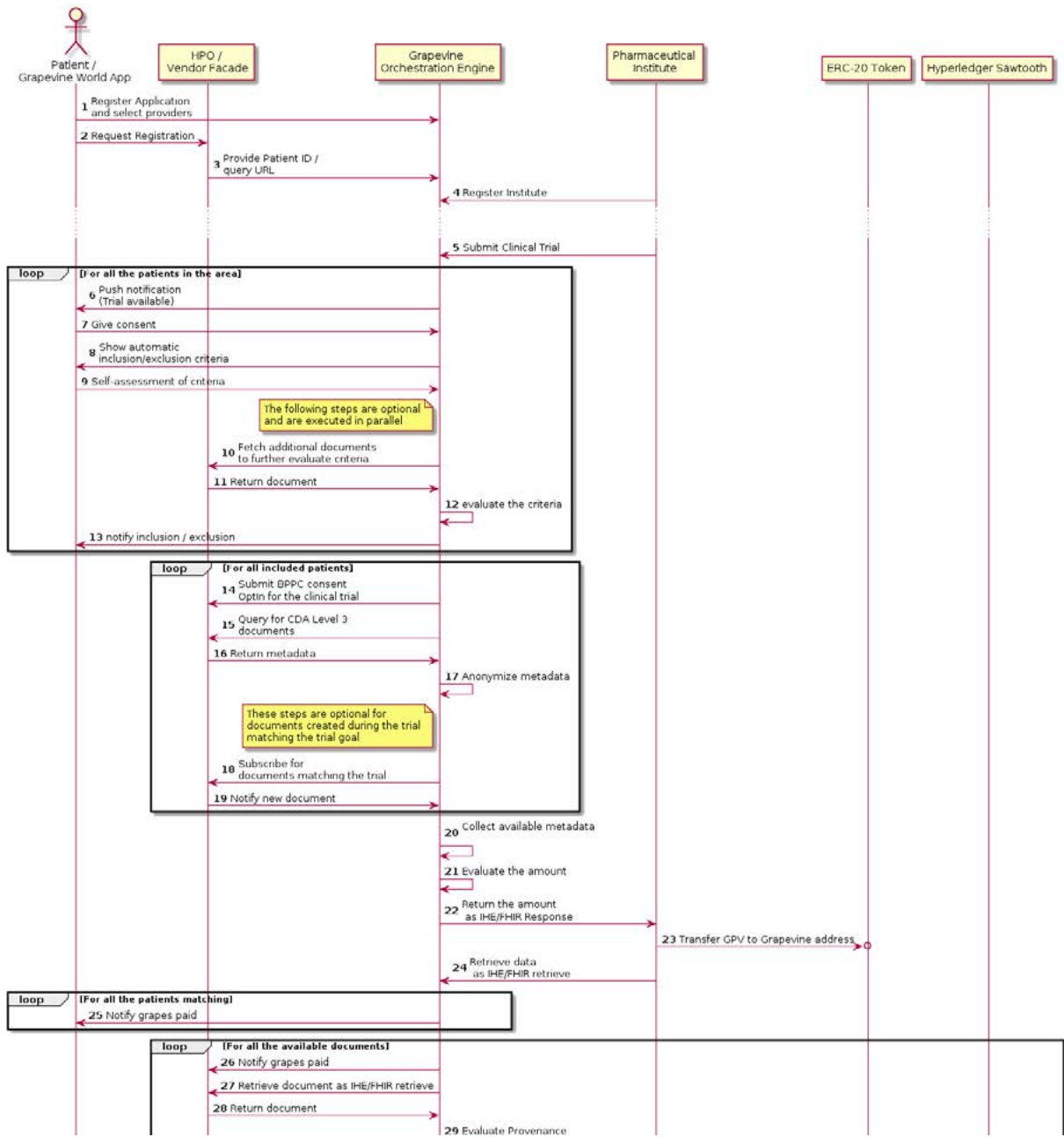


Figure 22: UML of the use case "Medical Research"

Steps 1&2

Patients and HPOs Register with Grapevine

Patients download the Grapevine App and register on the User Dashboard. This can be done with an OpenID such as a Facebook login. At this point, they can provide their demographic data, self-reported health data e.g. age, weight and lifestyle and fitness data (collected with e.g. Runtastic or Endomondo). To provide medical data, patients must select the HPOs which is storing their data.

HPOs voluntarily register on the User Dashboard and enroll into Grapevine by following a defined onboarding procedure e.g. support for IHE/FHIR transactions. Once they are registered, they can supply medical information to Grapevine at patients' request, having confirmed their identity using a low Authentication Assurance Level (AAL) such as a personal visit where a one-time password is created, or a QR Code scanned. Their internal patient identifier can then be linked to the patient's Grapevine username.

Note that HPOs also received Grapevine Tokens for data requests, and so are incentivized to register patients.

Step 3

Data is Requested

A Pharma company would like to perform statistical analysis on a specified subset of the population, for research towards a new medication. The company consults Grapevine for provenance guaranteed data, specifying its request parameters. The request is made using an IHE/FHIR transaction.

Step 4

The Data Broker Matches Potential Candidates

The Data Broker matches potential patient candidates and sends a message to them via the App or Portal, to alert them their data may be relevant for research purposes, and to request consent for its use.

Step 5-6

Patient Consents

If the patient consents, the Data Broker submits an IHE consent on their behalf. This rests on existing hospital procedures and security measures – to HPOs, Grapevine is seen merely as another data consumer.

Step 7-8

Grapevine Queries Document Metadata

The Data Broker queries and retrieves the metadata for the patient's data.

Step 9

Metadata is Anonymized

All metadata for the request is collected and anonymized.

Step 10

Payment is Determined

Using a formula mainly based on size of data request, the amount to be paid is determined.

Step 11

Requestor is Informed

The Pharma company is informed of the amount to be paid, with a IHE/FHIR response.

Step 12

Payment is Transferred

If the Pharma company decides to pay, they transfer the required Grapevine Tokens using the Ethereum DApp.

Note that the patient and HPO transactions are blocked until the necessary number of Grapevine Tokens (GVINE) is reached. If the GVINE are not received, the transaction times out.

Step 13

Data Retrieval is Enabled

Grapevine Tokens received, the transaction is enabled, and the Pharma company will be able to retrieve the data, once it has been collected.

Step 14-17

Patient & HPOs Informed, Data Retrieved

In parallel, the Data Broker notifies the patient and HPOs that payment has been received, initiating a data retrieval from all available HPOs.

Step 18

Data Cached and Anonymized on the Data Broker

The collected data is cached and anonymized - ready for delivery.

Step 19

Data Retrieved by Pharma

The Pharma company can now retrieve its requested data.

Step 20-22

Payment Distributed to Patients and HPOs

In parallel to (19), the Data Broker distributes the necessary Grapevine Tokens to the relevant patients and HPOs.

