



Cannabis Supply Chain Traceability Open Cannabis System



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Cannabis Supply Chain Traceability

Open Cannabis System

This document provides recommendations and guidance needed to understand and implement the Open Cannabis System of numbering and bar coding from the cannabis seed or clone provider to the retailer and to consumer experiences. This document is provided by Cannabis Reports and some technology may be subject to the "Terms of Service" and membership with Cannabis Reports (www.cannabisreports.com).

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Acknowledgements

We acknowledge the following sources of inspiration:

- Statewide legalization and traceability guidelines cannabis states in the United States of America.
- GS1 Traceability Guidelines (<http://www.gs1.org>)

We also acknowledge the individual contributions and inspirations made by, and from members of the cannabis industry and community:

David Drake CANNABIS REPORTS

Blake Haffner CANNA MAGIC

Timothy Spence CANNABIS REPORTS

Michael Hadj NORCAL TRIMMERS

Joseph Healy CANNABIS REPORTS

Scott Liebman FORT SYSTEMS

Kris Spohn CANNABIS PRODUCER

Steve D'Angelo HARBORSIDE HEALTH CENTER

Uwe Blesching CANNABIS HEALTH INDEX

And countless generations of cultivators, and cannabis producers that came before us all.



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1. Introduction

Cannabis Reports established themselves as a leader in the identification of cannabis strains in 2008 by being one of the first to organize and highlight the lineage information about cannabis strains and the seed companies that provided them. Today, thousands of people utilize Cannabis Reports to find information about their cannabis strains, extracts, edibles, and other products every day.

Working with various customers, retailers, and production groups in multiple states and internationally, it was clear that work needed to be done to focus on building a traceability model that has global applicability. The Open Cannabis System was developed in conjunction with producers and retailers in the field of cannabis from small farmers to massive production facilities.

Effective cannabis traceability is based upon the accuracy of the information about the products contained in records held by the various supply chain partners. This document provides recommendations and guidance needed to understand and implement the Open Cannabis System of numbering and bar coding from the company providing the seeds or clones to grow plants, all the way to the consumption of finished products. Getting access to the tools necessary to use the Open Cannabis System requires membership with Cannabis Reports. Please consult <https://www.cannabisreports.com/grow-your-business> to see how to get started.

The adoption of the full set of the Open Cannabis System is especially timely in view of the changing landscape of cannabis legalization and medical cannabis acceptance across the United States and around the world. While individual states are inventing compliance and regulatory practices for localized tracking and consumption, leading producers and retailers are adopting the Open Cannabis System ahead of regulations to ensure a healthy global cannabis industry where consumers and businesses can interact and thrive together.

2. Traceability

The most internationally recognized definition of traceability defines it as the “ability to trace the history, application or location of an entity by means of recorded identifications” (ISO 8402). There are however, other definitions such as the one contained in the General Food Law - Council Regulation (EC) No. 178/20020 and the one established by the Codex Alimentarius Commission.

3. Open Cannabis System

In this document, you can explore the Open Cannabis System for unique identification of standard trade item groupings not crossing the point of sale, logistic units and trading partners, as well as the data standards, bar code labelling and electronic data exchange as best practices for traceability.

The key reason for this is that the Open Cannabis System provides global, generic, voluntary standards for suitable use by all trading partners to facilitate the identification of companies and their products and to exchange information about them. These standards provide a common language of business used in retail trade and beyond.



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If properly used by each member of an extended supply chain, products and data, including information required to manage traceability, shelf life, and lab testing, can be exchanged through each link in the chain; facilitating the seamless flow of information with the flow of goods.

4. Cannabis Reports Traceability Tools

The introduction of the Open Cannabis System can improve the efficiency of recording and exchanging information between supply chain participants and consumers. When used in conjunction with databases containing accurate and timely records, Open Cannabis System provide all supply chain participants and consumers with the technical capability to see the origin and lab testings of a product, both in their own locations and across the entire supply chain.

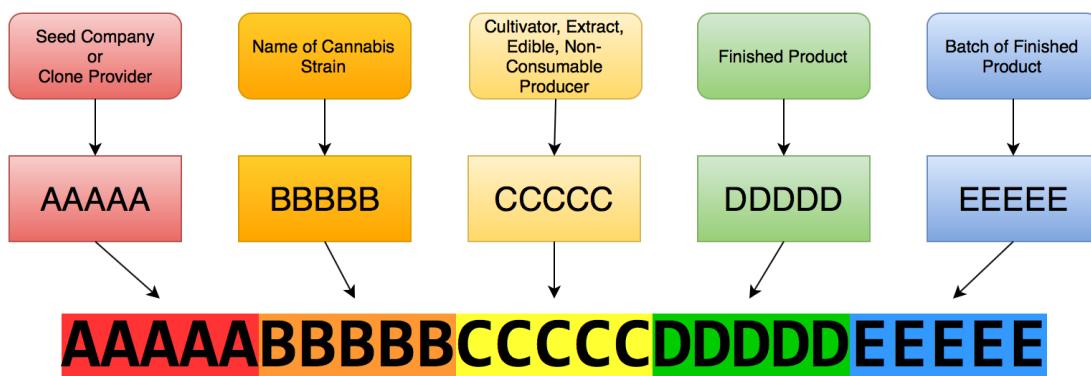
At the simplest level, item coding is what the name suggests — a system for identifying and codifying items by giving each one a unique identifier. Identification can be applied at every stage of production and distribution. It is used to identify products and services. While the most visible aspect of item coding is the bar code, it is only a machine-readable representation of a number. It is the code, which is the most important element in the Open Cannabis System, because the code identifies the item to which it is assigned.

