USING BLOCKCHAIN AND DATA ANALYTICS FOR IMPROVED MEDICAL CANNABIS EFFICACY

In this article, Brad Moore, Chief Executive Officer of Global Cannabis Applications Corp, and Tim Morch, Freelance Content Writer, describe GCAC's technology offering, a blockchain-based software system that is able to transparently track the progress of medical cannabis from cultivation through to consumption.

The history of legal medical cannabis is a brief one – it is only in the last decade or so that cannabis has been legalised, and only in some regions. However, with restrictive regulations and harsh penalties eliminated in many jurisdictions, medical cannabis is gaining traction for treating several ailments.

The lack of scientific knowledge about cannabis limits our understanding of the plant and its medical benefits. Growing safe medical cannabis repeatably is a challenge. And on top of this, legalisation has resulted in complex regulations that vary in every jurisdiction.

Global Cannabis Applications Corp (GCAC) is a leader in designing and developing innovative software-as-a-service (SaaS) data technologies specifically for the medical cannabis industry. Its technologies benefit the ecosystem by helping the cultivator control and optimise their product lifecycle to enhance the consumer experience, understand how different strains of the plant work and, ultimately, improve patient outcomes.

GCAC's core technologies include machine learning and Ethereum blockchain that interface with easy-to-use mobile and web applications for professional and personal use. These technologies transparently disclose cannabis chain-of-custody events and enable patients to crowd-source medical cannabis efficacy data. The use of a decentralised ledger helps establish medical cannabis efficacy.

Citizen Green Efixii is the world's first blockchain-powered medical cannabis platform that connects the cultivator and consumer by providing tools for every stage in the process. With Efixii, cultivators who already meet stringent cannabis cultivation requirements are rewarded by connecting these steps to a patient experience on a per-gram basis. The result is a revolutionary approach to using big data to determine cannabis efficacy.

Prescriptii Patient Experience is a personal cannabis guide to help users make better choices and optimise their journey. Patients can learn which strains are best rated for a condition, view efficacy comments from other verified consumers and provide personalised feedback. Additionally, for cannabis businesses, the extensive database provides detailed chemical analysis of active ingredients and helps find strains related to those they currently use.

GCAC's blockchain-based software empowers a community of medical professionals, cultivators, regulators and consumers to understand product efficacy better and deliver improved patient outcomes.

HOW BLOCKCHAIN DELIVERS TRANSPARENCY AND SECURITY

Blockchain technology offers numerous advantages for the medical cannabis industry. Using a decentralised ledger can establish medical cannabis efficacy. Transparency ensures that all data is visible to everyone. A blockchain is immutable and cannot be changed, certifying data integrity for all stakeholders – cultivator, manufacturer, regulator, consumer and medical professional.

By recording every step in the lifecycle of a plant, cultivators can analyse the

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data to improve productivity, efficiency and consistency. Manufacturers can trust suppliers and add valuable data to the chain. Regulators can audit the process with ease and confidence. Medical professionals can see every step for improved prescriptions. Everyone can review the entire chain of events by simply scanning a QR code.

Transparency enables stakeholders to see corporate statements turned into actions. Without traceability, consumers cannot use their collective purchasing power to drive and reward more responsible production.

THE LACK OF CANNABIS DATA IMPACTS CONSUMER SAFETY

Historically, the illegal status of cannabis left researchers unable to study the plant thoroughly. The result is a glaring lack of meaningful information about cannabis – its effects and benefits – impacting product safety and consumer guidelines.

Industry experts, medical and pharmaceutical professionals and, most importantly, patients agree that developing safer, more effective products is crucial. A core issue is the lack of guidance on how to use the product effectively. For patients, it is often a prolonged process of trial and error, further complicated by the variable potency of the products they consume. The requirement for labels that list tetrahydrocannabinol (THC) and cannabidiol (CBD) levels does not account for variations in plant strains and manufacturing processes. To date, there is an absence of data evaluating efficacy and dosage guidelines.