USE CASES

Note that the blockchain only stores the transactions of Grapevine Tokens, and nothing else. All personal information is handled through the Data Broker (Grapevine Orchestration Engine, GOE). It only stores data in transient mode - only for the time needed for the transactions to be concluded and only in a temporary storage - and then the data is immediately removed.

The other user information (e.g., email, ethereum address, name, surname) are protected in a database and accessible only through the GOE, therefore the attacks such as wanna-cry are impossible by design.

An example for an hypothetical payment could be:

1. Pharma Request costs **x** Grapevine Tokens/Patient
2. Patient receives **0,5x** Grapevine Tokens for giving consent and providing fitness data
3. HPO receives **0,2x** Grapevine Tokens/Patient for providing Clinical Data
4. Analytics Service Provider receives **0,2x** GVINE/Patient for providing Services
5. GV receives **0,1x** GVINE/Patient

USE CASE 2: GOVERNMENTAL

A governmental body is collating population health statistics.

The UML and the flow are the same as Figure 5, however, the Pharma company is replaced by a Governmental Body.

An example for an hypothetical payment could be:

1. Population Health request costs **x** Grapevine Tokens/Patient
2. Patient receives **0,5x** Grapevine Tokens for giving consent and providing fitness data
3. Healthcare Provider receives **0,2x** Grapevine Tokens/Patient for providing Clinical Data
4. Analytics Service Provider receives **0,2x** Grapevine Tokens/Patient for providing Services
5. GV receives **0,1x** Grapevine Tokens/Patient

USE CASE 3: PAYOR

To grant incentives or decrease the insurance premium, a Payor is interested in knowing if a patient is confirming to provided guidelines, for example, the patient is exercising regularly, adopting an active lifestyle, or participating in telemonitoring.

In this case, the Pattern is similar to Use Case 1, however, there is no HPO providing clinical data – all data is retrieved from the patient's own smartphone. This is shown in Figure 5.

An example for an hypothetical payment could be:

1. Payor Request costs **x** Grapevine Tokens/Patient
2. Patient receives **0,9x** Grapevine Tokens for providing Consent + Fitness Data
3. GV receives **0,1x** GVINE/Patient transaction

USE CASES

USE CASE 4: APP DEVELOPMENT

An App Developer needs data to e.g. train an Artificial Intelligence, or engage in machine deep learning.

The flow is similar to UC1, replacing the Pharma company with the App Developer. The Developer may obtain a discount on the data, in return for contributing to the ecosystem.

An example for an hypothetical payment could be:

1. AppDev Request costs **x** GVINE/Data Set
2. Patient receives **0,7x** GVINE for giving Consent and providing Fitness Data
3. HPO receives **0,2x** GVINE/Patient for providing Clinical Data
4. GV receives **0,1x** GVINE/Patient

USE CASE 5: TEACHING AND RESEARCH

A patient donates their data to universities for teaching healthcare related topics.

The UML is similar to UC1. However, in this case the transaction is triggered by the patient. A hypothetical payment could be:

1. Patient donates personal health data and gives consent
2. Teaching/Research Organization pays **x** GVINE/Data Set
3. Healthcare Provider receives **x** GVINE/Data Set

CROSS-BORDER DATA EXCHANGE

The Grapevine Backbone is used to share clinical data between regions and continents.

Examples include:

1. Accessing medical records of a patient requiring treatment away from their home country.
2. Sharing data across regions from rare disease research.
3. Supporting developing countries to access a wider range of data for research.

We are aware of the technical and semantic interoperability issues that may arise e.g. different dosages of medicines in electronic prescriptions; language barrier in patient summaries. However, these issues are already being researched by the EU Commission (with OpenNCP), IHE-enabled countries and the transatlantic data exchange, TrilliumBridge.eu.

We are confident that by leveraging this research, cross-border interoperability issues can be overcome in the future.

ACQUIRING MEDICAL SERVICES AND PRODUCTS

The patient uses GVINE to seek medical expertise such as surgery or diet suggestions from an expert network.

The UML is shown below.

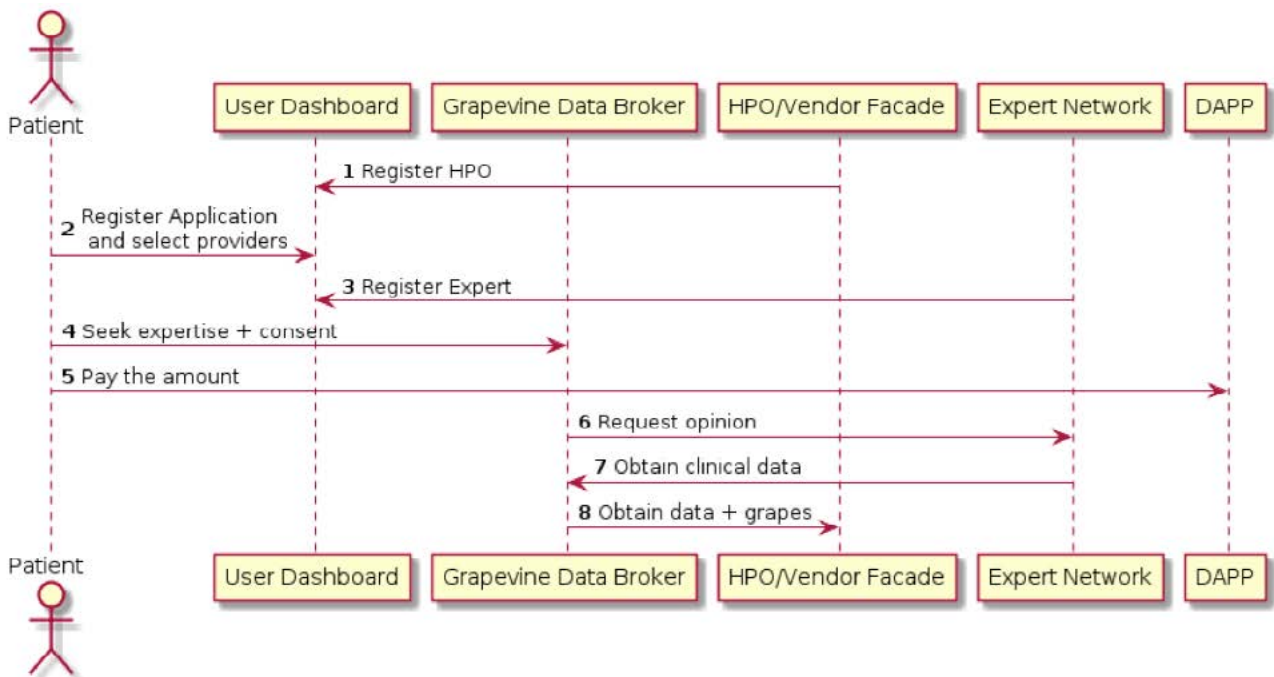


Figure 23: UML of the use case "Acquiring medical services and products"

GOVERNANCE STRUCTURE OF THE GRAPEVINE FOUNDATION

The Grapevine Foundation is an Austrian based Foundation, established for guiding the efforts of participants in the Grapevine World. The Foundation's assets are set apart from the private assets of the founders. The Foundation has no members, participants or shareholders. It operates pursuant to the Foundation documents and the articles of association. We have contributed the minimum capital of the Grapevine Foundation amounting to EUR 70,000. This amount became the assets of the Foundation to which its liabilities are limited.