The Cannabis Reports codification system provides for global uniqueness and overcomes problems of confusion, duplication, and misinterpretation, because all users of the Open Cannabis System follow the same codification rules. An Universal Cannabis Product Code can be recognized not only by local trading partner companies, but by companies operating overseas as well. Each code is unique worldwide, so there is no possibility of confusion. The Open Cannabis codification system also provides the ability for items to also carry, within the coding convention, extra or attribute information pertaining to the item.

Open Cannabis Systems carry data, which allow supply chain participants to track and trace products. The application of these standards requires manufacturers, importers/exporters, carriers, distributors, labs, and retailers to keep records of serial numbers of logistic units (CPLI), identification codes of trade items (UCPC), manufacturers behind them (CPIC), specific strain identification (CSIC), and retail level bar codes (UPC-A).

4.1 Universal Cannabis Product Code (UCPC)

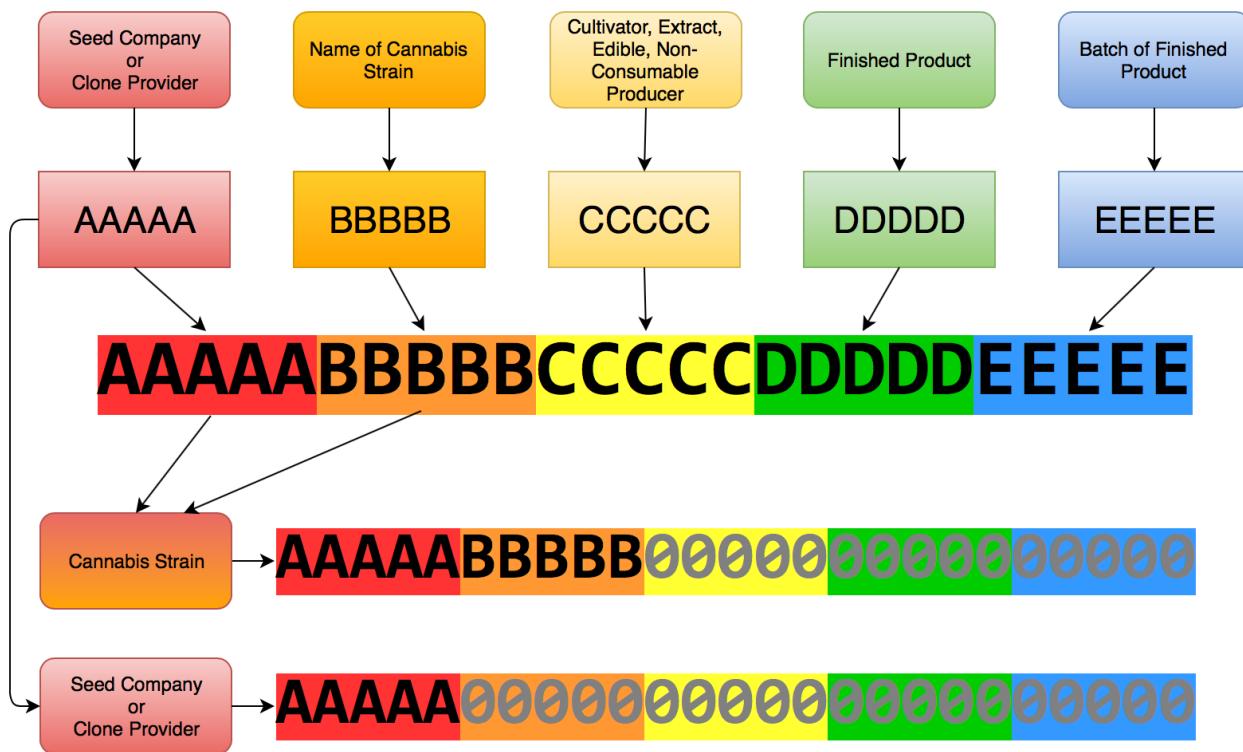
The UCPC is an alphanumeric code used to identify a particular batch of cannabis or finished cannabis product. Using a combination of individual identifiers, as well as a unique alphanumeric code for the batch, the UCPC allows for accurate identification of individual batches of finished goods in the cannabis production line.