In the recreational cannabis market, consumers are starting to demand more information about how the cannabis they consume was grown. They want to ensure the authenticity of test labs and THC/CBD levels and guarantee product consistency.

EFIXII – DATA SOLUTIONS FOR THE MEDICAL CANNABIS INDUSTRY

Citizen Green Efixii is an end-to-end blockchain-based mobile app that provides solutions for every stakeholder in the medical cannabis ecosystem. For example, it helps medical cannabis

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cultivators optimise the growing process for better yields and improved product consistency. Efixii securely records and tracks each step in the product lifecycle using artificial intelligence (AI) and deep learning algorithms to reduce compliance costs and stimulate more profitable cultivation. Post-harvest data analyses the impact of different manufacturing processes and evaluates consumer preferences with the SeedtoSeed™ feedback loop, which establishes a strong cultivator-to-consumer relationship, analysing data from cultivation to consumption on a "one gram grown, one gram consumed" basis.

The downstream benefits of blockchain transparency are numerous, from easier regulatory compliance and secure tracking at every stage to improved product safety. Anyone can scan an Efixii QR code and see the complete life story of a product.

HOW EFIXII WORKS

Efixii is a blockchain-powered compliance solution, enabling fast, agile registration of regulated goods and their source on the public ledger. Robust "Know Your Customer" on sign-up prevents criminality, ensuring each user involved in the process is known. It includes background checks against anti-money-laundering and politically exposed persons databases. The software assigns individual roles to users based on their access-level requirements, meaning that users can only access information and process questions pertaining to their role. A user's ID is notarised within each step of the process, enabling detailed reporting.

The secure technology documents and notarises each step in the

production, supply and shipping process. In this way, GCAC's technologies allow the entire product history, from seed to retail sale, to be fully tracked and traced down to the second, with every input stored on the blockchain and viewable to anyone.

Efixii is licensed to cultivators using a SaaS model and is a free-to-use app for cannabis consumers. Efixii's cannabis efficacy data is the intellectual property (IP) of GCAC. This IP creates an inherent difficulty in replicating or competing with GCAC's cannabis datasets. GCAC defined its protocols in a US Utility Patent Application "Tracking System For Cultivated Products And Associated Methods", serial number 17/456,385, filed November 24, 2021, Inventor Bradley Moore, ADDG file number 0132077.

THE SEEDTOSEED™ FEEDBACK LOOP

At the heart of Efixii is the patent-pending SeedtoSeed™ direct, real-time feedback loop. SeedtoSeed™ analyses every gram grown and consumed to generate transparent data for all stakeholders. Most importantly, it cements a consumer-to-cultivator relationship that yields better data for both. Consumers feed their experiences with a specific medical cannabis product into the loop, allowing cultivators to understand its effects, and cultivators learn which strains are more popular and why.

GCAC's proprietary technologies use a decentralised ledger to establish medical cannabis efficacy, layering and analysing thousands of patient journeys. This allows cultivators to provide patients with repeatable results and assure safe, approved, effective products (Figure 1). Citizen Green Efixii provides data-driven solutions for medical cannabis cultivators, manufacturers and resellers. The blockchain technology is visible to all stakeholders,
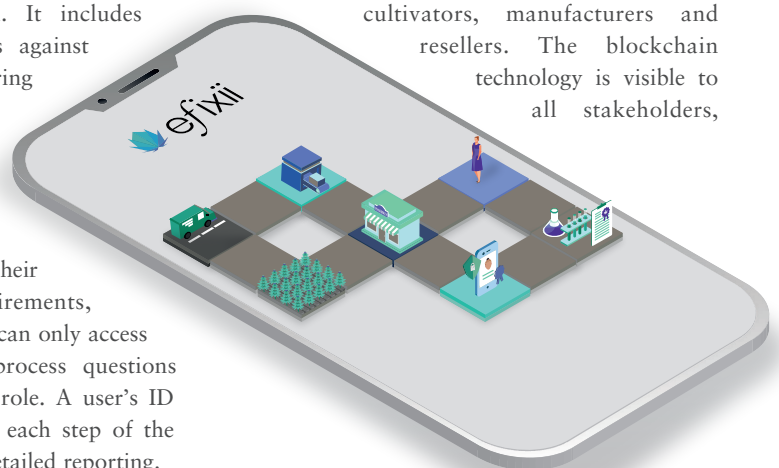