7.1. GOVERNING BODIES

The supreme authority of the Grapevine Foundation is the Foundation Council, established and run using best practices for non-profit board formation. It manages the Foundation and represents it in any legal relations.

7.2. AUDITORS OR CONTROL AGENCY

The Grapevine Foundation will appoint auditors from auditing firms and chartered accountants.

7.3. CODE REVIEW COMMITTEE

The Code Review Committee comprises core developers in the Grapevine World development team, who are responsible for the underlying technology development, API development, product development, etc.

Developers will hold weekly meetings to track project status and communicate progression and requests. Committee members follow the updates and hot topics from the community, maintain communication with GVINE holders inside the community and organize technical workshops occasionally.

7.4. DISPUTE RESOLUTION

All disputes related to the Grapevine Foundation, token acquisition and distribution, shall be settled based on independent and out-of-court mitigation to reach a mutually acceptable agreement.

THE GRAPEVINE ICO TEAM

8.1. TEAM

MARTIN TIANI

Founder & Project Sponsor



Martin has 20+ years of experience in building companies in the space of interoperability and standardized data exchange. Starting his career as a software developer in the radiology domain in 1991, he founded Tiani Spirit in 2004. Martin's vision is enable citizens around the world to share their personal information based on the standardized IHE methodology. After achieving major progress in the healthcare domain, he is determined to bring advances of standardized interoperability to other verticals like energy, education, the financial industry, e-government, automotive, and more.

WERNHARD BERGER

ICO Lead & Co-Founder



Wernhard graduated from Vienna University of Economics and Business and has held multiple roles at start-ups, consultancies and multinational corporations in Vienna, London and Silicon Valley. By establishing a Start-Up Accelerator for Cisco, Intel and Deutsche Telekom, he gained experience working at the intersection of the old and the new economy. Before his role at Grapevine World, he was leading business development and go-to-market for Cisco's Connected Health Interoperability Platform and Medical Data Exchange Solution, coordinating sales, marketing and product management activities across Europe and the US. Wernhard is also a pro-bono consultant for a social enterprise, a reserve officer in the Austrian army and completing his Masters at the University of Cambridge.

JÜRGEN PRICKEN

Operations Lead & Co-Founder



Jürgen started in PSK Bank, after Vienna Business School. Later he had several occupations, where he collected experience in various companies. He also was active in several leadership positions. Jürgen co-founded a Viennese local guide and a cross media agency before he finally landed at Tiani Medgraph in 2001. There he gained a lot of experience in software testing, documentation, IHE and was a lead of the service-backend management. As a co-founder of Tiani Spirit, he has experience in the field of interoperability. Jürgen was responsible for partner management, marketing over the last years. In recent years, Jürgen has been working as CMO and has a seat in the executive board of Tiani Spirit. Together with Martin Tiani he developed the grapevine concept and co-founded Grapevine World. In addition, Jürgen is still a member of the IHE MarCom and Steering Committee.

WALTER SCHLESCHITZ

Marketing Lead & Co-Founder



Walter graduated from the International School of Economics in Carinthia - specialized in business informatics and marketing. Later, during his studies of Media and Information Management in Vienna, he applied his knowledge at various marketing agencies, starting as team leader, marketing assistant and project manager. After finishing his master thesis, Walter was responsible for developing marketing strategies for several international companies and supervised the implementations on all levels.

MASSIMILIANO MASI

Blockchain, Architecture & Security Lead



Massimiliano received his M.Sc. in Computer Science, and his Ph.D. from the University of Florence in Grid Computing (with CERN) and Security and Formal Methods, respectively. He participated in the design and planning of security measures and requirements of several nationwide projects (e.g., Austrian ELGA, eHR.ZA in South Africa, Consent2Share in USA). Massimiliano was the coordinator of the core team of the epSOS.eu Security Expert Group and in the e-SENS.eu architectural board, while coordinating all the national eHealth pilots. Massimiliano has been a member of the OASIS and IEEE, and is also the editor of the IHE ITI profile XCF, and participated in the evaluation of the IHE profiles related to security (e.g., XUA, XUA++, SeR, Access Control White Paper, and ATNA). Massimiliano is acting as consultant for the ENISA, for the EU Commission, and the Austrian Federal Ministry of health. Together with the Hyper e-Health team, he is promoting and implementing blockchain-based initiatives.

ABDALLAH MILADI

Senior Blockchain & Healthcare IT Engineer



Abdallah has 10+ years of experience in the deployment of large-scale healthcare projects. After receiving his M.Sc in Computer Science, he worked for IHE-Europe for 3 years implementing orchestration and validation tools. He, then, joined Tiani-Spirit where he took over the Enterprise Master Patient Index product development. Abdallah helped integrating the local communities to national infrastructures in Albania, Austria and Switzerland. In the recent years, he is involved in many blockchain initiatives trying to reconcile blockchain with the healthcare data. Another strength of his activity is applying the IHE methodology to other verticals, thus his involvement in the IES project.

THE GRAPEVINE ICO TEAM

MARTIN RÜFENACHT

Community Building Officer



Martin has 15+ years of experience in building communities in the space of interoperability and standardized data exchange. Martin's vision is a connected society, where citizens and patients are able to receive new services and benefits using connected data. With Grapevine World he wants to enable people around the world to access and manage their health information based on global standards and with consent. After achieving major progress in the healthcare domain, he is determined to bring advances of standardized interoperability to other verticals such as energy, education, government, automotive and more.

FELIX BILER

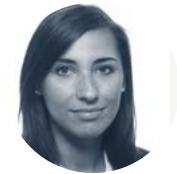
Blockchain & Business Analyst



Felix has the entrepreneurial spirit. At the age of 18 he founded his first start-up. He participated in several university programs around the globe (Wharton School, Cevro Institute, Kyiv National Economic University, University of Konstanz, City University of London). Besides his main study in London and Konstanz, he was working as Head of IT for a student led consultancy and advised a number of tech start-ups. Moreover, he was involved in creating a new IT environment for a hospital chain. Felix is specialized in classical econometric approaches such as Monte-Carlo simulations and bringing these into Grapevine's token economics. His main goal is to assure a scalable GVINE Token to create a long-lasting ecosystem and supporting Grapevine World in building a new health economy.

BOJANA PAVLOVIC

Marketing & Project Assistant



Prior to joining Grapevine World as a newcomer in December 2017, Bojana gained experience in marketing, PR and project management in various internships. She completed her studies in journalism and communication sciences at the University of Vienna with a focus on public relations and project management. After graduating, she independently managed projects as a PR consultant. Now she is expanding and consolidating her skills in her new position as an assistant in marketing and project management.

