**PayPill**

# CHANGING HEALTHCARE FOREVER

*Using a combination of Blockchain, Artificial Intelligence, Machine Learning and Cryptocurrency Technologies*

White Paper

# EXECUTIVE SUMMARY

*A third of the world's population – over 2.5 billion people – don't have access to medicines or adequate healthcare; a damning statistic of epic proportions for countries and economies.[1]*

However, this does not mean that the developed countries are exempt from scrutiny: even in America, 28 million people are without access to healthcare insurance.[2] Global challenges on this scale require bold, innovative solutions. This is why we've devised PayPill.

Our global solution is truly a disruptive play on the world's healthcare systems. Through our PayPill Artificial Intelligence (AI) app, anyone can not only have full access to their healthcare records but also share and monetize that data, while benefiting from lower medicine costs and ongoing insurance costs.

Our plan pioneers a new, groundbreaking approach to making healthcare affordable worldwide. In countries like the US, our solution could well reduce the nation's healthcare costs by billions of dollars each year.

Our healthcare blockchain/artificial intelligence platform is set to provide a scalable model that could help support accessible healthcare for everyone, driven by our passion to meet the healthcare needs of the socially disadvantaged and the advantaged alike.

We're therefore also establishing a PayPill Healthcare Foundation at the core of what we do, providing funds to charitable organisations who focus on meeting the healthcare challenges of the world's poor and underprivileged.

So you're invited to come with us on a journey: a journey of discovery, breakthrough and innovation to take the lead in tackling current demands and meet future global healthcare needs for ALL.

*We expect significantly reduced medicine and healthcare costs through our Blockchain/AI healthcare helper app…*

[1] Socorro Z Escalante, MD, MBAH, WHO Office of the Representative in the Philippines, Access to Essential Medicines – http://www.who.int/medicines/areas/nextgen_essentialmeds/1accessadditionalmaterials.pdf

[2] Lauren Thomas: The Number Of Americans Without Health Insurance Rose in First Quarter 2017 – https://www.cnbc.com/2017/04/11/the-number-of-americans-without-health-insurance-rose-in-first-quarter-2017.html

# CONTENTS

# THE CHALLENGE

/ *Healthcare systems in developed and underdeveloped nations all experience strain in one shape or form. Policy makers have struggled to find the answer to health care provision as a pattern of issues, inequalities and inefficiencies keep repeating worldwide…*

Aging, intensive health care populations; the break up of families providing social care; rising obesity and diseases (such as congestive heart failure, diabetes, kidney failure and chronic obstructive pulmonary disease) and more all combine to provide an on-going problem and headache for the world's governments and health professionals.

While the risk of dying from cardiovascular disease, chronic respiratory disease, diabetes or cancer has decreased since 2000, an estimated 13 million people under the age of 70 still died due to these diseases in 2016.[3]

The World Health Organisation also report that people with the most means – who often need less care – consume the most care, whereas those with the least means and greatest health problems consume the least.

Health care provision is incredibly complex and many nations worldwide spend considerable resources trying to provide it – while invariably struggling to do so.

Looking at the US healthcare system for example, we can see several pressure points revealing where the system is breaking down:

- A person who is unwell may have to attend a number of healthcare providers to establish his/her needs
- If the patient visits a doctor, then the

patient pays their deductible or co-pay themselves, and the doctor bills the third-party organization responsible for paying the rest of the healthcare costs (such as their employer's healthcare plan, a private insurance company, or the government, via programs like Medicaid, Medicare, Tricare, or the VA for veterans)

- Typically, the third-party payer organizations (PBMs – Pharmacy Benefit Managers) typically reimburse pharmacies within 30 days. However, in practice this occurs only 50% of the time, the remainder in accounts receivables are 11% under 60 days, and 38% up to 120 days later
- In the US, an employee for a company usually pays them a salary in cash and in health benefits. If the employer doesn't provide a health plan, the employee has to pay their own premiums from their salary to an insurance company as an individual or as a family
- Additionally, taxes generated by the US government cover those who qualify for Medicaid, Medicare, Tricare or CHAMPVA (Veteran fund). Taxes are how their premiums get paid to cover those health services
- The government has created what is known as a 'Risk Pool'. This is a state

[3] World health statistics 2018: monitoring health for the SDGs, sustainable development goals. Geneva: World Health Organization; 2018. Licence: CC BY-NC-SA 3.0 IGO, v.

administered system to provide a safety net for the 'medically uninsurable'. Ultimately, these risk pools have a finite amount of money in which to pay the healthcare bills of everyone they are responsible for – thus the risk is taken as an insurer with access to other sources of reinsurance funding

- In 2016, over $400 billion in estimated prescription revenue occured in the US with four large PBMs (Pharmacy Benefit Managers) dominating 85% of the market

- Many large employers are not experiencing the savings that they 'had signed up for'

- The size and power of PBMs has forced lower margins across the sector, from drug companies and pharmacy chains

- Patients want more control of their healthcare needs and specify drugs that they need rather than the ones prescribed, or forced on them from a healthcare plan

- If pharmacies, drug companies, large employers and insurers yielded greater transparency in the process, this in turn could lead to better pricing and outcomes for patients.

Consequently, the amount of cash needed to cover the uninsurable or uninsured in America is increasing to epidemic levels, leading to increased healthcare premiums for the average person and employer. Although this is a direct consequence of Obamacare, it is also true that the uninsured at the time of writing stands at 28 million compared to 48 million in 2010.

A series of political, economic, social and cultural conditions ensures this pattern of inequality and inefficiencies replays to varying degrees all around the world.[4]

## The Economic Impact of PBMs

Dr Wayne Winegarden conducted a literature review surveying studies on the economic impacts of PBMs,[5] and concluded that due to their current regulatory inefficiencies, PBMs:

- Create pricing uncertainty by incentivizing higher list prices for medicines that enable large rebates and discounts which are particularly valuable to the PBMs

- Create large discrepancies between list prices and transaction prices, resulting in higher than necessary patient co-pays

- (For Medicare Part D patients) the higher list prices and higher co-pays push patients into the coverage gap (donut hole) faster

- Impose large, and often unknown fees that create substantial revenue, uncertainty and volatility, which are problematic for small independent pharmacies, long-term care pharmacies and specialty pharmacies

- Increase PBMs share of the gross expenditures at the expense of pharmacies and manufacturers

- Through control of drug formularies, impose undue influence on the medicines patients can access.

*People with the most means – who often need less care – consume the most care, whereas those with the least means and greatest health problems consume the least…*

The role of PBMs is to aggregate the buying power of health plans and employer groups by negotiating discounted purchase prices

[4] See Appendix 1 for more examples
[5] Weingarden (2017) The Economic Costs of Pharmacy Benefit Managers: A Review of the Literature. Pacific Research Institute
[6] Vandervelde, A. & Blalock, E. (2017) "The pharmaceutical supply chain: gross expenditures realized by stakeholders" Berkeley Research Group.

## *Global healthcare transactions are dominated by middlemen or government organisations who make healthcare expensive and in many cases inaccessible…*

with retail pharmacies, purchasing drugs at discounted prices for delivery by mail, while securing rebates on brand pharmaceuticals from manufacturers."[6] These negotiated discounts and rebates lower the actual transaction prices relative to the list prices.

In practice, the large gap between the list prices for drugs and the actual transaction prices creates an opaque and complicated pricing environment. From the PBMs' perspective, the greater market complexity created by the less transparent pricing environment makes it is easier to earn higher profits. It also, however, makes PBMs' business operations more complicated. For instance, "according to an industry auditor frequently hired by health plans to audit their PBMs' performance, in more than 400 audits 'we have never found a single situation where something wasn't wrong'."[7]

From a health system perspective, this dizzying pricing environment distorts the pharmaceutical market to the detriment of patients, pharmacies, manufacturers, and payers. Due to their government-sponsored 'near-monopoly' position, PBMs can charge fees that are high and retrospective. The retrospective fees, such as the direct and indirect remuneration fees are particularly problematic as they 'claw back' revenues from pharmacies based on sales that were made months earlier. Consequently, unlike a typical transaction, many pharmacies will not know how much revenue they earned from the sale of a drug until months after the transaction has been completed.[8]

High fixed costs and large bureaucracies are typically more burdensome on smaller businesses. The costs PBMs impose on small, family-owned pharmacies, specialty pharmacies (pharmacies that provide comprehensive services, such as enhanced consultation services for chronic patients), and long-term care pharmacies particularly bear this out. Due to the retroactive claw back provisions, high fees and bureaucracy that PBMs create, these pharmacies often lose the ability to compete effectively.

Perhaps worse, patient care suffers as smaller pharmacies, specialty pharmacies, and long-term care pharmacies find it more difficult to serve their customers, or even stay in business.[9] For instance, according to a survey conducted by the National Community Pharmacists Association, "almost 87% of respondents reported that PBM auditing practices have a significant to very significant impact on respondents' ability to provide patient care and remain in business, which can lead to decreased access to care."[10]

Patients are also affected because the current payment structure disenfranchises them by removing their input from most of the major decisions regarding drug costs and availability. Patients have become passive spectators in a market where their interests should be the driving factor. This potentially could be an avenue that PayPill exploits. Allowing citizens to draw down funds from these corporate companies in relation to sharing and participating in health research activities with the funds earmarked for healthcare matters.

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[7] Garrett, A.D., and Garis, R. (2007). "Leveling the Playing Field in the Pharmacy Benefit Management Industry" Valparaiso University Law Review, Volume 42, Number 1, pp.33-80, Fall.

[8] Weingarden (2017). The Economic Costs of Pharmacy Benefit Managers: A Review of the Literature. Pacific Research Institute.

[9] Santye, L. (2017). "DIR Fees Have Wide-Ranging Impact on Specialty Pharmacy" Specialty Pharmacy Times, March 22.

[10] Coster, J.M. (2013). "Letter to Director Jonathan Blum, Center for Medicare" National Community Pharmacists Association, March 1.