4.1.1 Cannabis Strain Identification Code (CSIC)

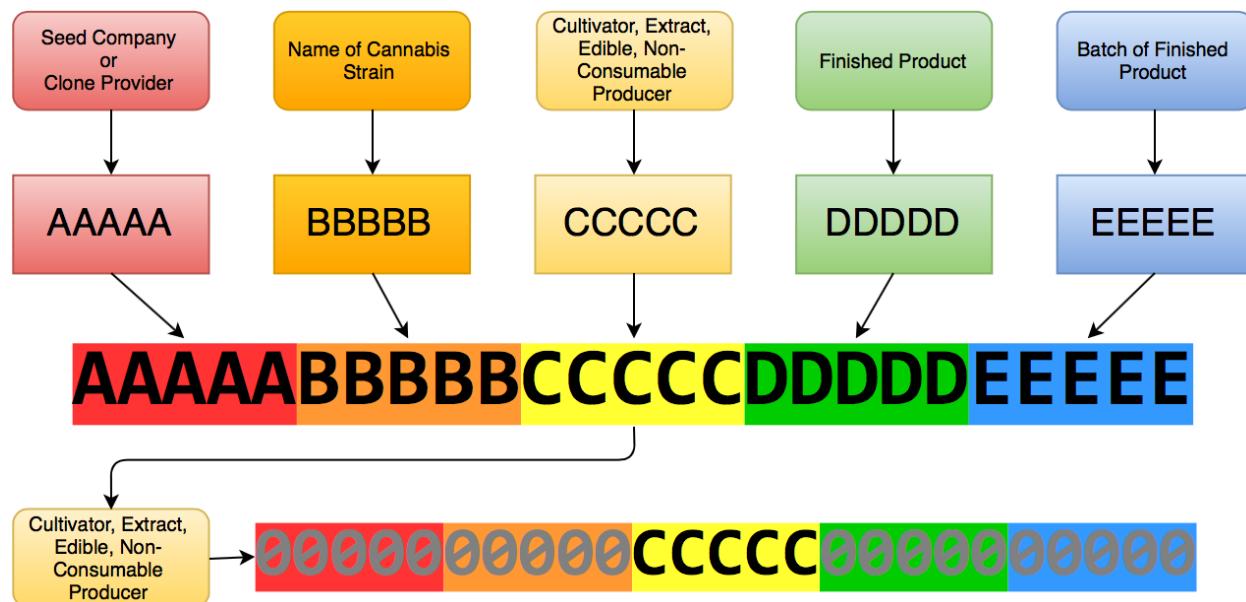
The CSIC is an alphanumeric code used to specifically identify a strain of cannabis. Rather than simply utilizing a "Name," which can be duplicated at length by various producers and manufacturers, the CSIC utilizes an additional piece of information, the origin for the seeds or clones of the individual strain of cannabis.





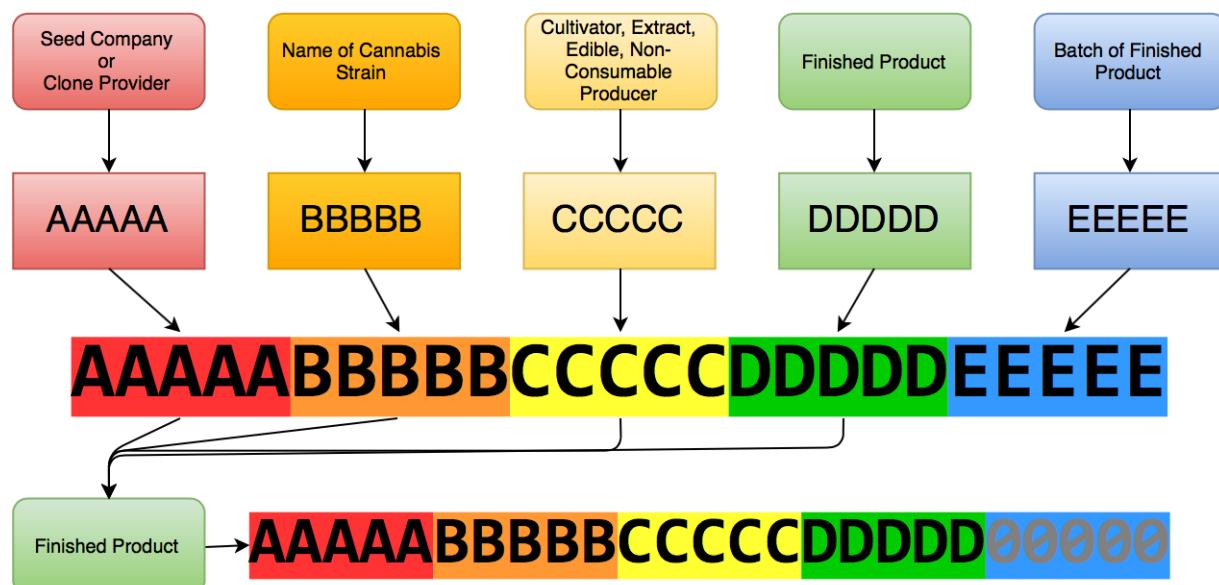
4.1.2 Cannabis Producer Identification Code (CPIC)

The CPIC is an alphanumeric code that identifies any legal (e.g. company, division), or physical entity (e.g. plot of land) within a business or organization. Each producer is allocated a globally unique number that is utilized in other identifiers in the Open Cannabis System.



4.1.3 Cannabis Finished Product Identifier (CFPI)

The CFPI is a combination of the strain (CSIC) and producer (CPIC) identifiers, as well as a uniquely generated alphanumeric code for a finished cannabis product. This can be various types of flowers, extracts, edibles, or non-consumable products.





4.2 Cannabis Product Logistics Identifier (CPLI)

The CPLI is a GS1-128 barcode containing the UCPC, as well as the date of production and human readable product type encoded in the barcode. This allows for identification in the shipping, packaging, production, and distribution of products beyond the other identifiers.