8.2. ADVISORS

SASHA BOROVIK

Legal & Cryptoeconomics Advisor

Cryptology Asset Group



Since graduating from Harvard Law School, Sasha Borovik has been working as an international attorney and entrepreneur in Silicon Valley, Seattle, Washington DC, Munich, Paris and London. As a member of several management teams, including Microsoft, Akamai and Bio-Signal, which he founded with a world-leading brain scientist from NYU, he has been leading companies' growth strategy across the world. He has handled major technology deals, with organizations such as NATO, UN and the EC. He is currently a legal & cryptoeconomics advisor for Grapevine and is working on several advanced blockchain projects together with Cryptology AG in finance, healthcare, energy and earth observation industries. Sasha is admitted to professional bars in the EU and in the state of New York.

JIM ST. CLAIR

Interoperability Advisor



Jim St. Clair is CTO at The Dinocrates Group and leads the Blockchain Advisory Service. He is also the founder of the Institute for Healthcare Financial Technology. With his expertise in Blockchain technology, health fintech, cyber risk and security, an experienced insider takes a seat on the Grapevine Advisory Board. "Dinocrates Blockchain Advisory Services help guide customers through the understanding, application and adoption of Blockchain and Distributed Ledger Technology" says St.Clair. "The strategic partnership with Grapevine will help establish global reach in offering comprehensive technical and strategic solutions".

ANDRÉ FENTON

Academic Research Advisor

Professor of Neural Science
New York University



André is a Professor of Neural Science at New York University. His research focus is molecular, neural, behavioral, and computational aspects of memory. He studies how brains store experiences as memories, and how the expression of knowledge activates information that is relevant without activating what is irrelevant. In an effort to integrate investigations and understanding across levels of biological organization, the Fenton laboratory uses genetic, molecular, electrophysiological, imaging, behavioral, engineering, and theoretical methods to investigate these fundamental and interrelated issues in neuroscience. André and colleagues identified PKMzeta as the first molecule that maintains the persistence of memories in the brain, a discovery recognized by Science Magazine as one of the 10 most important breakthroughs in all of science and technology published in 2006. André founded Bio-Signal Group Corp., which developed and commercialized an FDA-approved portable, wireless, and easy to use platform for obtaining medical quality EEGs anywhere, anytime, and for everyone. It is being used in innovative clinical applications including in emergency medicine, sports, space exploration, and underserved clinics in Africa. André co-hosts NOVA Wonders soon to air on PBS.

THE GRAPEVINE ICO TEAM

PETER POKIESER

Medical Advisor
Unified Patient Program Lead
Medical University of Vienna



Dr. Peter Pokieser manages the Institute of Medical Imaging at Sanatorium Hera and is founder and CEO of Unified Patient Program at the Medical University of Vienna. „The patient-oriented perspective of health professionals, directly to inform, communicate and share education at the point of need, seems to be completely underestimated in current E-Health activities. This has to change as soon as possible“, says Pokieser. He will advise Grapevine based on his medical expertise and knowledge of IT strategies for medical information, communication and learning systems. Pokieser is also adding his far-reaching network to Grapevine World.

FREDRIK LINDEN

eHealth Advisor
Hamling (Owner and
Consultant Hamling IT AB)



Fredrik has extensive domestic and international experience in eHealth and the healthcare industry and he has an understanding of its key business drivers. He has a diversity of skills in the eHealth field and recognition as a distinguished international leader in a multidisciplinary environment. He has always been driven by a strong social mission and a desire to improve the efficacy and efficiency of healthcare systems, mainly by improving the eHealth solutions ability to connect scientific research and healthcare delivery for mutual benefit. Fredrik was project coordinator of the European eHealth project epSOS, the forerunner of the current implementation of national contact points for healthcare across Europe.

YAGUB RAHIMOV

Blockchain, Media
and ICO Advisor



Yagub Rahimov is Co-founder and CEO at 7marketz Group, a leading global FinTech/Blockchain media holding with 17 brands worldwide. 7MARKETZ Group Blockchain Solutions is one of the Top 3 Global ICO makers. The group is the party behind leading brands such as iCoinSummit, iCoinSentiment, AtoZMarkets, GrowthChannel.io, NewsOgram, and a number of other Fintech brands.

Yagub is a Libertarian with strong vision in decentralized economy. He has been in Bitcoin world since July 2009. He has advised exchanges, trading platforms, regulators, compliance agencies and over 30 ICOs.

PETRA WILSON

Data Privacy, Compliance &
Governance Advisor
Managing Director and Co-Founder,
Health Connect Partners sprl



Petra Wilson is the Co-Founder and Managing Director of Health Connect Partners. She has over 20 years experience in digital health policy and strategy and is a Certified International Privacy Professional (CIPP/E). Petra's advisory role at Grapevine focuses primarily on ensuring the compliance with the requirements of the General Data Protection Regulation (GDPR). Petra will draw on her 8 years of experience in the European Commission, where she focused particularly on the data protection in healthcare and the applications of the Data Protection Directive in the eHealth sector. Petra holds a Doctorate in Public Health Law from Oxford University and is proficient in English, German and French. "I am delighted to serve on the Grapevine Advisory Board, and to be part of the exciting initiative which provides a dynamic, secure and exciting model for liberating health data to fuel the change in health systems around the world that are needed so badly".

MICHAEL BAYER

Corporate Partner
Expansion Advisor



Mr. Bayer brings with him more than two decades of experience in the high-tech industry. His deep understanding of multiple technologies, global markets, large enterprise operations and passion for digital innovation are expected to prove invaluable as Grapevine continues to hone its go-to-market strategy. Michael B. Bayer spent the bulk of his career running organizations and operations addressing the needs of multiple complex industries, including Service Providers, BPOs, Governments, Retail, T&L and Financial Services. He has a strong track record in successfully leading global organizations, as well as implementing and operating of large-scale initiatives. Most recently Mr. Bayer was Executive Vice President and Executive Director at NCR, in this capacity he was responsible for their global x-industry sales and field marketing forces and had run their Retail Division prior to this assignment. Throughout his career he held different senior positions in tech companies like Cisco, Symbol Technologies and Avaya.

WOLFGANG SCHUBERT

Legal Advisor
Managing Partner
BLS Attorneys at Law



Being admitted to the Austrian bar since 1993, Wolfgang has gained broad experience in commercial law through his involvement in more than 3,000 court and arbitral proceedings. Exemplary for his highly successful work in litigation, he was mandated in the Kaprun and BAWAG cases, both cases being among the largest ever to go to trial in Austria. Also, during his international activities as advisor for the negotiation and the drafting of numerous large-scale investments and contracts he represented multinational companies, especially in the high technology, IT and Healthcare sector. As highly respected and experienced professional with specific knowledge, he regularly counsels and represents leading companies in innovation and technology.



8.3. PARTNERS

Grapevine World has immediate access to the majority of established market players, thanks to the robust ecosystem of one of its core technology partners, Tiani Spirit.