## PBMs Impact on Drug Cost and Pricing

Most of Dr Winegarden's reviewed studies examined found that PBMs are having an adverse impact on the overall costs and prices of pharmaceuticals, and encourage an overly-complicated pricing structure. In contrast to most markets, where the final consumer expenditures conclude the transaction, due to PBMs, the pharmaceutical market contains even more transactions. As summarized by the Berkeley Research Group, "the purchase price of a prescription drug can ultimately be distilled into three types of transactions:

- Initial gross expenditures on prescription drugs made by patients and their health plans (both public and private)
- Payments and discounts along the supply chain
- Retrospective rebates."[11]

As documented in several studies, due to the growth in the latter two transactions (payments and discounts along the supply chain, and retrospective rebates) PBMs have been able to grow their share of total pharmaceutical expenditures at the expense of pharmacies and manufacturers.

What's more, having secured the lions share of pharmaceutical expenditure, PBMs are also enjoying the lion's share of profits, too. For example, on a drug with a list price of $300, a wholesaler makes $3 profit, a pharmacy makes $16 profit, meanwhile from their central vantage point, having designed the benefit plans in their favour, as well as negotiate rebates from the drug makers, the PBM makes $18.[12]

As far as the PBMs' profitability is concerned, the rebates from manufacturers are particularly key. As noted by Meador (2011): While exacting deep discounts from pharmacies helps PBMs to cut costs by sharing in the discounts with plan sponsors, the real money is made through rebates from drug manufacturers.

Manufacturers will offer rebates to PBMs based on how much the PBM increases the manufacturer's market share for a given drug. The catch is that the PBMs are not required to share information about these rebates with plan sponsors, and in the vast majority of cases do not. Instead, they pocket some or all of the money saved.[13]

Therefore, employers are searching for alternatives to the existing PBM model and have said that they're ready for change. A National Pharmaceutical Council survey of 88 large employers found that only 30% understood their contract with their PBM, and the majority – nearly 70% – would welcome an alternative to a rebate-driven business model.[14]

[11] Vandervelde, A. and Blalock, E. (2017) "The pharmaceutical supply chain: gross expenditures realized by stakeholders" Berkeley Research Group.
[12] CB Insights. How Amazon plans to use its e-commerce dominance to transform healthcare, p5.
[13] Meador, M. (2011). "Squeezing the Middleman: Ending Underhanded Dealing in the Pharmacy Benefit Management Industry Through Regulation" Annals of Health Law, Vol. 20.
[14] CB Insights. How Amazon plans to use its e-commerce dominance to transform healthcare, p8.

# THE SOLUTION

*/ Our innovative business model targets the groups and institutions controlling the movement of information and patient data from individuals, the distribution and dispensing of prescription drugs, and those limiting the healthcare needs of the disadvantaged.*

Our PayPill proposition seeks to meet three primary needs:

- Provide a fairer, more affordable healthcare through the PayPill App on mobiles so that individuals can control their health records and obtain revenue for drugs and services

- Provide a mail order service through the App that physicians and patients can use to get the drugs they require more timely and speedily

- Improve access to health care for the most disadvantaged via the PayPill Foundation, working with local healthcare practitioners.

PayPill's radical solution gives individuals the opportunity to control and monetize their healthcare data whenever an opportunity presents itself. Using the PayPill Helper App, part of the PayPill proposition provides a unique service, tailored to the individual, allowing them to take advantage of a wide range of targeted health benefits/tutorial/ research activities, and even health events.

*Push and pull: the PayPill App can volunteer treatment alternatives based on a users' medical history and drug use, as well as make informed suggestions upon users' requests for alternatives*

## PayPill – the solution for global healthcare

We aim to create a solution that:

- Helps individuals control and manage their own healthcare needs by linking all their healthcare records into one repository area – their own blockchain

- Is confidential and secure only to those who are given access to the data

- For the first time, individuals can monetize their healthcare data as little or as often as they like

- Allows individuals direct opportunities for involvement in innovative research or new drug opportunities – and get paid for it

- Provides opportunities for individuals to pay for their healthcare needs through the cryptocurrency savings and bonuses they receive

- With our patent-pending AI/ML engine, provide individuals, insurers and healthcare professionals with groundbreaking access to information that can improve individuals' existing and future healthcare needs

- With our healthcare foundation, support initiatives around the world that allows individuals to have access to those healthcare services that we so take for granted.

## Phase One: Enrolling members into the PayPill Helper App

- Working initially with larger employers and their employees, allowing the database to gain traction and scale. PayPill receive payment for membership and a transaction amount is added to the account of the employee for healthcare services. The amount is in the form of our digital cryptocurrency PayPill (PPLL)

- The transaction is represented online as a block

- The block is transmitted to every party in the PayPill network

- The network approves the transaction as a validated block

- The validated block is then added to the blockchain, which provides an indelible and transparent record of the transaction, while validating the member has a payment in their account.

## Phase Two: Members accessing health services

- The PayPill individual can now go to a doctor or other health service provider that is within the PayPill consortia of partners

- The facility uses the PayPill Medical Contact Card (similar to a debit bank card) or mobile app to acknowledge the member is present

- The PayPill block validates that the individual is who they say they are (e.g. picture ID as well) and funds are available for payment

- The individual can then allocate which part of their health records they want their medical professional to view. The App will show a menu of what records are available for viewing

- The medical practitioner sees the individual and provides the health service. Due to the nature of the Smart Contract with the clinician on the blockchain, the healthcare costs are fixed

- The healthcare service provider updates the PayPill health records with the health status of the member plus service notes from the visit, and the blockchain is validated and encrypted with the individual's health notes and payment

- The blockchain activates the Smart Contract and pays the practitioner in the PPLL currency to his digital wallet. This can be converted to other digital or world currency as she sees fit later on within her account. This transaction is immediate and completely subverts the old transactional model.

## Phase Three: Predicting healthcare behaviour and drug costs

- The AI/machine learning/deep learning capabilities of the software sits in the blockchain and reviews the healthcare data, recommending healthcare solutions that empowers the individual to engage productively with their medical practitioner, or agree on a plan from an insurer to reduce payments. Because the blockchain is a certain record of the individual's healthcare activities, it is easy for an insurer to reward individuals for living a healthy lifestyle

- Once we have a certain volume of historical data on the individual, we can start to predict their drug usage and healthcare needs. This allows us to go back to the insurer and agree to a package of healthcare, reducing overall healthcare insured costs for the employee or employer.

# THE OPPORTUNITY

*For the first time, we now have the capability, through ground-breaking technology, to create the healthcare world we want to live in. And PayPill is positioned to lead the way to resolving global complexities and inequalities, making healthcare accessible for all.*

### Our business focus

As stated previously, the healthcare system in developed and underdeveloped nations are all experiencing strain in one shape or form. So from the outset, we've developed PayPill to provide a holistic approach to healthcare, taking into account governmental and corporate factors to bring a truly patient-centric approach to healthcare.

Due to the complexities and the needs of the vulnerable in the US (at least 28 million people) the Phase One strategic plan will look to initially develop a business that is targeted on transforming the US healthcare system before rolling out to other healthcare systems around the world.

In our model, harnessing individuals' healthcare records will be our first priority. This repository of information is used to inform doctors, pharmacists, pharmacy benefit managers and insurers of your past, current and future healthcare needs.

### How we make money

In creating our cutting-edge solution to international healthcare challenges, four key technologies underpin the business:

- PayPill's backend **Proprietary Blockchain Database Platform** aggregates, secures, encrypts and traces data across the whole healthcare supply chain, from patients' data, wearables, doctors, healthcare provider information, etc.

- A **Patent-Pending**, machine learning/deep learning/AI platform that interrogates the data and learns about healthcare behaviors and trends, as well as recommending solutions to patients and healthcare providers. This includes generating 'Big Data' informatics for healthcare organizations and Pharma

- A **PayPill Dashboard** that allows healthcare organizations to review patients' consented details and to effect payment for services

- A **PayPill Helper App** that allows the consumer to review his/her medical needs in one place, identify appropriate treatments and gain financial incentives through following treatment, improving health and sharing analyzed data with third party organizations, as well as paying for drugs via PPLL cryptocurrency or cash.

Because we will have the opportunity to predict a patient's healthcare needs, we can offer mail order pharmacy activities to those individuals who require it. To that end, we are looking to acquire a mail order pharmacy facility that will allow us to do this.

The flow of revenue can be illustrated with the schematic example shown on the next page:

# PAYPILL REVENUE STREAMS
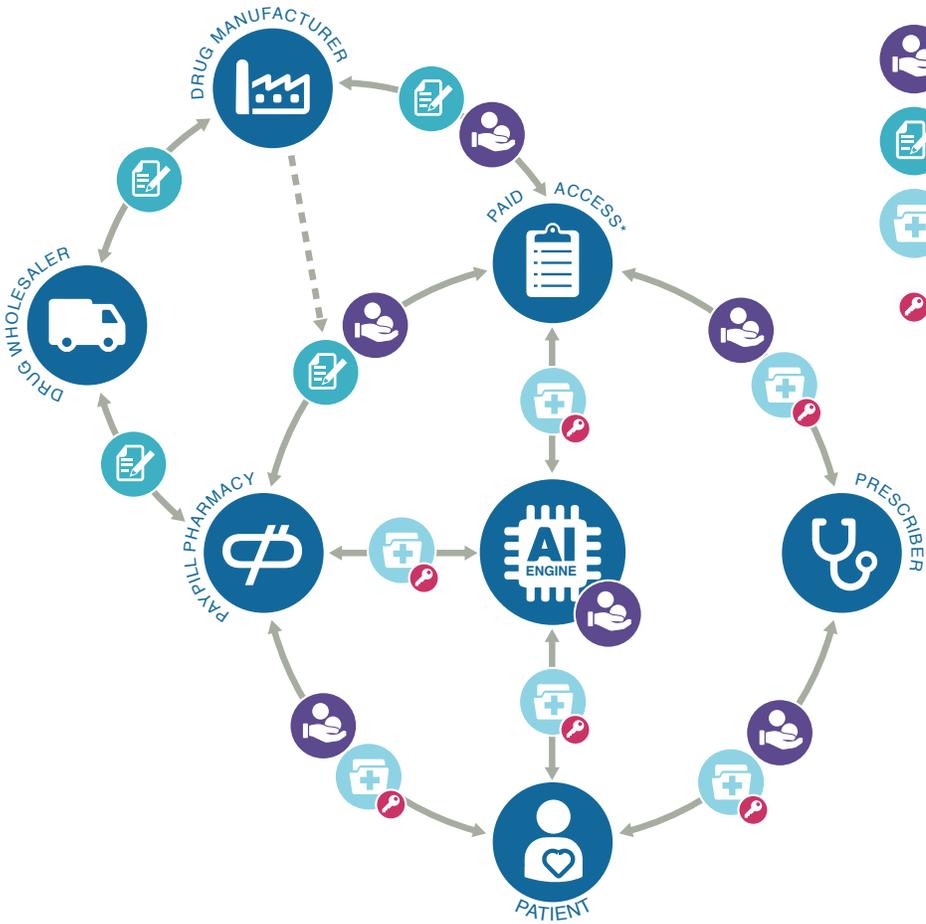


## LEGEND

Where we pick up revenue

Contract

Patient's Smart Contract with Personal Health Information and Private Key

Patient's Private Key

*Anyone paying for Rx drugs for employees and beneficiaries
Government payers
Third party payer
Small/large employers
Third party administrators
Self-insured companies