4.3 Universal Product Code (UPC-A)

The Open Cannabis System utilizes GS-1 methodologies for creating and maintaining familiar and industry standard UPC-A codes for the cannabis industry. With unique prefixes, producer identifiers, and globally unique product identifiers, the UPC-A is suitable for consumer level packaging or for generation by retailers on distributing bulk or unpackaged goods.

4.4 Quick Response Code (QR Code)

For consumer level identification and access to information, a quick response code is generated for each UCPC in the Open Cannabis System. The QR code is based on the ISO/IEC 18004 definition and encodes a link to the Cannabis Reports website with the UCPC code that is guaranteed to remain consistent and available even if changes to the website or underlying products occur. QR codes are linked to the Cannabis Reports website in the following format:

<https://www.cannabisreports.com/UCPC/{UCPC}>

Providing consumers with the ability to accurately identify products in hand gives access to information about production, lab testing, reviews, and other related products. This provides a key component to moving forward in an industry full of disparate data. Patients, consumers, the scientific community, politicians, business owners, and technologists deserve a way to globally identify the thousands of new cannabis products entering the market.

4.5 Application Programming Interface (API)

Cannabis Reports provides an application programming interface to access thousands of producers, retailers, products, reviews, lab tests, and more to the cannabis community. By utilizing the UCPC and the Open Cannabis System, software can be written, data can be collected and analyzed, and the industry can communicate effectively about individual components of the cannabis industry from the conception of cannabis strains to the consumption of products. More information about the API can be found on the Cannabis Reports website here:

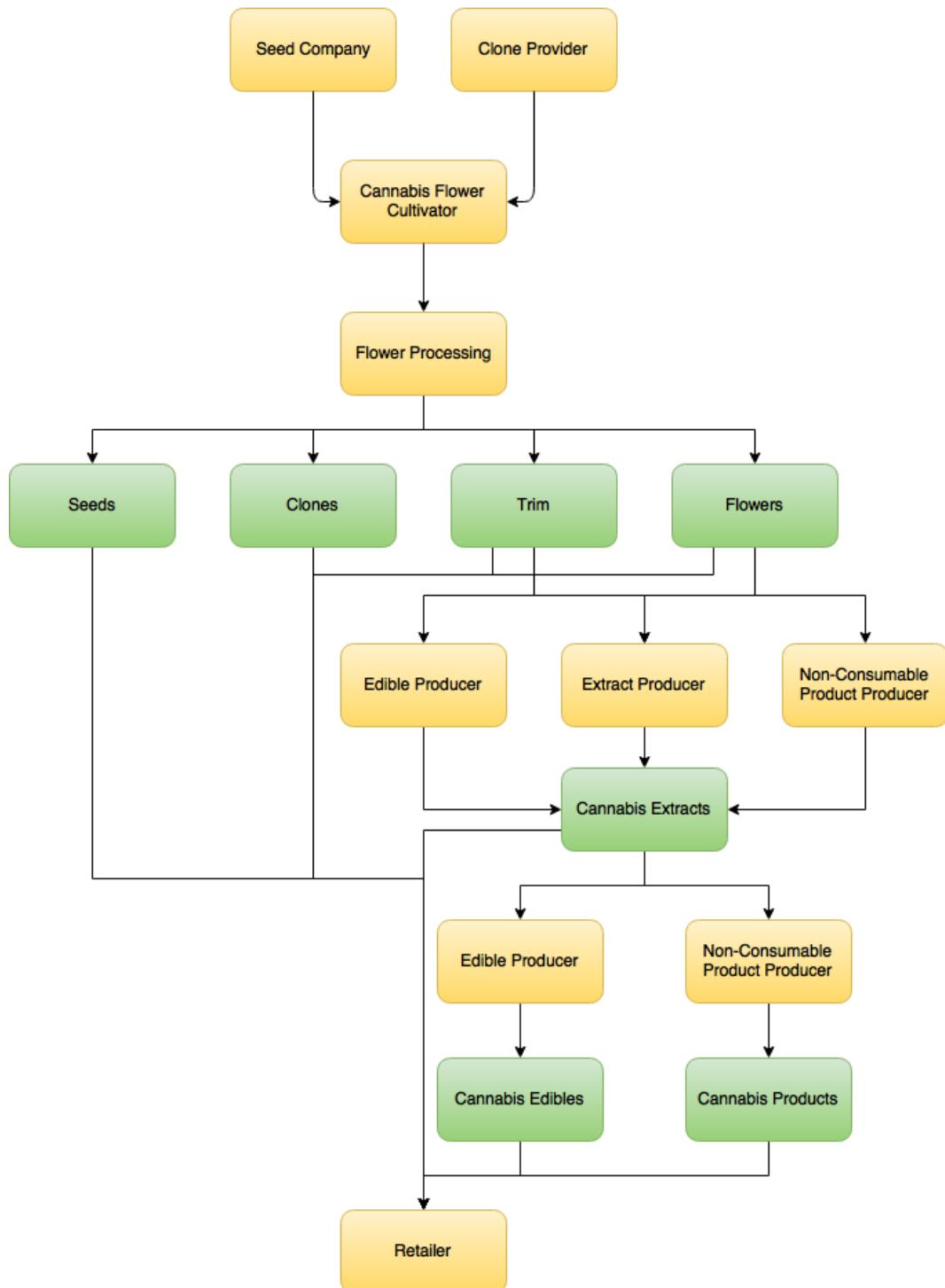
<https://www.cannabisreports.com/api>



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Open Cannabis System

Production Line





5. The Cannabis Supply Chain Model

The cannabis supply chain has always been complex and fragmented with more distant suppliers and ever-more demanding customers, the unique characteristics of this supply chain bring challenges to implementing an effective traceability system.