Potential partners, who we expect to join Grapevine World, are:

- Governmental Entities
- Healthcare Technology Vendors
- Healthcare IT Startups
- System Integrators
- Hosting Providers
- Pharma Corporations
- Private and Public Healthcare Insurances

Through collaboration with business partners and the integration of resources from companies, businesses, technology communities and governments, Grapevine World will make the most efficient use of shared resources to achieve synergetic development with society.

It will provide transparency for financial management, code management, and business practices. Furthermore, Grapevine World will maintain high standards of honesty, ethical business conduct and compliance with applicable laws, rules and regulations.

Current partners of Grapevine World are:

powered by



Media Partner:



RISKS AND DISCLAIMERS

This Whitepaper is intended solely to assist prospective participants' decision whether to participate in the Grapevine World ecosystem. We emphasize that this is an open-source initiative where everyone makes the decision independently.

Financial information contained in the Whitepaper and accompanying materials is unaudited. The projections contained herein and the accompanying materials are based on certain assumptions. No assurance can be given that these assumptions will prove to be correct. Accordingly, no assurance can be given that actual results will conform to the projected results.

The Grapevine Foundation, the management and the development teams of the project, each expressly disclaim any responsibility for ensuring the accuracy or completeness of the information contained herein and in the accompanying materials. Accordingly, neither us, nor any other individuals or entities, nor any of our affiliates, representatives or advisors will be subject to any liability for any inaccuracies in or any omissions from materials contained herein or the accompanying materials or any other oral or written information provided with respect to the Grapevine token or the Grapevine Foundation, and no express or implied representations or warranties will be deemed to have been made with respect to the Whitepaper or any other matters.

Neither the Grapevine Foundation, nor the project management and core development teams, nor any affiliates, representatives or advisors are under any obligation to update, supplement or correct this

Whitepaper or accompanying materials in any respect, or otherwise provide any recipient or reviewer of these materials with access to any additional information. In addition, the project management, core development, and development teams reserve the right, without prior notice to any reviewer or recipient of this Whitepaper or any accompanying materials, to terminate, at any time, further participation in the Grapevine Foundation or Grapevine World and, until tokens are generated, we reserve the right to modify any applicable procedures, without giving advance notice thereof and without providing any reason therefor.

We emphasize in the strongest possible terms that a Grapevine token does not represent ownership or a security interest in the Grapevine Foundation or any other entity. Nor is a Grapevine token related to any other assets or properties. The token does not represent a debt owed by the Foundation or any other entity, and shall not be considered a debenture. To acquire Grapevine tokens, you must be genuinely interested in contributing skills, time, energy and expertise to Grapevine World by becoming a member of the Grapevine World community of volunteers. If you determine that Grapevine tokens may constitute a security subject to regulations in any country, we strongly advise you not to acquire them and suggest you immediately notify us of any possible risks. In addition, we feel compelled to advise you of the following risks, and indicate that these and additional risk need to be factored in your decision.

9.1. TECHNOLOGICAL & ORGANIZATIONAL RISKS

The Foundation will build upon the data exchange technology which Grapevine World has developed with its partners. The system has been tested and is considered

to be reliable and stable. The token system will be based on the Ethereum technology which has certain technical risks, some of which are outlined here.

A major technical challenge will be to enable automatic generation of more complex smart contracts, which will require the work of several parties.

9.2. TOKEN VALUE RISKS

Due to the very short history of crypto-tokens and crypto-economic systems, there are several challenges that token holders face when attempting to value these projects and their underlying tokens.

First, the healthcare system has historically been, and remains, fragmented. Grapevine has attracted a significant number of partners to its ecosystem.

Second, the short history of crypto-tokens shows an even shorter lifespan for many projects,

often due to a large principal-agent problem. This is different to startups, that usually raise money in a series of different rounds over several years.

Third, as a nascent industry, crypto-markets are subject to a level of systemic risk that cannot be diversified away. Therefore, token-holders take on both project-specific risk and market risk when acquiring tokens.

The systemic risk is very hard to predict, due to the short time-span, and is unique to the industry.

Everything from hard forks to new crypto attacks are a source of systemic risk that traditional investments don't suffer from.

Finally, many projects are interdependent, which causes dependency risk to projects. For example, a crypto project built on Ethereum will be affected by things happening in Ethereum, like a bug found in a compiler, or an attack on the Ethereum network.

Furthermore, as layers of the ecosystem build up, this dependency risk deepens.

9.3. REGULATORY RISKS

Generally, as the development of blockchain tokens continues to enable new business models, new legal issues come into focus. For developers, legal and regulatory uncertainty can be one of the main barriers to building new blockchain protocols and applications, including Grapevine World. *In this video*, Sasha Borovik, an international attorney and one of Grapevine World's advisors, explains the legal risks associated with TGEs. The legal risks can be further examined in this Legal Framework for

Blockchain Tokens. This Framework has been prepared in collaboration by [Coin Center](#), [Union Square Ventures](#) and Consensys.

This *chart* is a starting point for analyzing the likelihood that Grapevine tokens would be subject to securities laws. It also establishes a set of best practices for token crowdsales, which the Foundation attempts to follow rigorously and diligently. We emphasize in the strongest possible way that **Grapevine tokens do not grant a claim**

against or represent ownership or a security interest over the Foundation or any other entity or any other assets or property. They do not represent a debt owed by the Foundation or any other entity and shall not be considered a debenture under any applicable law. It is for these reasons that we believe that our tokens are not securities and may be purchased by anyone who is genuinely interested in becoming a member of the Grapevine World community of volunteers.

Recently there has been growing interest in whether, and in what circumstances, crypto-tokens may constitute “investment contracts” under the U.S. Supreme Court’s *Howey* test, or similar regulations around the world, rendering them securities subject to regulation in the United States and other coun-

tries. The resources in section 12 explore the structural, marketing and other key considerations that may make crypto-tokens more- or less-likely to be securities under *Howey*. As these resources demonstrate, the *Howey* test is highly fact-dependent, indicating that certain crypto-tokens may be securi-

ties under *Howey* whereas others – if properly designed – may not.

If you determine that our tokens may constitute securities subject to regulation in any country, we strongly advise you against acquiring them and suggest you immediately notify us of the possible risks.

9.4. TAX, LEGAL AND ECONOMIC RISKS

Without proper consultation of tax, legal and economic advisors - taking into account your personal circumstances - you may not be able to fully assess the tax, legal and economic impact of participating in this Initial Coin Offering.

Insufficient or faulty consultation can lead to unintended or unforeseen tax, legal and economic consequences. The absence of advice from experts such as financial advisors, lawyers and tax consultants

can have detrimental consequences for a Participant in this ICO. Prospective Participants should carefully consider the following risks together with their expert advisers before deciding whether a participation in the Initial Coin Offering is suitable for them or not. Grapevine World is not liable for a loss in connection with erroneous or insufficient consultation or advice provided by third parties.