We will look to develop the business around the following milestones:

- **3 months;** Development of the PayPill beta blockchain database and AI/ML portal

- **4 months;** Acquisition of mail order pharmacy

- **6 months;** PayPill blockchain pilot with government and corporate groups

- **10 months;** Integration of AI platform with the blockchain database platform

- **12 months;** 1st pilot deployed with an employer

- **15 months;** Pilot completion and analysis

- **18 months;** Commercial roll out of PayPill Business Intelligence Dashboard for healthcare service professionals

- **18 months;** Individual PayPill App and complete pilot of insurance portal

- **20 months;** PayPill contact cards for non-App users.

### Use of proceeds

The investment will allow us to develop the sales execution strategy and pricing model for the business. Needless to say, revenue will come from our dashboard licensed software (larger companies) and SaaS (software as a service) for small outlets. For consumers, our revenue will be derived from a combination of advertising on the PayPill App and licensed sales transactions from the PayPill App portal.

Consultancy activities will be on a customer-by-customer basis, including customers such as research institutions and Pharma looking to understand any health data trends that we have on our database. This data is anonymized to protect patient confidentiality.

The proceeds will also be used to create mail order logistic movement of fulfilled scripts from the blockchain. The AI/ML part of the blockchain solution is able to predict the individual's drug needs, hence the need to be able to continuously manage the script process.

### Competitive landscape

There are several blockchain providers looking to carry out similar activities. However, NONE are addressing the whole healthcare system.

PayPill seeks to provide not only a disruptive PBM alternative, but use the data and information to help individuals lower their healthcare service and drug costs, while giving the individual vital control of their healthcare data.

## HOW WE'LL SPEND OUR REVENUE IN PHASE ONE

| Intended Use - Phase One Commercial Exploitation | Cost |
|---|---|
| Staffing and benefits costs. As above with the addition of more software engineers, Business Development, AI Business Analysts, Marketing, Tech Support, Clinical Development, Operational and Finance/Admin support ~20 FTE | $6,053,000 |
| Operational Expenses – includes office expenses, insurance cover, legal, patent costs | $1,370,000 |
| Launch development costs. Marketing/PR/Trade Shows (stands) US, EU, Middle East, Asia and Australia. Flights for team | $1,142,000 |
| Sales, US and global travel to build partnerships and develop business | $1,425,000 |
| Acquisition of Mail Order Pharmacy | $1,710,000 |
| **Total** | **$11,420,000** |

# BUSINESS ROADMAP

**Q1 2021**

Launch of Insurance/Pharma and Health Organisation's Web Portal

**Oct 2020**

PayPill Apps developed and formally launched. Web Portal launched simultaneously

**Dec 2020**

AI/Blockchain solution for insurers piloted

**July 2020**

Blockchain software pilot with government and corporate client gets under way

**Feb 2020**

MVP created

**May 2019**

AI non-provisional patent filed

**Jul 2019**

Mail Order Pharmacy LOI in place

**Jan 2020**

Regulation D 506(c) paperwork submitted to the SEC

**Jan 2019**

Formal PayPill company office base created and team assembled

**July 2018**

Activities accelerate: Richard Slater (Wyoming) and Ray Bailey (Florida Cancer Specialist) and Jay Godla (PBM Expert) join the advisory team

**Nov 2018**

Website created for investors

**Aug 2018**

White paper complete. John attends Block Show Las Vegas to launch PayPill LLC

**Aug 2017**

Tayo Dada, top cybersecurity advisor from Uncloak ICO, joins the team

**Nov 2017**

Zenabi Data LLC, world class blockchain and AI/ML developer for governments and corporates, advise and partners with PayPill

**July 2017**

John Kutzko and Wayne Wright develop PayPill proposition, first of several healthcare divisions

**Sept 2017**

Scott Lake from Compound Claims, former software executive from Priceline, joins the advisory team

**May 2018**

New York meeting with Top Four Global Accountancy validates PayPill proposition

New AI provisional patent filed!

**Pre-2016**

John Kutzko pioneers patent around AI algorithm for drug dosing – the first drug-dosing software granted 501k approval by FDA

## Legal governance and compliance

PayPill utilises the most advanced applications and solutions that can be built into the blockchain and cryptocurrency system. These enable PayPill to be HIPAA, GDPR and HITECH compliant with associated applications needed from delivery of telehealth to clinical data exchange.

The blockchain's importance becomes even clearer in the eventuality that data is incorrectly sent to the blockchain. Even if this takes place, our solution maintains a transparent record of activity, ensuring that any data is clear and traceable.

This is critical, because by 2023, every entity in the pharma supply chain will have to be a part of an interoperable tracking system, and every individual unit (i.e. a pill bottle) will need to be traceable from start to finish, as a result of the Drug Supply Chain Security Act (DSCSA). Therefore at launch, PayPill will be fully compliant with the new regulation – way ahead of the competition.[15]

HIPAA has strict privacy and security standards for the use and disclosure of personal health information, and blockchain technology is currently being assessed as a viable solution to managing and transferring data across individual and organizational lines. And rightly so, because the extensive encryption processes that underpin blockchain architecture can provide a great opportunity for the creation of smart contracts for payments and the transfer of appropriate data – ALL managed through the patient controlling their own data.

In Europe, data protection and use has been regulated to a new level through the General Data Protection Regulations (GDPR) that came into effect in May 2018. The act forced organisations to design privacy principles and processes for the data they hold. This gives individuals the right to know what data is being held as well as the right to ask organisations to remove all their data from their systems.

The beauty about blockchain technology is that it provides inherent data security as well as anonymizing the data. Therefore, the blockchain technology is a real benefit to GDPR compliance due to:

◢ Within our blockchain healthcare solution, all individuals will have 'total control' of their health data and not have to extract it or verify where the data is in GP surgeries, hospitals, physiotherapists, employers, etc

◢ The individual will also have total control of their data, including control of whether they want to send it to third party healthcare providers (e.g. research organisations or Pharma)

◢ Access to the data is subject to permission from the individual and the individual alone

◢ Any data given can be tailored and anonymized when passed by the individual to a recipient

◢ The data in the blockchain will not be incorrect unless the source of the data is incorrect BEFORE it is uploaded to the blockchain file

◢ The data in the blockchain cannot be modified, providing a clear audit trail of activity and transactions.

## Risk Register

The risk register outlines the areas that we will need to manage and mitigate to ensure we execute the proposition professionally and timely. The table on the page after next (p16) presents what we see as the most salient and mission critical areas of the business to address and monitor regularly.