Figure 1: Illustration of how the Efixii SeedtoSeed™ feedback loop works.

including regulators, medical professionals and patients – this transparency breeds trust at every level:

- Manufacturers have increased trust in suppliers with best-in-class data
- Suppliers improve the value chain from grower to consumer and build strong relationships with patients
- Medical professionals can use the data for better prescriptions, improving patient outcomes
- Regulators can audit the entire process with ease and confidence, reducing compliance costs.

A pain point medical cannabis cultivators face is efficacy and dosing. Citizen Green solves this challenge by tracking and analysing every step in the product lifecycle. The goal is to understand what happens under certain, specific circumstances on a gram-by-gram basis. Thousands of personalised treatment journeys are analysed, letting cultivators accurately establish correct dosing levels and the average efficacy of product-ailment treatment.

Prescriptii

Patient-Care Solution

PRESCRIPTII – MAKE BETTER CHOICES AND OPTIMISE YOUR JOURNEY

The Prescriptii Patient Experience (PPE) website helps patients learn which strains are best rated for their condition and find related strains based on those they currently use. PPE is a Reddit-style web portal for medical cannabis consumers powered by an AI engine built by Curve Tech (Tel Aviv, Israel), creator of machine learning environments and prediction engines that are used by global e-commerce leaders like Shopify.

The advanced algorithm analyses over 600,000 verified data points from studies about cannabis, including questionnaires, user reviews and rankings of widely available strains, for more than 80 medical conditions. Machine learning establishes

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links between the conditions and strains to create a data-driven picture of medical cannabis. The proprietary heredity tree maps the origin and ancestry of over 9,000 strains and their chemical compound levels, including THC and CBD levels, indica and sativa ratios, and additional active compounds, such as cannabinol, cannabichromene, cannabigerol and tetrahydrocannabivarin.

The easy-to-use app features two search modes. The traditional mode will look familiar, and the neuro-linguistic programming (NLP) mode makes queries easy with an intuitive auto-suggest feature. Prescriptii helps find strains rated best for certain conditions using PAIN to STRAIN, analyses a strain to see which conditions it works best for with STRAIN to PAIN, and helps find other strains similar to a strain a user is familiar with or already uses with STRAIN to STRAIN. Prescriptii offers basic search results, and consumers can create an account for more comprehensive results, recommendations and preferred strains.

With the introduction of this free consumer service, GCAC is striving to improve customer knowledge and create confidence in this incredible plant. Additionally, for cultivators using Efixii, Prescriptii's powerful AI engine can evaluate new strains as the AI engine "learns" what the medical effect of existing strains is and can predict the behaviour of similar new strains.

REGULATORY VARIATIONS CHALLENGE THE MEDICAL CANNABIS INDUSTRY

Before legalisation, cultivators and consumers operated behind closed doors – with varying results. Potency fluctuations and inconsistent yields were common, compounded by an inability to test the product. Consumers had no advice on how to use the product safely. Legalisation has underscored the regulatory variations in every jurisdiction. Regulators require strict documentation, and the cost of compliance is high for cultivators, manufacturers and retailers.

In the US, for example, every state with legal medical cannabis has different regulations that apply to the possession, consumption, cultivation, transportation, how to obtain a prescription and quantity limits. In contrast, Canada has fully legalised cannabis for medical or recreational consumption and medical cannabis is legal in many countries in the European Union, again with unique laws in each. With Citizen Green Efixii, regulators can inspect all information by scanning a secure QR code, which, because blockchain-based data is tamper-proof, makes their job easier, decreasing compliance costs and speeding approval times.