The exchange of virtual currencies

(GVINE / Ether) without taking into account the individual circumstances and the financial situation of the Participant might have negative consequences. The decision to obtain GVINE should take into account the individual knowledge of the Participant. Only freely available capital should be used for participation in this Initial Coin Offering as a total loss cannot be excluded.

LEGAL AND TAX ASPECTS

The following covers only a small fraction of potential legal issues regarding a TGE. It is to be considered our best knowledge at the time of writing, and is strictly non-binding. Furthermore, it is subject to change, according to ongoing development in the Grapevine project. Under no circumstances should this section be interpreted as legal or tax advice. You are advised to consult legal advisors and/or tax advisors of your own to evaluate potential risks of participation in Grapevine. If you do not acquire such professional advice you may not be able to completely assess the risks and implications that arise from your participation in the ecosystem.

10.1. LEGAL

Are GVINE a form of securities or e-currency?

No. Since GVINE do not entitle their holder to participate in the Foundation's or any other entity's profits or confer voting rights with regard to how Grapevine World is managed, none of the main qualities of securities are fulfilled under Austrian law and because GVINE holders are not entitled to any claims against the Grapevine Foundation or its subsidiaries, the definition of e-currency is not fulfilled either. However, this may be different under the definitions of other countries. In addition, GVINE are not refundable.

What are GVINE?

From an Austrian law perspective, GVINE are immaterial, moveable assets that are subject to property rights and therefore can be bought and sold. GVINE might be compared to tickets, allowing their owners to gain access to, and participate in, the Grapevine ecosystem, in part by trading them for services with providers, who, in joining Grapevine World, may accept GVINE as suitable exchange items.

How can I get GVINE?

During the Token Generating Event, GVINE may be acquired from the Grapevine Foundation (via a 100% subsidiary since a foundation pursuant to Austrian law may not conduct token sales or exchanges respectively) in exchange for Ether (<https://ethereum.org/ether>) and Bitcoin (<https://bitcoin.org/en/>).

It is not possible to "conventionally buy" GVINE in

exchange for FIAT money such as USD, EUR etc.

A guide to the procedure for participation in the TOKEN GENERATING EVENT will be published on our homepage soon, along with terms and conditions. If you are interested in participating as an early supporter during the pre-round, and wish to receive certain contractual commitments with respect to the transfer of GVINE before the actual TGE, please contact us at office@grapevineworldtoken.io

Is it possible to acquire GVINE anywhere or are there limitations for certain areas?

We aim to provide GVINE to everyone, everywhere, in pursuit of truly global healthcare integration. However, due to recently published views from authorities in the US, China, Japan and South Korea that tokens will be viewed as securities under their law (an assessment we do not share), we currently deem it necessary to exclude residents from the U.S., China, Japan and South Korea from the acquisition of GVINE.

This decision is under review and may change in the near future. Please contact us if you are interested in an updated status.

Does Grapevine itself enter into contracts with patients/users, or do they act as trustee or intermediary?

Grapevine itself acts as an intermediary connecting all kinds of people who want to enable the development of better medicine, all-time access to their health

LEGAL AND TAX ASPECTS

data, cost-efficient administration in the healthcare system and such.

Grapevine provides a platform and system for a “smart” exchange of services and data. To achieve this, Grapevine certifies software providers and verifies the patient’s consent to the use of their data. Furthermore, Grapevine introduces and initially distributes the GVINE to make the “smart” exchange possible. Grapevine does not directly enter into contracts with its participants in the day-to-day transactions and itself does not offer software, health data or medical services to users.

Why is Grapevine a non-profit Foundation and not a profit-oriented Company?

Grapevine’s aim is to form a community for its users.

To prevent any potential conflict of interest between shareholders and people who hold GVINE, we decided to exclude the shareholders’ interest absolutely. The goal of the non-profit Foundation as a basis for Grapevine is to ensure it acts only for public benefit. The Grapevine Foundation is bound by its statutes to use its assets solely for the benefit of all participants in the ecosystem. The gains from the ICO and the pre-round will be used for the implementation and operation of the ecosystem, in particular the Data Broker, marketing

and administration. Furthermore, pursuant to Austrian law, foundations are estates dedicated to the fulfilment of certain purposes and are legally separated from their previous owner. In case the foundation is dissolved, any remaining assets within the estate have to be used solely for the benefit of the ecosystem. The founder would only receive its initial capital contribution back.

In what connection do other “Grapevine - Entities” stand with the Grapevine Foundation?

Legally and economically: none. Before the establishment of the Grapevine Foundation, Grapevine WORLD, as well as national Grapevine entities have already existed and provided software solutions for users in the health sector. Their main focus was spreading the IHE standard and promoting interoperability.

As it became apparent that the Grapevine idea needs a more “open” surrounding to bring together every kind of user to whom it might be beneficial, it was clear that this could only be achieved through the creation of a completely new ecosystem. What followed was the start of Grapevine as it now presents itself to you.

10.2. TAX

The potential uses for blockchain go beyond the capabilities of what our financial systems can support today.

In a futuristic sense, blockchain could revolutionize how tax is calculated with real-time transactions that everyone, including governments, taxpayers and their advisers, could have live access to. But in a current sense, we are faced with various tax uncertainties driven by new global business models.

Therefore, we must clearly stress that participants in this Initial Coin Offering without proper consultation of tax, legal and economic advisors, taking into account personal circumstances, might not be able to fully assess the tax, legal and economic impact a participation in this ICO could have. Insufficient or faulty consultation can lead to unintended or unforeseen tax, legal and economic consequences.

Grapevine World shall be structured in a way that secures that all fiscal and regulatory requirements are met.

Value Added Tax and/or Sales Tax are applicable to the business model of Grapevine World. However, the exchange from a currency and/or from a virtual currency (in our case Ether) to another virtual currency is exempt from VAT, under a European Court of Justice ruling in 2015.

The exchange of business services for GVINE constitutes bartering under the definitions of Austrian and many EU VAT Acts. We strongly advise any participant in Grapevine World to consult their tax advisors before rendering services in Grapevine World.

WHAT'S UNIQUE ABOUT THE GRAPEVINE WORLD ICO?

Strong market need.

Everyone can be a patient. And every patient benefits from a standardized health data exchange. Grapevine World will enable universal access to patients' own personal data, digital patient files and allow for the viewing and sharing of information at any time by smartphone - with complete control and autonomy.

Meanwhile, this simplification of health data exchange will contribute to cost reductions in the delivery of healthcare, lowering prices for all patients, whether or not they directly participate in the Grapevine ecosystem.