15 CB Insights. How Amazon plans to use its e-commerce dominance to transform healthcare, p8.

# RISK REGISTER

| Risk ID Code | Risk Description | Risk Owner | Current internal controls (provide details of how you currently manage the risk) | Assessment of Risk | | | Describe the actions you can take to reduce the impact/ likelihood should the risk materialise. Identify the risk owner for each action | Last/Next Review Dates | Current Status | Overall indicator |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Impact (1, 2, 3, 4, 5) | Likelihood (1, 2, 3, 4, 5) | Score | | | | |
| GPC001 | **Financial**<br>☐ Budgeting (relating to avaliability or allocation of resources)<br>☐ Failure to meet project revenue targets<br>☐ Failure to address economic factors (interest rates, inflation)<br>☐ Shortage of working capital | WW | ☐ Weekly sales review including gross profit review, ordering patterns and invoicing<br>☐ Age debtors reviewed on a weekly basis and chased accordingly<br>☐ Manage cashflow on a weekly basis | 4 | 2 | 8 | ☐ If age debtors are creeping up then pursue<br>☐ Also reduce the lead time before chasing from two weeks to one week | Last Review 09/08/2019<br>Next Review 09/06/2021 | Unchanged | Yellow |
| GPC002 | **Legal and Compliance**<br>☐ Failure to achieve satisfactory contractual arrangements<br>☐ New or changed legislation may invalidate assumptions upon which activity is based Changes in tax structure | WW | ☐ NDA and agreements all review with our lawyers Gresham International. Contractual arranagements with some suppliers.<br>☐ Insurance cover in place for Employer Liability | 4 | 1 | 4 | ☐ PI to be put in place for the business to take into account more advisory role in creating reports for Pharma | Last Review 09/08/2019<br>Next Review 09/06/2021 | Unchanged | Yellow |
| GPC003 | **Operational/Service Delivery**<br>☐ Performance failure<br>☐ Lack or inadequacy of Business Continuity Plans<br>☐ Lack of clarity of service requirements Products passed to operational teams without due consideration to implementation | WW | ☐ No Business Continuity Plans, but internal processes for accessing files and sending invoices remotely | 3 | 2 | 6 | ☐ Creation of a Business Continuity Plan once funding is achieved | Last Review 09/08/2019<br>Next Review 09/06/2021 | Unchanged | Green |
| GPC004 | **Staff (workforce)**<br>☐ Key knowledge and skills are not retained<br>☐ Inadequate training and development programme<br>☐ Poor recruitment and induction<br>☐ Fraud, corruption, theft<br>☐ Professional negligence<br>☐ Human error<br>☐ Widespread illness/death | WW/JK | ☐ Employess have staff handbook and full contracts<br>☐ Appraisals are carried out annually, with a review of training and development needs<br>☐ Internal policies on conduct and behaviour as part of Staff Handbook includes advisors | 3 | 1 | 3 | ☐ Continue to meet staff on a regular basis (as currently<br>☐ Recruitment policy to identify PhD a Colleagues to sponsor to secure the best talent around blockchain and AI specialisms | Last Review 09/08/2019<br>Next Review –/––/–––– | Unchanged | Green |
| GPC005 | **Infrastructure/Building**<br>☐ Inadequate infrastructure to provide required services<br>☐ Failure of infrastructure (including utility supplies, computer networks etc)<br>☐ Breaches in statutory/information security/cyber | WW | ☐ Online and offline processes to ensure if IT system goes down then can go manual in relation to ordering  Information backed up on computer | 4 | 2 | 8 | ☐ Need to test back up<br>☐ IT/Cybersecurity Manager to be recruited  Uncloak to monitor systems | Last Review 09/08/2019<br>Next Review 09/06/2021 | Unchanged | Yellow |
| GPC006 | **Enviromental**<br>☐ Natural hazards<br>☐ Security<br>☐ Waste and refuse<br>☐ Transport problems | GC | ☐ Not subject to one haulage company  Storage of supplies currently externally | 3 | 1 | 3 | None | Last Review 09/08/2019<br>Next Review 09/06/2021 | Unchanged | Green |
| GPC007 | **R&D**<br>☐ Failure to take on new technology where appropriate to achieve objectives<br>☐ Failure to control ICT effectively<br>☐ Collapse of key contractors eg blockchain/AI<br>☐ Not hitting development milestones | JK | ☐ IT contractor on call<br>☐ R&D equipment calibrated annually | 3 | 1 | 3 | None | Last Review 09/08/2019<br>Next Review 09/06/2021 | | Green |
| GPC007 | **Political**<br>☐ Change of government or policy<br>☐ Adverse public opinion/media intervention | JK/WW | ☐ We use lawyers Gresham International to provide advice on regulatory changes on a worldwide basis for crytocurrency and healthcare changes | 2 | 1 | 2 | None | Last Review 09/08/2019<br>Next Review 09/06/2021 | Unchanged | Green |
| GPC008 | **Reputation**<br>☐ Adverse media attention<br>☐ Failure to keep partners/advisors/team on side<br>☐ Breach of confidentiality | JK/WW | ☐ Processes in place to pass any media enquiries to WW with support from lawyers Gresham International | 3 | 2 | 6 | None | Last Review 09/08/2019<br>Next Review 09/06/2021 | Unchanged | Green |
| GPC009 | **Organisation/Management Factors**<br>☐ Management incompetence<br>☐ Poor leadership<br>☐ Personality clashes<br>☐ Health and safety constraints | WW | ☐ Daily, weekly and monthly internal management meetings | 3 | 2 | 6 | None | Last Review 09/08/2019<br>Next Review 09/06/2021 | Unchanged | Green |
| GPC010 | **Failure to deliver**<br>☐ Failure of pilots<br>☐ No clients taking up pilots<br>☐ Insurers not interested in product | WW/JK | ☐ Account management<br>☐ Contract monitoring and compliance<br>☐ Strong beta testing of blockchain/AI solutions | 5 | 2 | 10 | ☐ Work with strong partner with data BEFORE formal piloting with customers | Last Review 09/08/2019<br>Next Review 09/06/2021 | Unchanged | Amber |
| GPC013 | **Poor key account management**<br>☐ Customer satisfaction poor<br>☐ Financial penalties for poor response | WW | ☐ Review on a weekly basis | 4 | 2 | 8 | ☐ Ensure regular training of account managers to ensure ethos and culture is retained in the organisation<br>☐ CEO to visit top accounts | Last Review 09/08/2019<br>Next Review 09/06/2021 | Unchanged | Yellow |
| GPC014 | **Not keeping up with technology**<br>☐ No focus on new technology<br>☐ Competitors catching up or passing us | JK | ☐ R&D reporting | 4 | 2 | 8 | ☐ As above, creating links with strong organisations and Universities who are pioneering advances in our core technologies | Last Review 09/08/2019<br>Next Review 09/06/2021 | Unchanged | Yellow |

# THE PAYPILL TOKEN

## The PPLL token raise is conducted by PayPill LLC.

The PayPill (PPLL) token is a blockchain-based token. PPLL tokens grant their holders the right to:

- Trade on all respected coin exchanges
- Buy drugs and other non-drug products and services
- Accumulate tokens through repeated use of the PayPill app
- Spend on supporting the PayPill Foundation, a not- for-profit charity to support those suffering healthcare needs.

| | |
|---|---|
| Token Issue Volume | 4.2 billion tokens minted at genesis |
| Total Number of Tokens issued to be sold at crowdfunding event | 1.68 billion |
| Pricing, Discount and Issue dates on the website | www.PayPill.com |
| Payment types | BTC, ETH, bank transfer |

**Token Supply Allocation**

- Token Sale (40%)
- PayPill LLC reserve (7.5%)
- Founders (12.5%)
- Team (5%)
- Marketing (7%)
- Advisors (1%)
- PayPill Foundation (12.5%)
- Patient Data (7.5%)
- Mining Rewards (7%)

**Use of Proceeds**
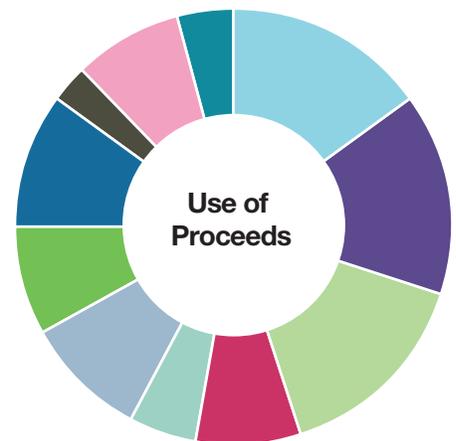
- AI/ML R&D (15%)
- Blockchain Development (15%)
- Clinical Development (15%)
- Sales (8%)
- Operations (5%)
- Purchase Mail Order Pharmacies x2 (9%)
- Marketing (8%)
- Use acquisitions (10%)
- Legal (3%)
- Salary (8%)
- Administration (4%)

## Crowdfunding and Token economics

The PPLL token is ERC20 and we have created 4.2B (billion) tokens at genesis. Our goal is to sell 1.68B tokens across three distinct phases.

Firstly, we will have a private placement period where we will sell the first 500M (million) tokens priced at $0.01 and the second 500M will be priced at $0.015 with a goal of raising $12.5M during this period.

Our follow-up sale will be in the form of a token raise period of four weeks where we will offer 350M tokens at the blended price of $0.025 to add another $9M to the coffers

Finally, we will then move to the full token raise event for four weeks where we will sell another 330M tokens at a blended price of $0.05 for another $16.8M. The final public token sale price when listed on an exchange will be $0.06 and our complete token sale will have achieved $38.3M.

## Deriving the PayPill Token Price

The current PBM marketplace for the US marketplace we're seeking to disrupt is currently $500B and our goal is to achieve a 24 month market penetration of 0.05% which would equal $250M in revenues. By dividing the $250M by 4.2B tokens (issued) we'd have a relative value of $0.06 per token and the issued tokens include those in the sale, those held by the company, as well as those held by the PayPill Foundation. The circulating supply of traded tokens (1.68B) valued at $0.06 would give us a token market cap of the PayPill tokens of $100M.

Over the next three years, the PBM marketplace will organically grow to $600B and our goal is achieve 0.5% of this market which would equal $3B. At that point, the outstanding tokens would give us a token market cap of $1.2B and an implied token value of $0.72. We'd offer a handsome return to token raise participants.

## PAYPILL TOKEN ECONOMICS

| | Private placement | | Pre-Crowdfunding | | Crowdfunding event | | Total |
|---|---|---|---|---|---|---|---|
| Weeks | | | Four weeks | | Four weeks | | |
| Pricing | $0.010 | $0.015 | $0.020 | $0.030 | $0.040 | $0.060 | |
| Total tokens sold | 500M | 500M | 150M | 200M | 150M | 180M | 1,680M |
| % tokens/tranche | 11.9% | 11.9% | 3.6% | 4.8% | 3.6% | 4.3% | |
| Cumulative tokens | | 1,000M | 1,150M | 1,350M | 1,500M | 1,680M | |
| % Cumulative tokens | | 24% | 27% | 32% | 36% | 40% | 40% |
| Total $ raised | $5M | $7.5M | $3M | $6M | $6M | $10.8M | $38.3M |
| Cumulative dollars | | $12.5M | $15.5M | $21.5M | $27.5M | $38.3M | |

Total Number of PPLL Tokens (at genesis): 4.2B
Total Number of PPLL Tokens in circulating supply: 1.68B

# THE PAYPILL SYSTEM ARCHITECTURE

/ *By integrating our proprietary AI, machine learning and deep learning platform with Blockchain technology, PayPill is fully equipped to transform global healthcare.*

PAYNET is the planned PayPill consensus engine. It contains ABCI, UTXO, smart contracts and other network modules. Consensus engine is the core, application connects with consensus engine by ABCI to form a Byzantine fault-tolerant state machine, which can be implemented by the Solidity programming language.

The PayPill blockchain platform enjoys the following characteristics:

- **Scalability:** the PayPill blockchain can be extended through the side chain, which means that not only currency transactions, legally binding contracts and certificates, audio and video files can be stored in the blockchain database

- **Decentralization:** Without an agency, all nodes have the same rights and obligations. Therefore any node that stops working will not affect the system's overall operation

- **Trust-less environment:** All nodes in the system can be traded without the need for trust. Because the operation of the database and the entire system is open and transparent, the nodes cannot deceive each other

- **Consistency:** The data information between nodes is consistent

- **Fault-tolerance:** The system can accommodate 1/3 node Byzantine failure

- **Scalability Account Model:** UTXO Model + Account Abstraction. PAYNET has also made targeted improvements on the premise of UTXO's easy-to-parallel

computing model. To make data easy to manage and easy to program, PAYNET introduces the world state/lightweight state tree concept, each of which maintains a global world state, which has the features of quickly find, cannot be changed, easy-to-provide proof.