The largest companies account for a significant percentage of the industry and have significant technology requirements. The remainder of the industry is comprised of small to medium enterprises, many of which have found niches in specialty products and branding. There is also a myriad of other support companies that provide materials, transportation, storage and other services that are also impacted by traceability.

Companies vary greatly in their technical capabilities; from phone, fax and paper based transactions, through robust e-commerce, bar code, and other internal and state or locally mandated systems. Their ability to identify implicated product, and perform track and trace activities is directly related to their technical capabilities.

Cannabis Reports and others determined that the cannabis supply chain could be broken down into the following key areas:

- Seed or Clone Providers
- Cultivators and Farmers
- Extract, Edible and Non-Consumable Producers
- Lab Testing Organizations and Facilities
- Finished Good Distributors and Packagers
- Retailer
- Consumer

Each area was examined with a view to explaining traceability within that business process, and to determine the relevant Open Cannabis System standards to be deployed.

5.1 Key Area 1: Seed or Clone Providers

5.1.1 Scope

The seed or clone provider is responsible for the acquisition and hybridization of cannabis strains necessary to create the effects and flavors that appear in cannabis. They are responsible for the distribution and harvesting of seeds and clones, as well as record keeping about the lineage that went into the strains. Information about production of seeds or conditions of clone source should be available on request.



5.1.2 Description

The seed or clone provider is responsible for the acquisition and hybridization of cannabis strains necessary to create the effects and flavors that appear in cannabis. Seed companies have worked for decades traveling the globe acquiring and propagating cannabis strains to cross-breed or bring to cultivators throughout the world. The cannabis plant has the capability of remaining in a vegetative state for a considerable amount of time without producing flowers that are cultivated for their resinous trichomes. Because of the aforementioned capability, generations of strains can be kept and small cuttings or clones retained to ensure consistency.

5.1.3 Traceability Data

The propensity for a strain of cannabis to produce different ratios of phytocannabinoids, flavonoids, and other terpenes is based on the genetics and conditions of cultivation. Due to this, it is important to keep good records to understand and build upon successes or failures regarding the lineages of different strains of cannabis found throughout the world.

Seed and clone providers can also be listed as producers for the seeds and clones that go into other finished products, or for those that are directly at the retail level. They should also supply information about cultivation expectations including estimated flowering time and ideal conditions for consumers and producer alike.

5.1.4 Open Cannabis Recommendations

The Open Cannabis System does not simply refer to a strain of cannabis by a single identifier consisting of a name. Due to the thousands of different names currently available for strains of cannabis, there is considerable overlap that cannot be discounted. Therefore, the Open Cannabis System includes and requires the identification by both the source of genetics, as well as the name of the strain, to ensure accuracy and correct representation.

Utilizing the Universal Cannabis Product Code (UCPC - Sec 4.1), the identification of the strain consists of the first two parts of the entire identifier. The source of genetics, and the name of the strain. This is called the Cannabis Strain Identification Code (CSIC - Sec 4.1.1).

The following information should be associated to each CSIC:

- Name of the source of genetics or seed company
- Name of the strain of cannabis
- Direct parental lineage of the strain

The production of seeds and clones to be available on the retail market should contain identifiers and codes to allow for accurate consumer identification.

On packaging for seeds or on labelling for clones, the UPC-A barcodes should be attached for retail processing and identification, and the UCPC or associated QR code applied to allow for retrieval of information on a per batch basis.



5.2 Key Area 2: Cultivators and Farmers

5.2.1 Scope

Cannabis cultivators and farmers are responsible for the production, harvest, and delivery of the cannabis plant. Often, processing of the cannabis plants are done by the cultivators or farmers themselves. They are responsible for record keeping and appropriate information about what is received and what is sent. Farm or cultivation treatment details, or certification details should be available on request.

5.2.2 Description

Since traceability does not confer a guarantee of quality, disciplined record keeping is a key success factor. It is essential that the grower keep records for each plot of cannabis under their control. This includes details about: the location, strain and care of the cannabis, production record, origin, and chemical content of water used for cleaning and irrigation and the treatment records which includes all fertilizers, pesticides, fungicides, and/or other treatments carried out. On receipt of treatment products from suppliers, a record should be made of the supplier's details, a description of the product received, as well as applicable batch numbers.

5.2.3 Traceability Data

The key data required for traceability purposes are the identification of the plot or block from which the cannabis comes, the harvest date, and the strain of cannabis cultivated. There are major benefits from having a standard globally unique location number (this number would be changed if the plot is sub-divided or if the strain variety on the plot changes). All communications and related paperwork can have a common means of identifying location, thus eliminating the need to include names, addresses, and other related information in repetition.

5.2.4 Open Cannabis Recommendations

Each cultivator or farmer is identified with a Cannabis Producer Identification Code (CPIC - Sec 4.1.2). The following information should be associated to each CPIC:

- Name and location of farm
- Contact details
- Any certifications associated with the location

The general availability of the varietals of cannabis strains from each cultivator or farmer should be identified with a Cannabis Finished Product Identifier (CFPI - Sec 4.1.3).