Efixii grows trust at every level. Manufacturers and retailers can get transparent, verifiable data and can add post-harvest events to the blockchain for compliance. An enhanced understanding of these processes creates solid relationships with all stakeholders and the decentralised ledger helps establish medical cannabis efficacy.

EFIXII ENHANCES MEDICAL CANNABIS CULTIVATION PROCESSES

The role of the cultivator has never been more critical. Cultivation requires meticulous attention to growing details, adherence to regulations and understanding every step post-harvest. It is a delicate balance of compliance with certification costs and optimising growing techniques to boost revenues. Every batch must be tested, certified and approved before it can move to the next stage. To develop better, more effective products, cultivators must make sense of the product lifecycle, especially the patient experience. The lack of valuable data often leaves them guessing.

Using the power of a blockchain to talk to connect cultivators and consumers, Efixii creates a unique relationship on a per-consumer basis, resulting in better cultivation and marketing decisions, as well as increased sales without customer acquisition costs. Attestations on the blockchain can be used as part of a cultivator's product marketing strategy.

BETTER EFFICACY FOR MEDICAL AND PHARMACEUTICAL PROFESSIONALS

Medical and pharmaceutical professionals depend on efficacy data to establish correct dosages. Efixii's decentralised ledger helps to establish a better understanding of what happens under specific circumstances on a gram-by-gram basis, accurately determining average product-ailment treatment efficacy and dosing recommendations. By making use of such data, medical professionals can properly prescribe cannabis and deliver better patient outcomes.

IMPROVED PATIENT EXPERIENCES WITH BLOCKCHAIN TECHNOLOGY

The consumer experience has never been more critical, and transparency is the new standard. Without traceability, consumers cannot use their collective purchasing power to drive and reward more responsible production. Visible, verifiable data improves the medical cannabis ecosystem and increases trust.

With Efixii, a simple QR code scan reveals the entire story of a product. Patients get trustworthy, tested and certified medical cannabis (Figure 2). They benefit from ratings and observations in the SeedtoSeed™ feedback loop and actively participate in the system. Tracking every gram grown and consumed for thousands of journeys supplies essential efficacy and dosing data, which, when fed back to cultivators, can help them to understand which products

Figure 2: Scan this QR code for sample product history and patient feedback.

work, enhancing product efficacy and safety. GCAC's end-to-end data-driven solution for the medical cannabis industry transparently connects all stakeholders, resulting in better outcomes for medical cannabis patients.

ABOUT THE COMPANY

GCAC is a leader in designing and developing innovative software-as-a-service data technologies specifically for the medical cannabis industry. The company's technologies benefit the ecosystem by helping the cultivator control and optimise the product lifecycle to enhance the consumer experience, understand how different strains work, and improve patient outcomes. GCAC's core technologies include machine learning and Ethereum blockchain that interface with easy-to-use mobile and web applications for professional and personal use. These technologies transparently disclose cannabis chain-of-custody events and enable patients to crowd-source medical cannabis efficacy data. The decentralised ledger helps establish medical cannabis efficacy.

ABOUT THE AUTHORS

Brad Moore, Chief Executive Officer of Global Cannabis Applications Corp, has over 20 years of management experience working with Fortune 500 companies and tech start-ups. He is a military veteran, having served nine years with the Canadian Armed Forces and holds an MBA from Royal Roads University (Victoria, Canada). Mr Moore's focus is on creating better outcomes for medical cannabis patients using a decentralised ledger to establish medical cannabis efficacy.

Tim Morch is a seasoned freelance writer and communications strategist with over 30 years' experience developing content, strategies and analysis for a range of private and public sector clients. He helps brands create relevant, impactful messaging that both informs and entertains. Mr Morch is a veteran traveller with decades of international living, work and adventure. His heightened cultural awareness has shaped his ability to adapt to different situations and work with people of different backgrounds.