## Software hierarchy

The software architecture is divided into two parts. The first part includes APIs, SDKs and CLI, mainly used for calling an external provider for convenient development. The second part includes the Wallet, Blockchain and Smart Contract modules, providing a robust storage interface, making each module's data persistent.

## UTXO

In the UTXO model, it is possible to transparently trace the history of each transaction back through the public ledger. The UTXO model has parallel processing capability to initialize transactions among multiple addresses, indicating its extensibility.

Additionally, the UTXO model supports privacy protection; users can use Change Address as the output of a UTXO. The target of PayPill is based on smart contracts.

Compared with the UTXO model, Ethereum is an account-based system. In Ethereum, balance management works not unlike your bank account. Every newly generated block potentially influences the global status of other accounts. Every account has its own balance, storage and code-space base. Users perform peer-to-peer transactions

via client remote procedure calls. Although sending messages to each account via smart contracts is possible, these internal transactions are only visible in the balance of each account, and tracking them on the public ledger of Ethereum is a challenge.

Because of this, we consider the Ethereum account model to be a scalability bottleneck. By contrast, Bitcoin's UTXO model has enhanced network efficiency with obvious advantages. Therefore, the PayPill blockchain is based on the UTXO model and abstract the concept of the account, making it a more intuitive understanding of the real world, which was PAYNET's original intention.

### Smart contract

Certainty and Termination are two properties of a smart contract. When designing a smart contract system, non-deterministic factors need to be excluded.

Bitcoin has a set of scripting engines, while the instruction set is very simple and non-

Turing complete, with termination, so Bitcoin smart contracts are certain. The Ethereum Virtual Machine is a runtime environment for Ethereum smart contracts. The system functions for Ethereum smart contracts are not nondeterministic, but the contract's call path can be nondeterministic and result in scalable performance losses, as it uses meter to achieve the termination.

The Hyperledger Fabric smart contract uses Docker as the execution environment. Docker is a lightweight virtualization technology. Under the blockchain, Docker is a 'heavier' execution environment, which is where the performance bottlenecks of Fabric, currently only up to hundreds of transactions per second, uses a timer to achieve termination.

In order to keep with the advantages of certainty, termination, and lightweight of virtual machines and the language flexibility of container programming, PayPill is poised to develop the Virtual Machine as an execution environment for its smart contracts in the

## BLOCKCHAIN SHARDING: SOLVING SCALABILITY, LATENCY & TRANSACTION THROUGHPUT ISSUES
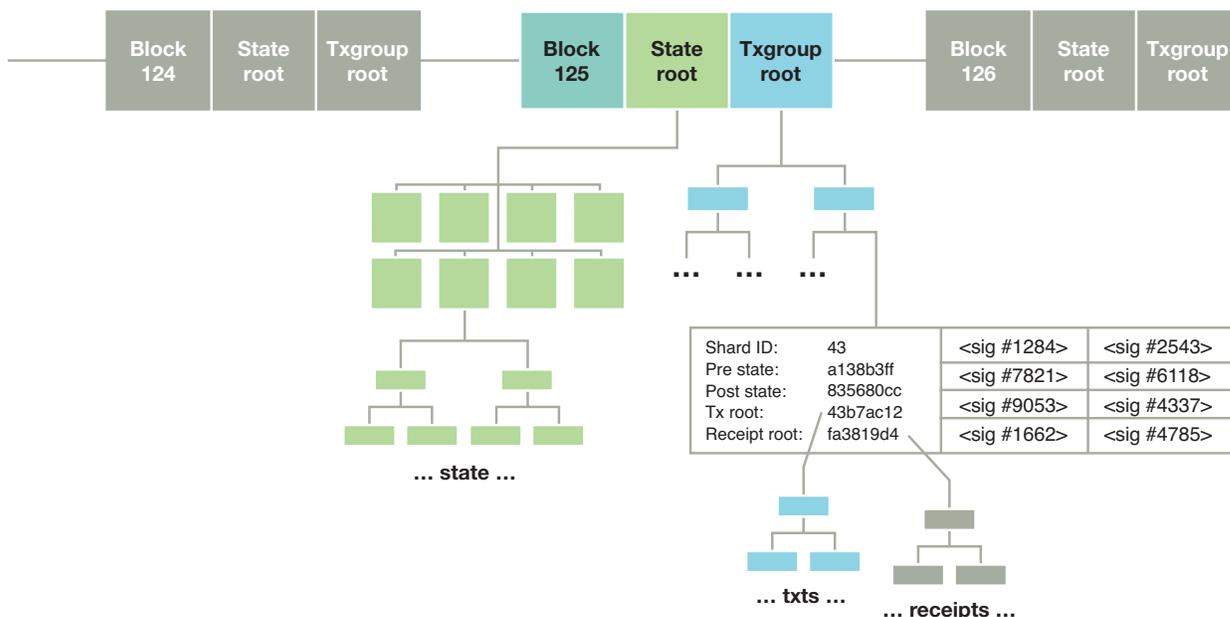
future, as it boots very fast and occupies less resources. PayPill's virtual machine data manipulation instructions are directly to the array, as complex data structures provide support. These will enhance the operational performance of PayPill smart contracts. The PayPill Network plans to charge for the operation and storage of tokens and smart contracts, giving economic incentives to book-keeping persons and to prevent the abuse of resources.

In the future, PayPill smart contract developers can use almost any high-level language they are good at for PayPill smart contract development. The first languages supported include Java, Go, etc. PayPill plans to provide compilers and plug-ins for these languages to compile high-level languages into the instruction sets supported by PayPill virtual machines.

The PayPill smart contract model on the previous page is a piece of code (a smart contract) that runs on a smart contract virtual machine and is deployed on a shared, replicated ledger (blockchain). PayPill has a life cycle for smart contracts management, namely the establishment, deployment, development, rollback, and termination. It can maintain its own status, control its own asset value and receive external information, transactions, or external information and transactions to respond.

The PayPill smart contracts provides a digitized agreement between parties (insurer–employer, employer–employee, employee–healthcare provider and pharmacy) regarding areas that they would like to agree; such as appropriate selection, adherence and compliance with prescribed medication, obtaining refills, reporting objective or subjective metrics regarding drug regimen, self-reporting of home monitoring values, or healthy exercise and eating plans. Once accepted, it is a digitized, lawful contract.

This ensures price and service transparency between patient and health service provider. It also sets the terms that health service providers are to manage their patients' health to the best outcomes and ensures the provider's clinical instructions are agreed with the patient.

## Consensus

The consensus of PayPill adopts a three-step strategy. The first step is to adopt a Kafka-based technology system to implement a centralized consensus algorithm. The objective here is to achieve system joint debugging and functional integration. The second step is to use a Raft-based distributed consensus mechanism to realize the centralized and distributed leapfrogging. This step gradually improves the functions of network and distribution and lays the foundation for the eventual realization of a wide distribution with no logical center.

The third step is to realize the Consensus mechanism of PoS and realize the Byzantine Fault Tolerant Consensus based on the "Margin Mechanism + Epoch Confirmation" and the compatibility consensus between PoS and PoW.

PayPill is currently open source code to achieve a consensus algorithm for the first phase of the center. The second phase of the distributed consensus algorithm is under development and testing.

## PPLL Mining Capabilities and Proof-of-Performance

In order for the blockchain to be validated and the currency to be active, we need the network to be able to 'mine' the PPLL token. This is known as 'proof of work' and miners are rewarded for deriving coins in the system. PayPill members and health professional within the consortia may also mine PPLL tokens.

Additionally, mining PPLL tokens goes beyond just the processing power in the network. Both PayPill members and health service providers may mine more PPLL tokens by executing 'proof-of-performance'.

The PayPill proof-of-performance is a natural solution consisting of using the PayPill blockchain to validate healthcare information or events like drug data, genomics, wearables data, blood laboratory values, blood pressure, check-ups, gym events and eating plans. Once the event is executed then the blockchain is updated with the healthcare event and the results (including health apps data on mobiles) while the AI predicts the data trending. This leads to the Smart Contract goals being activated and the individual receiving PPLL token rewards.

Doctors and other health service providers may mine for PPLL tokens by providing in-office services, use of generics and biosimilars, superior customer service, attaining quality outcomes, and managing healthy patient populations. This is referred to as proof-of-performance and is permission-based by the network once the member and the health service provider have been validated as a part of the PayPill consortia.

However, if an individual or a service falls below the goals set then the Smart Contract will lose any rewards developed. It is hoped this will provide a strong incentive for not falling back into poor healthcare practices or services rendered to patients.

## Network architecture overview

In the past, typical monolithic applications were built using different layers: for example, user interface, business, and persistence layers. A central idea of a microservices architecture is to split functionalities into cohesive 'verticals' – not by technological layers, but by implementing a specific domain. The following diagram depicts a reference architecture for a typical

microservices application on Amazon Web Services cloud platform (AWS) (p22). Modern web applications often use JavaScript frameworks to implement a single-page application that communicates with a RESTful API. Static web content can be served using Amazon Simple Storage Service and Amazon CloudFront.

Since clients of a microservice are served from the closest edge location and get responses either from a cache or a proxy server with optimized connections to the origin, latencies can be significantly reduced. It is best practice to implement other caching mechanisms to reduce chattiness and minimize latencies.

The API of a microservice is the central entry point for all client requests. The application logic hides behind a set of programmatic interfaces, typically a RESTful web services API. This API accepts and processes calls from clients and might implement functionality such as traffic management, request filtering, routing, caching, authentication and authorization.

The Elastic Load Balancing (ELB) Application Load Balancer, combines with Amazon EC2 Container Service (Amazon ECS) and Auto Scaling to implement a microservices application. The Application Load Balancer routes traffic based on advanced application-level information that includes the content of the request. ELB automatically distributes incoming application traffic across multiple Amazon Elastic Compute Cloud (EC2) instances. The Application Load Balancer distributes incoming requests to Amazon ECS container instances running the API and the business logic.