When new batches are completed, they should be tested and assigned a Universal Cannabis Product Code (UCPC - Sec 4.1). The following information should be associated with the UCPC for a finished batch of cultivated flowers:

- Date of harvest
- PDF of lab test results



- Lab test results should contain phytocannabinoid contents, terpene contents, as well as residual testing results for each individual batch

Finished products to be made for sale after processing should contain labelling that includes the finished UCPC or QR code to access the information regarding the finished UCPC. If the finished products are not going to be made for sale at the retail level, the Cannabis Product Logistics Identifier (CPLI) should be attached to labelling for shipping and handling for all receipts and delivery of the finished batch.

5.3 Key Area 3: Extract, Edible, and Non-Consumable Producers

5.3.1 Scope

The cannabis plant stands alone in the plant kingdom in the sheer variety of applications for both consumable and non-consumable products. Extract, edible, and non-consumable producers are responsible for taking raw cannabis plant and processing into finished goods, or taking previously treated and extracted cannabis and processing it into finished goods. Some companies perform their own extraction methods and others acquire extractions and use them for their products. Producers are responsible for record keeping and appropriate information about the production, testing, and delivery of goods along the supply chain.

5.3.2 Description

Because there is such a massive variety of products that cannabis finds itself into, and a huge variety of plant contents in finished products ending up in the hands of consumers, disciplined record keeping is essential for safety and conducting business. This includes details about where the cannabis contents came from that ends up in final products. If the production company is performing their own extractions, or creating extractions destined for the consumer, then details about that production are vital. The source of the cannabis, including appropriately linking to information about the production records of those plants, must be available to ensure proper quality control is being followed throughout the process.

Additionally, the transformative process of cannabis that occurs during various stages of extraction and production should not be ignored. Appropriate lab testing of components of finished products, as well as the finished products themselves, is necessary to ensure the safety of those contents throughout the processes.

5.3.3 Traceability Data

Key data points for traceability for extract, edible, and non-consumable producers are identification of the company of production, the sources of cannabis that went into the products, and lab testing information for transformative processes that take place at various locations. All communications and paperwork regarding the purchasing, transport, and ultimate consumption or use of products should carry identifying information and have easily accessible lab testing and production information available.

5.3.4 Open Cannabis Recommendations

Each extract, edible, or non-consumable producer is identified with a Cannabis Producer Identification Code (CPIC - Sec 4.1.2). The following information should be associated to each CPIC:



- Name of production company
- Contact details for the company
- Certifications associated with the company and production

The general availability of the variety of products available from each producer should be identified with a Cannabis Finished Product Identifier (CFPI - Sec 4.1.3).

When new batches of products are completed and ready to be transported or made available to consumers, they should be tested and assigned a Universal Cannabis Product Code (UCPC - Sec 4.1). The following information should be associated with the UCPC for a finished batch of extract, edible, or non-consumable product:

- Date of production
- PDF of lab test results
- Lab tests results should contain phytocannabinoid contents, terpene contents, as well as residual testing results for each individual batch
- The source plant material should be identified by strain (CSCI - Sec. 4.1.2), indicated as non-strain specific, or for the most transparency and information, the actual batches of source materials should be identified and associated (UCPC Sec. 4.4).

5.4 Key Area 4: Lab Testing Organizations and Facilities

5.4.1 Scope

Lab testing organizations and facilities are responsible for analysis of cannabis plant material and finished products. From flowers, to extracts, to edibles, to bath and beauty products, many methodologies exist for the testing of cannabis products. Lab testing organizations supply the results of these lab tests in various formats to production companies, retailers, and other organizations to help consumers understand the contents of their cannabis products or plants.

5.4.2 Description

Accurate analysis of cannabis is essential for a healthy global industry and necessary for consumer safety. The methods for testing cannabis in various forms are evolving and improving at a rapid rate. Lab testing organizations and facilities greatly differ in their equipment, capacities, standards, and capabilities throughout the United States and the rest of the world. This document does not attempt to impose standards on how the labs are operated or conducted, but the standards by which the information should be made available, and when it is appropriate for testing to occur to maintain the quality and safety of cannabis products throughout the supply and production chain.

5.4.3 Traceability Data

The important data for cannabis testing can be narrowed down to three main categories:

- Cannabinoid (phytocannabinoid) contents like tetrahydrocannabinol in its acidic and non-acidic form (THC, and THC-A) or cannabidiol in its acidic and non-acidic form (CBD and CBD-A) as well as others.



- Other terpene and flavonoid content like myrcene, limonene, linalool which produce flavors and aromas and have been shown to have other biochemical effects.
- Harmful residual pesticide or other chemical contents.

All communications and information availability for cannabis products that are transported or made available across the point of sale should have this information available.

5.4.4 Open Cannabis Recommendations

Each batch of finished product identified by a Universal Cannabis Product Code (UCPC - Sec. 4.4) can be accompanied by one or many PDFs containing the results from a cannabis lab testing facility. While the format of the data varies from different labs, the main results should be made available and clearly recorded regarding the content of tetrahydrocannabinol and cannabidiol as they are the main active cannabinoids in the human cannabis experience.