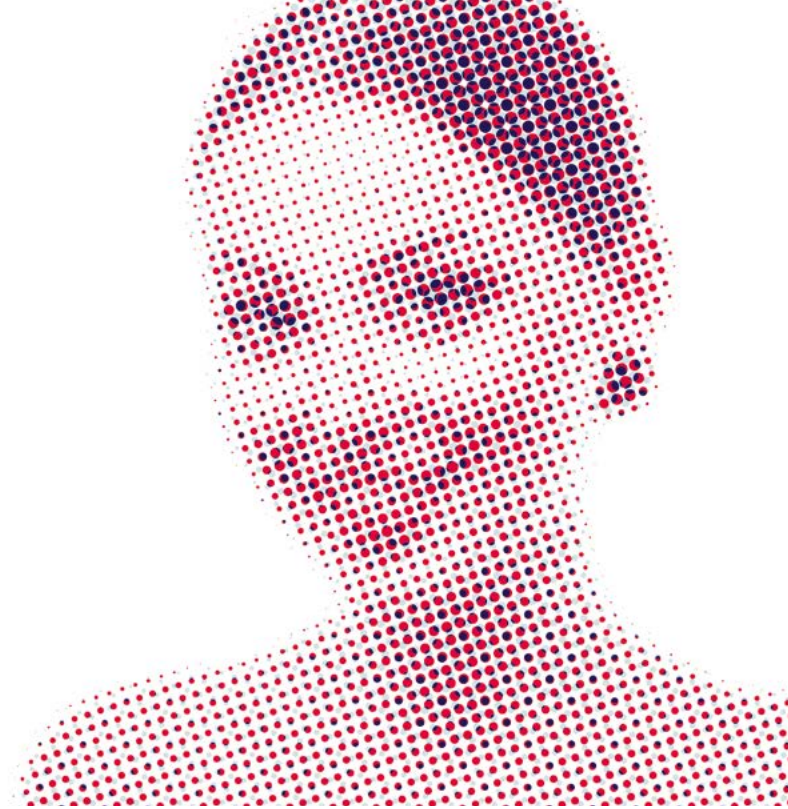
The history of health IT is one of incompatible, proprietary systems; inhibiting data exchange and collaborative enterprise at a cost of billions of dollars of missed opportunity and lost productivity. Simultaneously, budgets have been cut and spending minimized, making costly infrastructural projects to overhaul and replace archaic architectures all but impossible.

Most efforts from corporate groups to resolve this situation have been based on the principle of "winner-takes-all", determined to establish their own solution as the only standard – inhibiting innovation and market development in the process.

Grapevine World, by contrast, stands for a global cooperative ecosystem, involving all market participants in a united bid to achieve global interoperability.

Solving current problems, encouraging future innovations.

As demonstrated in section 5.3, not only will Grape-



vine World solve – or help to solve – existing problems created by the lack of health data interoperability, the accompanying ecosystem encourages the innovation of new solutions, new uses and new collaborative enterprises.

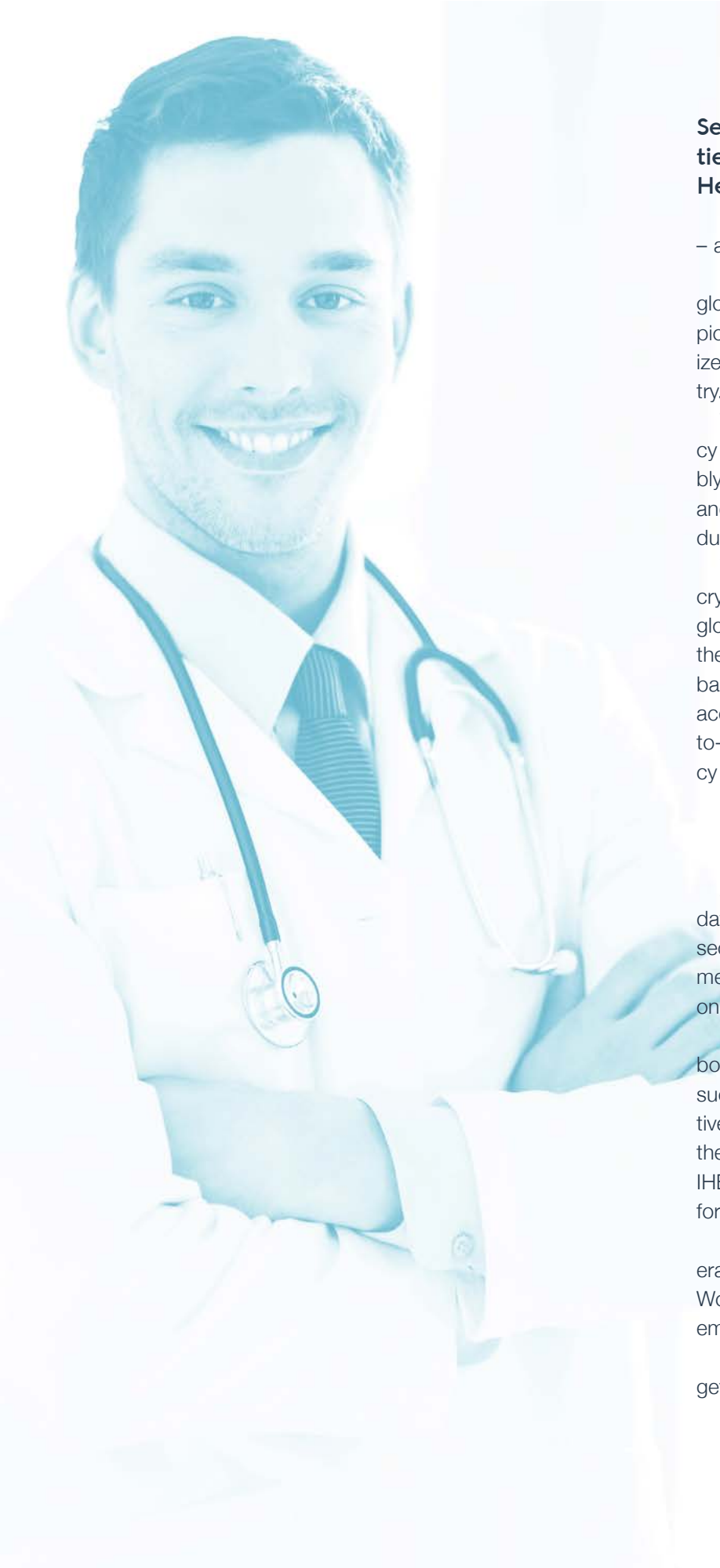
These new uses will serve to not only improve health standards and choice worldwide, but increase the value of the ecosystem as a whole – including the value of GVINE themselves.

Grapevine World is more than just an idea. Its constituent parts already exist.

Grapevine is leveraging the right technology at the right time. The IHE is well-established worldwide, often using solutions from Tiani Spirit - the market leader in IHE technology and one of Grapevine's core technology partners.

The Ethereum blockchain provides a cost-effective, efficient structure for implementing an IHE standards based health data exchange.

These technologies are brought together by an expert team. Grapevine's founders have decades of multinational business, healthcare, legal and technology experience. Tiani Spirit - one of Grapevine's core technology partners - is the market leader in IHE technology. And with the establishment of the Grapevine Backbone, we unite technology and expertise from a multitude of vendors, stakeholders and companies under one roof, which will only enhance our future development.



Several involved existing communities (IHE, Blockchain, Crypto, Healthcare).