EC2 is a web service that provides secure, resizable compute capacity in the cloud. It's designed to make web-scale cloud computing easier for developers. It is a highly scalable, high performance container management service that supports Docker

## ARCHITECTURE FOR A TYPICAL CLOUD-BASED MICROSERVICES APPLICATION



**AWS**
**VPC**
VPN Connection
Internet Gateway
Customer Gateway
VPG
Remote Management & Administration
**Private Blockchain**
**Token Distribution**
**Data Storage & Management**
**Public ETH Blockchain**
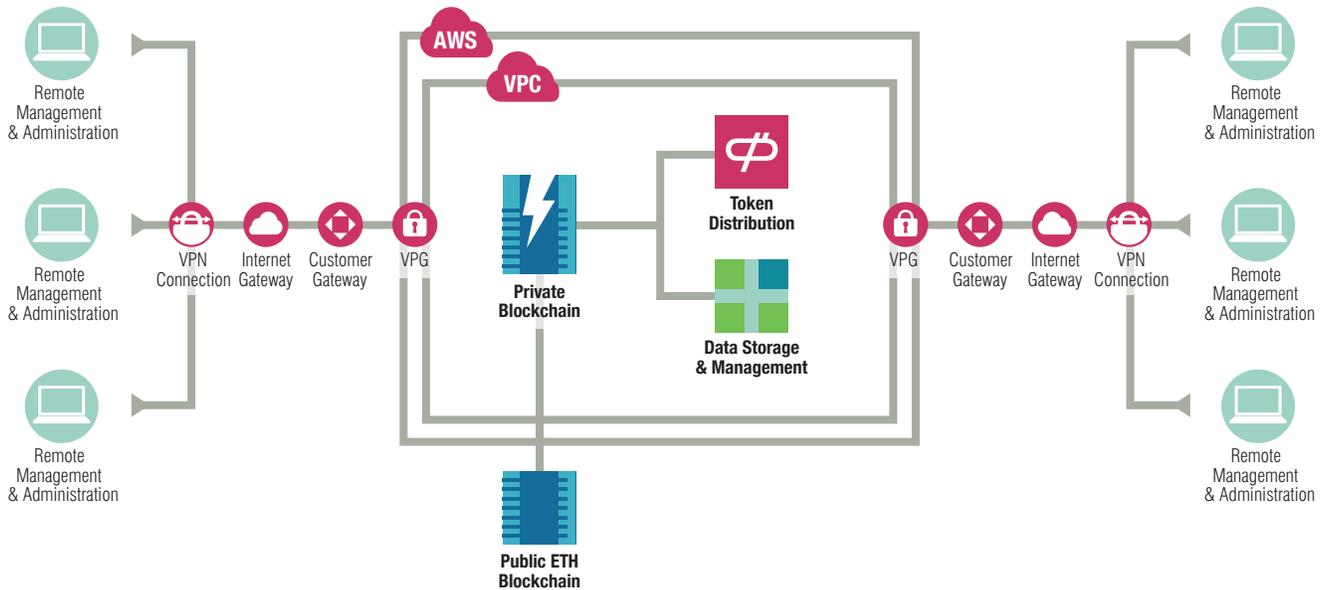
containers, allowing applications to be run easily on a managed cluster of Amazon EC2 instances.

Amazon ECS container instances are scaled out and scaled in, depending on the load or the number of incoming requests. Elastic scaling allows the system to be run cost-efficiently and also helps protect against denial of service attacks. Auto Scaling also helps us maintain application availability, allowing us to automatically scale our Amazon EC2 capacity up or down according to conditions we define.

### Containers

A common approach to reducing operational efforts for deployment is container-based deployment. After a cluster of EC2 instances is up and running, task definitions and services can be defined that specify which Docker container images to run on the cluster. Container images are stored in and pulled from container registries, which may exist within or outside an AWS infrastructure. To define how applications run

on Amazon ECS, a task definition is created in JSON format. This task definition defines parameters for which container image to run, CPU, memory needed to run the image, how many containers to run, and strategies for container placement within the cluster. Other parameters include security, networking, and logging for containers.

Docker images used in Amazon ECS can be stored in Amazon EC2 Container Registry (Amazon ECR). Amazon ECR eliminates the need to operate and scale the infrastructure required to power a container registry. Amazon ECR is a fully-managed Docker container registry that makes it easy for developers to store, manage, and deploy Docker container images. Amazon ECR is integrated with Amazon ECS, simplifying development to production workflow.

### Data store

The data store is used to persist data needed by the microservices. Popular stores for session data are in-memory caches such as Memcached or Redis. AWS offers

both technologies as part of the managed Amazon ElastiCache service. Amazon RDS makes it easy to set up, operate, and scale a relational database in the cloud. It provides cost-efficient and resizable capacity while managing time-consuming database administration tasks, allowing free focus on applications and business. Relational databases, however, are not designed for endless scale, which can make it very hard and time-intensive to apply techniques to support a high number of queries.

## VPC

PayPill users will connect to the private blockchain via an AWS VPC. Enterprise customers are able to access the Amazon EC2 over an IPsec based virtual private network. Unlike traditional EC2 instances which are allocated internal and external IP numbers by Amazon, the customer can assign IP numbers of their choosing from one or more subnets. By giving the user the option of selecting which AWS resources are public facing and which are not, VPC provides much more granular control over security.

## Public & Private Blockchain

The sole distinction between public and private blockchain is related to who is allowed to participate in the network, execute the consensus protocol and maintain the shared ledger. A public blockchain network is completely open and anyone can join and participate in the network. The network typically has an incentivizing mechanism to encourage more participants to join the network. Bitcoin is one of the largest public blockchain networks in production today.

One of the drawbacks of a public blockchain is the substantial amount of computational power that is necessary to maintain a distributed ledger at a large scale. More specifically, to achieve consensus, each node

in a network must solve a complex, resource-intensive cryptographic problem called a proof of work to ensure all are in sync.

To combat this, PayPill will deploy private + public blockchain hybrid vertical that will give users the best of both worlds. Blockchains that are private or permissioned work similarly to public blockchains but with access controls that restrict those that can join the network, meaning it operates like a centralised database system of today that limits access to certain users.

## API integration and interoperability of health apps with PayPill

We want to ensure that ALL health data is captured for the individual and added to the blockchain. So for this we will need to create Application Programming Interfaces with all the well-known patient records organisations in healthcare. Examples of systems include Cerner, AllScripts, GE Healthcare and Epic Systems.

For the AI/machine/deep-learning capabilities, we will have access to some of the foremost health databases to be able to bring state-of-the-art thinking and healthcare solutions to patients and healthcare professionals. Examples include:

- DeepMind Health
- Babylon Health
- BenevolentAI (data acquisition and aggregation of science periodicals and information)
- Google Health
- Microsoft Health Vault
- Blockchain database health records solutions:-
  - Patientory
  - Medicalchain.

### Artifical Intelligence, Machine and Deep Learning

Our solution will not be complete without the use of machine and deep learning to the healthcare data that gives individuals the opportunity to not only support healthcare outcomes but allows insurers to spot changes in behavior.

Artificial Intelligence (AI) is definitely the latest buzzword in the press. But it is important that we highlight the importance of Machine Learning (ML) and Deep Learning (DL). Consider those as the subset and a different software application in the field of AI.

Big data and technology author Bernard Marr has succinctky defined both AI and ML:

*Artificial Intelligence is the broader concept of machines being able to carry out tasks in a way that we would consider "smart".*

And:

*Machine Learning is a current application of AI, based around the idea that we should really just be able to give machines access to data and let them learn for themselves.*

The simplest form of AI is the calculator working out what a human would do, or working out complex calculations, as in a Microsoft Excel spreadsheet.

However, the basic mimicking of complex tasks has been taken to another level entirely, where computers are programmed to think like humans and carry out tasks based on a set round of responses. In other words, the vacuum cleaner is taught that it cannot go through a solid object but around it and to not retrace the route it has just vacuumed.

Machine Learning applications can read text and work out whether the person who wrote it is making a complaint or offering congratulations. They can also listen to various sounds and determine whether the sounds are from a distressed person or one that is happy.

Another field of AI, Natural Language Processing (NLP) has become a source of hugely exciting innovation in recent years, and one that is heavily reliant on ML.

NLP applications attempt to understand natural human communication, either written or spoken, and responds to individuals using similar language they can understand.

However, Deep Learning takes machine learning to another level and this is where our technology sits. Deep Learning seeks to take the range of data that is available from real life and research to develop and suggest outcomes. In our technology, this means predicting modification of existing drug dosages or schedules, new drugs or drug regimens, or ancillary treatments based on the individual's unique personal response, demographics and social circumstances. This is why it's essential that the AI has access to a myriad of data from the broadest range of environments to not only learn but 'tweak' responses based on correct and incorrect assumptions.

Essentially, Deep Learning involves feeding a computer system a lot of data, which it can use to make decisions about other data. This data is fed through neural networks, as is the case in Machine Learning. These networks – logical constructions that ask a series of binary true/false questions, or extract a numerical value, of every bit of data that pass through them – classifies data according to the answers received.

## ILLUSTRATING HOW OUR ML/DL PROPRIETARY SOLUTION SUPPORTS THE BLOCKCHAIN

- A PayPill user requests some information to regulate naturally their Type 2 diabetes. They are on a series of prescribed oral medication to control their condition and would like to learn if regulating it can be done naturally, resulting in a reduction or even an elimination of their drug dosages

- The PayPill App calculates and attributes a percentage of the patient's overall response to each drug in the regimen in the form of response to objective or subjective markers demonstrating efficacy. The App then takes data from research, other individuals, the user's health records and environmental activity (i.e. do they exercise and eat well?) and recommends a series of solutions

- The individual discusses these solutions with their doctor and sets some goals to monitor progress based on the solution generated. This information is added to the healthcare record and therefore the blockchain

- If the outcome is successful, then data around that success e.g. change in drug dosing or scheduling, change in drug regimens, blood tests, weight, and dietetics plan is used to anticipate similar questions from other individuals

- The individual, and potentially the physician, are awarded tokens for reducing the drug bill and therefore affecting the individual's healthcare insurance policy with a reduced cost policy.