Each PDF lab test results should contain the following information:

- Name and location of lab testing facility
- Date of test
- Methods of tests conducted
- Contact details for the lab testing facility
- Individual laboratory information management system (LIMS) identifier for the results of that test
- Tetrahydrocannabinol (THC) content
- Cannabidiol (CBD) content
- Negative results for harmful agricultural and processing residual chemicals

Each PDF result, as well as raw data for important markers should be associated with a finished batch of a product and the appropriate UCPC for that product. The lab testing results should be available and easily accessible for all products which cross a point of sale to ensure consumer safety and product efficacy.

5.5 Key Area 5: Finished Good Distributors and Packagers

5.5.1 Scope

Finished good distributors are relatively new to the cannabis supply chain as prohibition is gradually lifted in various parts of the world. They are responsible for packaging, distribution, record keeping, testing, or other tasks depending on the legal or regulatory requirements in their operating environments. For these distributors, it is essential to keep proper records about intake, delivery, and distribution for both products destined for consumers or products destined for further processing. Currently, the role of distribution, processing, and packaging is all done by a single production company or companies and there is not a separate entity for the distribution, processing, or packaging. These standards can apply for either scenario.

5.5.2 Description

Since the cannabis supply chain is still adapting to techniques and regulations regarding the identification and tracking of products, components, and finished goods, it is essential that accurate records are kept for finished good distributors and packers. Finished good distributors and packers are responsible for ensuring information



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does not get lost amongst the various parts of the supply chain. This means that accurate information must be kept regarding the volume of goods, source of goods, and production of goods, throughout the handling of incoming and outgoing products from within their services and locations. Record of receipt and transferring of goods should be kept for the intake and distribution of all goods. Each container of product should carry a Cannabis Product Logistics Identifier (CPLI - Sec 4.5), which is a GS1-128 barcode that contains the Universal Cannabis Product Code (UCPC - Sec 4.1), date of production, and type of product in a human readable format. Additional information regarding the treatment of any bulk product including packaging, washing, chemicals used for cleaning, and so on, should be recorded and maintained.

5.5.3 Traceability Data

The finished good distributor dispatches contents that contain information regarding the source of materials for those contents. This includes the UCPC for all materials that went into a finished product or component, as well as the CPLI barcode to allow for continued tracking and identification for additional transportation. The recommendations concerning the identification and labelling of consumer units, logistic units, or other containers are as follows;

5.5.4 Open Cannabis Recommendations

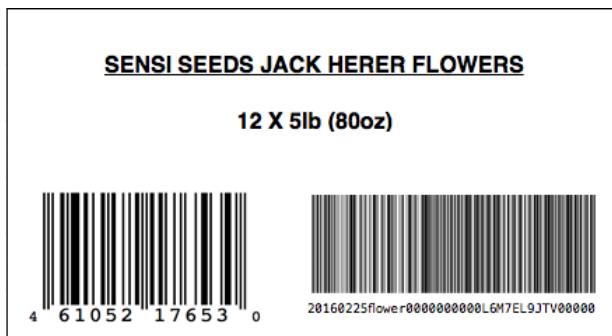
5.5.4.1. Trade items crossing the point of sale

These must be identified with a UCPC and bar coded with a UPC-A symbol for scanning at the point of sale. If details about the production or contents of the product cannot be placed on the packaging, the UCPC or QR code should be made available on the unit for further identification and traceability information.

5.5.4.2. Trade items that may be crossing the point of sale

Option One:

Trade items sold through a retail point of sale are identified by labelling containing the name of the product and bar-coded with a UPC-A symbol. For traceability purposes, the CPLI should be applied. The preferred placement for the GS1-128 bar code symbol would be on the same horizontal plane as the UPC-A symbol and as close as possible to the main symbol while maintaining the quiet zones for those symbols.



Example of Option One: UPC and GS1-128 add-on bar code



Option Two:

For containers that will never be sold through a retail point of sale, identification is done through the CPLI which encodes the UCPC, date of production, and human readable product type in a GS1-128 bar code.



5.6 Key Area 6: Retailer

5.6.1 Scope

Retailers are responsible for the distribution of cannabis products. They include medical dispensaries, delivery services, or other retail locations where cannabis is sold. They are responsible for the intake, inventory, tracking, and accurate record keeping to ensure the safety of their consumers as well as the success of their business. In many locations and areas throughout the world, retailers are responsible for the packaging, dispensing, labelling, testing, or other areas of the cannabis supply chain.

5.6.2 Description

Since purchasing cannabis in retail or medical locations started becoming more available in the United States, the purveyors of cannabis products have largely been responsible for the education, quality control, and all distribution of finished goods to consumers and patients. To help accurately identify, inventory, and educate consumers and patients, retailers should try to ensure proper labelling, and traceability reaches consumers and patients in ways that allow them to ensure their own safety and efficacy of products they are purchasing or consuming. Record of incoming goods should be kept including information about the producer, and any pertinent lab testing information and records from the transfer of goods towards sale.

5.6.3 Traceability Data

For the case of bulk distributed goods, proper labelling to ensure quantity, as well as traceability and test results should be readily available. Labelling should include access to the Universal Cannabis Product Code (UCPC - Sec. 4.4) on the receipt of purchase or on the packaging itself. For packaged goods, the UPC-A barcode should be available for point of sale scanning.