Grapevine World brings several existing – and enthusiastic – communities together.

IHE has been working with a huge global community since 1998, performing pioneering work on developing a standardized data exchange in the healthcare industry.

The global blockchain and crypto-currency communities have been growing inexorably, ever since the introduction of Bitcoin, and are now a significant part of the IT industry.

We hope to energize blockchain and crypto-enthusiasts towards our goal of globalized health data exchange, both with the introduction of our own blockchain based crypto-token (GVINE) and acting in accordance with the three pillars of crypto-economics: decentralization, transparency and trust.

Expandable to other verticals.

A sustainable solution for standardized data exchange is desirable in every business sector, not just health. Work on applying IHE methodology to the energy sector is already ongoing.

Once established, the Grapevine Backbone could be applied to other verticals such as energy, education, finance, automotive and many more. This is a stated aim of the Grapevine World, strongly supported by IHE itself and represents enormous potential for the growth of the Grapevine ecosystem.

If you wish to take part in the Token Generating Event, or participate in Grapevine World in any way, please contact us by emailing office@grapevineworldtoken.io

Let's build the future of healthcare, together.

REFERENCES

Economics of Initial Public Offering, Dr. Avtar Sehra et al, August 2017
HIMSS Dictionary of Healthcare Information Technology Terms, Acronyms and Organizations, 2nd Edition, 2010, Appendix B, p190, original source: Wikipedia.
American Academy of Family Physicians (AAFP), Center for Health IT, 2013.

HIMSS Dictionary of Healthcare Information Technology Terms, Acronyms and Organizations, 3rd Edition, 2013, p. 75.

National Committee on Vital and Health Statistics (NCVHS) Report on *Uniform Data Standards for Patient Medical Record Information*, July 6, 2000, pp. 21-22.

Institute of Electrical and Electronics Engineers, *IEEE Standard Computer Dictionary: A Compilation of IEEE Standard Computer Glossaries*, New York, NY: 1990.

HIMSS Dictionary of Healthcare Information Technology Terms, Acronyms and Organizations, 2nd Edition, 2010, Appendix B, p190, original source: HIMSS Electronic Health Record Association.

Cloud Computing Systems and Applications in Healthcare Chintan M. Bhatt(Charotar University of Science & Technology, India) and S. K. Peddoju (Indian Institute of Technology Roorkee, India)

Peter Van Valkenburgh, *A Securities Law Framework for Blockchain Tokens*, COINCENTER (Jan 25, 2016) Discusses certain blockchain token “rights” that likely decrease the risk of blockchain tokens being categorized as securities under the Howey test.

Reuben Bramanathan, *Introducing the Blockchain Token Securities Law Framework*, THE COINBASE BLOG (Dec. 12, 2016) Discusses the result of a joint initiative of Coinbase, Coin Center, Union Square Ventures and Consensus.

Houman B. Shadab, *Why Cryptoequity May Not Be Securities, Lawbitrage* (Nov. 12, 2014) In this piece, NUY Law Professor Houman B. Shadab discusses a number of factors that would make certain tokens less likely to constitute securities.

Jason Somensatto, *How are Cryptocurrency Investments Different than securities Investments?*, COINCENTER (Feb. 11, 2015) Distinguishes tokens sold primarily for a “consumption motive” from tokens likely to be considered securities.

Josh Boehm, Dax Hansen and Josh Boehm Speak at *Stanford Cyber Initiative About Blockchain Tokens*, VIRTUAL CURRENCY REPORT (Apr. 12, 2017) Linking to a slide deck featuring analysis of token sales under securities and other laws. Also available here.

REFERENCES

J. Dax Hansen & Carla L. Reyes, *Legal Aspects of Smart Contract Applications: Digital Asset Sales and Capital Markets, Supply Chain Management, Land Registries, Government Records and Smart Cities, and Self-Sovereign Identity* (May 2017) Discusses the application of the Howey test to digital asset sales.

A Securities Law Primer, SELC e-resource library, CommunityEnterpriseLaw.Org. Discusses in detail the United Housing limited company (or Foundation) v. Forman case, which held “when a purchaser is motivated by a desire to use or consume the item purchased . . . the securities laws do not apply.”

Brito, Jerry and Shadab, Houman B. and Castillo, Andrea, *Bitcoin Financial Regulation: Securities, Derivatives, Prediction Markets, and Gambling* (January 15, 2015). COLUMBIA SCIENCE AND TECHNOLOGY (2014). Proposes that certain bitcoin denominated instruments that may otherwise fall within the Howey test for investment contract be excluded if they are “bitcoin economy transactions” – transactions in which the entire use of the instrument is within the blockchain ecosystem in which the token was created.

Peter Van Valkenburgh, *Could your decentralized token project run afoul of securities laws?*, COINCENTER (Sept. 20, 2016) Describes a number of elements that will make a token less likely to fit the Howey test, including building “tokens that have a use-value and are not mere speculative investments.”



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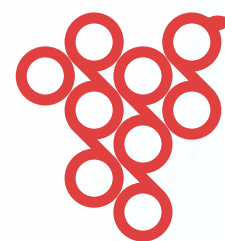
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13.3. LIST OF ABBREVIATIONS

AAL	Authentication Assurance Level
ACOs	Accountable Care Organizations
AI	Artificial Intelligence
API	Application-Programming-Interface
ATNA	The Audit Trail and Node Authentication
BMBF	German Federal Ministry of Education and Research
BMJ	British Medical Journal
CIA	Confidentiality/ Integrity/ Availability
CRO	Contract Research Organizations
DApp	Ethereum Distributed App
DDoS	Distributed Denial-of-Service
e-SENS	Electronic Simple European Networked Services
EHR	Electronic Health Records
EIRA	European Interoperability Reference Architecture
ENISA	European Union Agency for Network and Information Security
epSOS	European Patients - Smart open Services
EURO-CAS project	A conformity assessment scheme for eHealth in Europe
FHIR	Fast Healthcare Interoperable Resources
GOE	Grapevine Orchestration Engine
HCP	Healthcare Provider
HL7	Health Level 7
HPO	Healthcare Provider Organizations
ICO	Initial Coin Offering
IHE	Integrating the Healthcare Enterprise
IoT	Internet of Things
NGO	Non-governmental organization
ONC	Office of the National Coordinator for Health Information Technology
PHI	Private Healthcare Information
REST	REpresentational State Transfer
SDKs	Software Development Kits
SGAM	Smart Grid Architecture Model
SME	Small and Medium-sized Enterprises
SMITH	Smart Medical Information Technology for Healthcare
TLS	Transport Layer Security
TOGAF	The Open Group Architecture Framework
UML	Unified Modeling Language
VNA	Vendor Neutral Architecture
WHO	World Health Organization
XDS	Cross Enterprise Document Sharing



CONTACT

For more information about Grapevine World, the ICO in 2018, or if you wish to participate in any way, please contact us at office@grapevineworldtoken.io or visit our website at grapevineworldtoken.io

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