## HOW WE DEVELOP PAYPILL'S ML CAPABILITIES

| | AI Acquisition knowledge | Data Theorem exploration | Theorem validation | AI product service |
|---|---|---|---|---|
| AI/ML Development | Acquire data from variety of sources Plug-Ins and scientific periodicals/blogs<br><br>Compile database with logical search terms | Identify trends for employers, physicians, insurers, pharma, PBMs<br><br>Identify solutions for individuals, drug selection, health and clinical trial opportunities | Validate theorem, pilot trials | Dissemination to the community – best practice data |
| Creating a proprietary product for individuals, doctors and healthcare physicians | New 'Dredger' algorithm scraping sources of data from scientific blogs, personal and social media data | New algorithms linking scientific, blogs, personal and social media data | New algorithms for knowledge learning of a particular health or disease state | Information for community via blogs, best practice sheets, sharing forums |

# MANAGEMENT AND OUR
## TEAM OF ADVISORS

*We have assembled a strong and capable team of full and part-time practitioners who have extensive experience of growing and exiting businesses within the manufacturing, health, biosciences and software sectors.*

### Dr John Kutzko
### Chief Scientific Officer and Co-Founder

**in** /in/john-kutzko

John has a doctoral degree in pharmacy and science. With six patents to his name and over 30 years' experience working in the pharmacy sector, he has helped manage chronic diseases including rheumatoid arthritis, multiple sclerosis, cancer and related-symptoms, HIV/AIDS and hepatitis C virus.

John has worked with many patients with these and other chronic diseases who have turned to medical cannabis as a means to improve both their therapeutic outcome and minimize the untoward side effects often caused by mediation regimens. As such he has worked hard to raise awareness on the benefits of medical cannabis and the medical evidence behind its utility in pain management, chemotherapy-induced symptom management and others maladies.

John was the Founder and CEO of PharmCare Infusion, Inc. – a home infusion company for people living with HIV/AIDS and cancer. John was also a lead partner in an AI software development company that developed a single and multi-agent drug dosing algorithm – the first such technology to receive FDA 510K approval. He has also been a partner in and consulted for specialty and compounding pharmacies as well as pharma in Colorado, Florida, Missouri, Pennsylvania and Texas.

John is in high demand as a knowledge specialist for start-up and existing compounding firms, as well as the originator for the AI engine which will power PayPill and our future propositions.

## Dr Wayne C A Wright
### CEO and Co-Founder

**in** /in/drwaynewright/

Wayne is a widely experienced director and scientist (with seven patents to his name). He has performed several high-profile roles within celebrated blue-chip businesses, including Unilever, Caradon and ERA Technology Ltd - one of the world's largest technology consultancies.

His experience is in the building of businesses from the bottom up with a clear understanding of the strategies essential to drive successful growth. Additionally, Wayne is a seasoned entrepreneur with investments in a biotechnology business in the US (CellMetRx), a start-up Compounding Pharmacy in Colorado US (Pagosa Specialty Pharmacy), Kytappo Healthcare Technologies in the UK and formally with an architectural practice in London (Paul Henry Architects). He is the owner and chairman of a social

enterprise, Maidstone Warriors Basketball club - now the largest all-ability club in Kent for 6-18 year old youth and adults.

With his coaching company [W]sq solutions, his turnaround and business growth activities have been extensive, including VC backed (3i and Merlin Biosciences) run businesses such as PetroTechnik and Scantrack, owner-managed businesses such as Scipac and Gel Systems, as well as established businesses such as Brett Waste (now Viridor), Smiths Medical and BBI. His clients have gone on to win 28 business awards for growth over the last six years, resulting in Wayne himself receiving an award as one of the IBC's top three business advisors in the UK, as well as the Institute of Director's director of the month in 2010.

## Ray Bailey
### Advisor (Speciality Healthcare)

**in** in/ray-bailey

Ray Bailey is responsible for overseeing the operations of Florida Cancer Specialists' Oncology Specialty Pharmacy, Rx To Go, including financial management, business development, new drug access, purchasing contracts and overall formulary management. Bailey was promoted to Director of Pharmacy in 2010, two years after joining as Pharmacy Manager. Before that, Bailey was General

Manager of Walgreens/OptionCare of Southwest Florida from 2005 until 2007. Also, he has been a Staff Pharmacist at Naples Community Hospital, owner of a pharmacy in Pine Island, FL and President/CEO-Owner of OptionCare of Southwest Florida, a national franchise of home infusion pharmacy services. Ray earned his bachelor's and graduate degree from the University of Georgia.

### Tayo Dada
### Advisor (Cybersecurity within blockchain)

in /in/tayodada

Tayo Dada is an entrepreneur and cyber security expert with over 30 years of experience working in IT, from software development to IT management. Tayo manages an award-winning InfoSec team of experts in IT security and cyber threat management who are decorated with industry-recognised qualifications and certifications, including SC clearance, CISSP, ISO27001, Cyber Essentials, CEH and CREST. Based in London's Tech city. Set up Big Four consultancy's first ethical hacking division in the UK.

### Rich Jarvis
### Advisor (HR, Leadership, Culture and Values)

in /in/richjarvis

Scientist, artist, inventor, adventurer, business owner, and thought leader who has a knack for catalyzing big 'aha!' moments and convergence between people, ideas, technology, and resources. Rich has eight patents to his name and is passionate about discovering enabling technologies and roles that uniquely connect a person's passion, talents, and skills with entrepreneurship. He enjoys working with colleagues and teams to prepare leaders who want to be fast-tracked into launching meaningfully unique solutions that influence culture and transform marketplaces.

### Scott Lake
### Advisor (Blockchain and AI)

in /in/sclake/

Scott is currently the Chief Data Officer at Zenabi Analytics LLC. His experience as a senior executive driving data strategy and developing the data-rich applications to execute those visions goes back many years. He has specific experience leading the effort to harness machine-learning science and advanced analytics to produce bottom-line value and growth for Fortune 500 clients.

### Cal Evans
### Advisor (Legal and regulatory)

in /in/calevans1

Cal is our team's lead consultant: a UK lawyer and US Litigation Consultant with experience working in top law firms in California and London. Cal undertook advanced IT at a junior college and received the top AVCE recognition award before then undertaking his undergraduate in law. Having passed law school in England specializing in business and corporate law, Cal completed his certificate in financial markets with Yale in 2016. Cal is considered one of the leading authorities on cryptocurrency and ICO compliance. He is one of the few people with the technological, legal, and financial expertise needed to navigate the cryptocurrency market. He has experience working with companies across the globe including some of the largest tech companies during his time working in California.

Cal is appointed to the board of a number of international ICOs and writes for publications such as CoinTelegraph and CryptoSlate. He has consulted with over 40 ICOs and has been featured in CNBC, Forbes, Bangkok Post, WSJ, and others. Cal has also consulted with government and regulatory bodies including the Bank of England, Government of Dubai, and Malta.

### Rich Slater
### Advisor (Legal and regulatory)

in /in/richard-slater

Rich has a wide range of experience consulting in several areas of legal/business practice, including limited liability companies, corporations, trusts, blockchain, ICO and cybercurrency, business planning, financial management, due diligence and regular reporting to clients. He also enjoys particular experience overseeing community relations while giving on-going advice regarding all aspects of business activities as it relates to CSR. Rich has extensive experience in bench and jury trials, appeals in state district courts, Wyoming Supreme Court, 10th Circuit Court of Appeals, administrative hearings and appeals, proceedings before regulatory bodies and governmental entities, as well as participation in legislative process.

### André Wright
### Advisor (Product/Data)

in /in/andrejwright

André is our product development and data platform advisor. He current works in data analytics at Expedia Group as their Senior Performance and Operations Analyst, and has worked in various analytics type roles. He has previously worked in various product roles at Fly.com, part of Travelzoo.

### Jay Godla
### Advisor (Global healthcare, PBMs)

in /in/jay-godla

Jay is Vice President and a Lead Partner of Strategy&, a division of PwC with primary focus on Corporate and BU Strategy development and implementation for Payers, PBMs, Med Devices, Healthcare Services and Healthcare Private Equity. Jay has extensive experience in Next Generation Medical Management, Product Development and Sales and Distribution. He's also the Leader of Corporate & BU Strategy team for Health Industries Advisory.

# THE PAYPILL HEALTHCARE FOUNDATION

/ *To fulfil PayPill's vision of healthcare for all, it has always been the intention to create a not-for-profit arm of our efforts, to take our mission into the farthest corners of the world, where conventional business models may not reach…*

In order to fulfil our mission – to 'forever change healthcare' – we are passionate about how our healthcare foundation can support our aims. Establishing this foundation has always been at the heart of our ambitions as we anticipate that there will be some healthcare challenges that are best served – at least in the short term – through non-commercial solutions.

Managed by a small team and trustees, the purpose of our foundation will be to identify and support groups and individuals who would not normally be able to access healthcare services.

But rather than operate the foundation as a go to service for the disadvantaged, we will work through carefully chosen, dedicated charity/not-for-profit groups who are in the best position to meet individuals' needs. This will apply not only in developed but also underdeveloped countries. In some instances, we envisage the foundation providing specialist equipment for hospitals without the funds to buy or replace equipment.

We see the foundation benefiting from not only tokens allocated to it through the initial genesis round but through a percentage of PayPill profits that are generated annually.

It's important to us for our staff to feel connected to the foundation. We want the heart of our mission – to improve equality and access to healthcare around the world – to sit at the core of our organisations' DNA. So we will ensure various members of staff can personally support the foundation's initiatives through either voluntary fund-raising activities or special assignments (paid by the company) to support relevant projects abroad.

*We are already developing a list of NGOs, charities and not-for-profit groups that we can work with, ready to begin collaborating to effect change on a global scale as soon as possible.…*

# HEALTHCARE AROUND
# THE WORLD

/ *Our business model targets the groups and institutions controlling the movement of information and patient data, the distribution and dispensing of prescription drugs, and those limiting the healthcare needs of the disadvantaged. This is how the land lies worldwide…*

### Europe

Clearly all countries have slight variations in their organisational structure and operate a compulsory and insurance payment variant. Only the UK has a medical system paid at the point of care. The only system linking all countries together is the European Health Insurance Card scheme, which attempts to join systems up (such as patient records). The only information contained in this system includes personal data linked to the country. No other information is contained which may be of benefit to the hospital or doctor in another European Country. The basic information allows the authority in another country to charge the patient's home country for services rendered.

In Belgium, each citizen has a health card that is used at the point of care. The health mutual then reimburses 50-75% of the individuals' health scheme. Although some hospitals and GPs try to minimise the cost of treatment, individuals can often be left with debt due to the cost of their treatment.

In France, as in the UK, there is a two-tier system, i.e. a publicly funded service and a private health service. Different services (as in Belgium) are funded from 70-100%. The majority of French citizens top this up to 100% by taking out a health mutual insurance. Again, those who are disadvantaged can be left with debts for medical treatment.

Germany has a two-tier health system, public and private, too. Their young people are opting for private care because the premiums are lower when they are young. German citizens pay into a health fund with monthly payments around 13% of their salary. The unemployed are cared for by a separate social fund. In Germany, as in the UK, the disadvantaged are largely catered for. This causes problems for those who do not pay regularly into their health plan because of their fluctuating income.

In Sweden the councils control the healthcare systems. The healthcare is paid through local council taxes and a high percentage (over 95%) is government funded. Patients' drug needs are charged but are capped to a rate of around $200/year.

A two-tier system of public and private funding is also available in the UK. All individuals are eligible for free treatment at the point of care, but there are those who choose to pay health care insurance to provide additional (privileged and fast) treatment from private hospitals. However, some services have to be paid for, such as occupational therapy services as an example. Drugs are subsidised heavily by the government – free if individuals are on social care plans and paid for by everyone else,. Although those from poor, elderly and underprivileged backgrounds are catered for today, there are already strains on the

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[16] Sarah O'Grady: 'Older people will end up paying' Outrage over NHS plans to delay 'non-urgent' operations - https://www.express.co.uk/news/uk/786465/Outrage-as-NHS-plans-to-delay-non-urgent-operations

system and the care that these groups are experiencing. For example, not going to the dentist negates paying dental fees and the NHS can refuse or delay certain operations if it is deemed not to be cost effective or non-urgent.[16]

## Russia

Outside of the EU, Russia is the largest country of relevance. As expected of a historically communist administration, Russians are entitled to free universal health care. Since the financial crisis of 2014, the Soviets have encouraged their people to take out private healthcare insurance.

That same crisis also led to a massive reduction in healthcare investment and maintenance, leading to under resourced facilities and outdated equipment. The problem with this is such consequences can create the environment where doctors are bribed by patients desperate to be treated rather than sit indeterminably on long waiting lists. This can inadvertently result in producing a tiered health service struggling to meet the needs of the 'haves' and the 'have-nots'.

Typical salaries for doctors and nurses can be as low as $250/month (below the country's poverty level) which can also exacerbate the kind of environment where bribery and corruption can take place.

Recent estimates are that 17,500 towns outside of the city do not have adequate healthcare facilities and that the government, at the time of writing, is considering reducing the healthcare budget downwards by 33%.[17]

## Africa and Middle East

We will not be able to delve too deeply into the healthcare systems in Africa here. Thankfully, technology is transforming how healthcare is delivered across the continent.

But needless to say, Africa is grappling with huge, complex healthcare challenges including managing a range of infectious diseases on an epidemic level and fending off the increasing growth of non-communicable diseases – while simulataneously contending with disparate, disjointed and underdeveloped healthcare systems. Although it is true to say that the private sector comprises facilities akin to the best in the western world, they are clearly available to the few rather than the many.[18]

In the Middle East, the healthcare system is at the other end of the spectrum, well-developed but under considerable strain from epidemic and chronic diseases. However, apart from Israel, access to health services is still Africa's biggest challenge, with the majority of people across the continent struggling for access to modern health facilities. And exasperating the health needs of the populous are issues with resourcing the healthcare workforce, combined with the inadequate supply chain of medicines and healthcare equipment.

Through PayPill we look to engage with the populations of these nations through our blockchain technology on mobile apps allowing the opportunity for individuals to be able to gain token currency for any existing or future healthcare event.

## Healthcare in Asia-Pacific

When ranking healthcare systems and accessibility in the 15 countries that include Afghanistan, through to India, Pakistan, Indonesia, China, Taiwan and New Zealand, only Australia and Japan come into the top ten of global healthcare systems with Cambodia and Afghanistan near the bottom of the ranking.[19]

The healthcare systems in many countries have also to deal with large-scale inequalities,

[17] Newsweek: Russia's bad health care system is getting worse – http://www.newsweek.com/2016/12/02/dire-russia-health-care-523380.html
[18] The Economist, Intelligence Unit: Access to Healthcare in Africa and the Middle East –
 http://accesstohealthcare.eiu.com/wp-content/uploads/sites/42/2017/06/AccesstohealthcareinAfricaandtheMiddleEast.pdf
[19] The Economist, Intelligence Unit:Access to Healthcare in Asia Pacific –
 http://accesstohealthcare.eiu.com/wp-content/uploads/sites/42/2017/06/AccesstohealthcareinAsia-Pacific.pdf

especially between urban and rural areas. Large land masses are not conducive to a slick and efficient healthcare supply chain. So the facilities of regional health centres compared to the urban facilities are as sharply contrasting as chalk and cheese.

Although urban primary care is good in some of the larger nations i.e. China, India and the Philippines, for them the primary question is not about access but quality of care and the lack of basic facilities in rural areas. As ever in strained health care systems, the strategic focus falls on providing emergency care over preventative care, and this of course impacts the poorest, who are deprived of a holistic public health solution.

A typical example is in India where the private sector dominates the nation's healthcare spending – 70%.[20] The result? The poor and rural areas miss out. Although healthcare is free to all, good and timely care is incredibly difficult to find, with junior physicians sent to rural areas having been trained to meet only the basic care needs. To put this incredible disparity into context, the private sector accounts for 58% of the country's hospitals, 29% of hospital beds, and 81% of doctors.[21]

Additionally, insuring low-income, disadvantaged and poor citizens is the 'holy grail' for Asia-Pacific governments. Corporate and Pharma support are cited as potential solutions,[22] with academics like C Van Weel advocating supporting healthcare investment in return for access to emerging markets.

This potentially could be an avenue that PayPill exploits, as it allows citizens to draw down funds from these corporate companies in return for sharing and participating in health research activities, with the funds earmarked for the individual's personal healthcare.

## Healthcare in South America and the Caribbean

Latin American countries have made the biggest changes in improving healthcare accessibility to the population, especially Brazil.[23] Even Cuba in the Caribbean is ranked 7th – above the US in the global healthcare index. These countries have expanded their primary care and hospital services. However, these two nations are the exception. Meanwhile, the ravages of political infighting, corruption and economic instability has led many South American countries to continue to have low life expectancy as well as child and maternal mortality challenges. This is certainly true in the Caribbean, with the 2011 UN report on the Millennium Development Goals (MDG) showing mortality rates are continuing to be 'stubbornly high'.[24]

As is the case in Asia, there is disparity between healthcare in the urban and rural settings. Countries such as Guatemala, Honduras and Bolivia all suffer such issues. Cuba is the exception where, due to the political socialist system, invests not only in healthcare infrastructure but training medical providers, too. Cuba has a lot of doctors and a big university in Havana.

Aside from Cuba, many of the region's healthcare systems are run on the typical two-tier system of government and private funded healthcare where, of course, access to private-funded facilities typically provide better care than government-controlled establishments.

[20] Bhardwaj, Geeta; Monga, Anuradha; Shende, Ketan; Kasat, Sachin; Rawat, Sachin (April 1, 2014). "Healthcare At the Bottom of the Pyramid An Assessment of Mass Health Insurance Schemes in India". Journal of the Insurance Institute of India. 1 (4): 10–22.
[21] Thayyil, Jayakrishnan; Jeeja, MathummalCherumanalil (2013). "Issues of creating a new cadre of doctors for rural India". International Journal of Medicine and Public Health. 3(1). doi:10.4103/2230-8598.109305.
[22] C Van Weel et al: Primary healthcare policy.
[23] http://accesstohealthcare.eiu.com/region/south-america/
[24] 2011 UN Report on Millennium Development Goals http://www.un.org/

## Healthcare in North America

With healthcare spending expected to reach $4.8 trillion by 2021, this is an enormous issue for the US to tackle.[25] Accessibility to healthcare is becoming a big issue with 'Obamacare' aka Medicaid attempting to support those disadvantaged having no insurance, only to alienate those individuals and employers who are having to see their insurance premiums increased to cover this change.

Which is why accessibility to healthcare looks set to be an issue in the US for the foreseeable future, with the most vulnerable bearing the brunt of the difficulties in caring for their healthcare needs. This is because the US is the only industrialised nation in the world without universal health care. Of the 325 million people in the US, 28 million are not insured. As everyone knows, a lack of health insurance leads to increased mortality.[26] At the time of writing, 26% of Americans reported barriers that restricted their access to care.[27]

What is very interesting is that although African-Americans represent 12% of the population, only 5% of those are clinical trial participants.[28] This presents a huge opportunity for PayPill, as it gives individuals the opportunity to monetize their health data for participation in clinical and research activities.

Canada has one of the most established healthcare systems in North America, with high access and better care, and are ranked in the top 10 of the global health care index above the US. That said, there are pockets of immigrants not having easy access to healthcare.

Canada's healthcare system is administered through a publicly funded health care system, popularly called Medicare. Private organisations typically run the services in the regions and provinces. The system is cost effective, as the doctor provides ALL the administrative headache of claiming, billing and follow up with the insurers. Healthcare costs are covered through provincial taxes, with lower income or vulnerable groups protected.

However, and this is unique to Canada, healthcare coverage does not cover prescription drugs, home care and long-term care, prescription glasses or dental care – not even part payment (as in the UK). Canadians either use their own resources for this or get cover through additional healthcare insurance.

Although not a reported issue at present, increasing drug costs around the world will make this extremely difficult for the general public to afford normal drugs let alone the speciality drugs for diseases such as rheumatoid arthritis, multiple sclerosis and cancer. This is where the PayPill system will add value to those vulnerable to having to pay for costly long-term care.

[25] http://www.chisite.org/?gclid=EAlaIQobChMlkuGjj4fu2AIV753tCh0MwwGhEAAYAAEgLmR_D_BwE
[26] Vox-Atul Gawande on the GOP plan to replace Obamacare June 23 2017
[27] Center for Healthcare Innovation: http://www.chisite.org/research/
[28] Center for Healthcare Innovation: Diversity, Inclusion & Health Equity Symposium; http://chisite.org/dilss/

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