5.6.4 Open Cannabis Recommendations

For all items crossing the point of sale, the UCPC should be available in a human readable format or via the QR Code technology. These should appear on the packaging, or be available on the receipt for the customer. The UPC-A barcode should appear on all prepackage items for easy barcoding and tracking. With strict record keeping, the knowledge of which batch may be crossing the point of sale can be achieved solely through the UPC-A labelling and scanning at point of sale.

For other cases and to ensure proper inventory tracking, the GS1-128 barcode should be used to identify individual batches of products.

5.7 Key Area 7: Consumer

5.7.1 Scope

The consumer should be provided access to information regarding the traceability of the cannabis products that they are using or consuming. To ensure the ability for a market where independent and small businesses can continue to thrive and operate, and a cannabis industry that can continue to support such a wide variety of strains, products, and non-consumables, it is essential to ensure traceability is easily accessible and available to all sizes and types of producers throughout the cannabis supply chain. Through the use of the Universal Cannabis Product Code (UCPC - Sec. 4.4) and other identifiers, it is possible to ensure the availability of information regarding the source and lab testing results for all participants.

5.7.2 Description

With availability of cannabis products becoming mainstream and out of medical-only consumption, it is important to allow for accurate traceability of products entering the marketplace. Without easy access to traceability and transparency tools, participants throughout the cannabis supply chain will not be able to operate on equal playing fields. Allowing equal participation in a new, global, and rapidly growing industry is essential for continued innovation, safety, and allows for the diversity of cannabis to continue thriving.

5.7.3 Traceability Data

Consumers should be provided access to the Universal Cannabis Product Code (UCPC - Sec 4.1) for all products they use or consume. This will allow them to know where the individual components of their finished products were from, will provide them with assurances regarding the lab testing results of products, and allow for producers to accurately represent themselves and describe their products to their consumers in the absence of the ability to do so through labelling or education. With states and legal entities demanding this data to be tracked while not offering easy consumer access and identification, there stands to be more transparent and traceable ways of ensuring equal access to tracking and traceability data for consumers, lawmakers, and business owners alike.



5.7.4 Open Cannabis Recommendations

The Universal Cannabis Product Code should be made available in a human readable format, or the Quick-Response Code symbol, which allows for lookup through the Internet or on the Cannabis Reports database. The information that should be available through a UCPC are:

- Name of the producer of the product
- Date of production
- Lab testing results of the product
- Historical batch information of a product
- Contact information for producers of the product

6. Best Practice Foundation Elements

6.1 Data Alignment

Some companies already have effective internal traceability systems in place. The next step is to achieve full supply chain traceability. The main requirements for handling product withdrawals and recalls across the supply chain are having reliable data, the possibility to exchange the data, and properly mapped business processes. A good internal traceability system is a prerequisite to a chain traceability system. The investments in an internal traceability system will not be wasted in moving towards chain traceability. All good supply chain traceability software should be able to integrate seamlessly to any internal system. The application of the Open Cannabis System is a prerequisite for the alignment of traceability systems.

6.2 Bar Code Print Quality

Although technical improvements are continuously being made, printing GS1-128 bar codes onto corrugated boxes does not provide the optimal scanning quality (in terms of the combination of the quality of the corrugated board and/or the quality of the printing devices). Therefore, GS1-128 bar codes are currently printed onto labels, which are then applied onto the corrugated box.

6.3 Migration to Open Cannabis System

In a supply chain where many trading partners are involved, it is important to invest in technology that supports properly aligned product identification and traceability processes to ensure that the full potential benefits of the investment can be achieved. Manufacturers and retailers, large and small companies can participate. Achieving proper alignment is the main driver for recommending companies to access their current position and to consider implementing best practice as described by the Open Cannabis System.

Throughout this process, a collaborative approach is recommended including dialogue between all supply chain partners. This dialogue will lead to the identification of all essential supply chain information and material flows to be received, handled, and generated within a company's boundaries and at interfaces between the company and its trading partners (e.g. at receiving and dispatch of materials and finished goods). The important information that must be properly recorded and exchanged includes:



Cannabis Supply Chain Traceability

Open Cannabis System

- Identification of all supply chain partners through unambiguous coding using the Cannabis Producer Identification Code (CPIC - Sec 4.1.2)
- Identification of all unique products using the Cannabis Finished Product Identifier (CPFI - Sec 4.4)
- Identification of logistic units using the Cannabis Product Logistics Identifier (CPLI - Sec 4.5)
- Bar coding of trade items and logistic units with the appropriate GS1-128 bar codes
- Precise and cost efficient electronic data interchange using standard electronic messaging formats

A clear analysis should be completed to identify and describe the current status of your company organization, IT systems and business practices ("as is") and an analysis should be prepared to describe the desired future status ("to be"). The analysis of the current practices of the cannabis supply sector and their expected future development are to be taken into account in order to assess the timeframe needed to reach a critical mass of players for implementation. This will help identify and document the steps required to implement a migration program and achieve a successful implementation of standards including:

- Organizational changes
- Investments in technology
- Integration of new technology process designs

The final key step in the migration plan is to find the best sequence in which to implement the solution, starting with organizational change and driving into technological implementation whilst preserving the benefits achieved through each step of the process improvements. All steps developed should be documented including investment, impact and expected improvements, and results. An established timeline taking account of legislation, coupled with sound economic analysis is the backbone of the migration plan.

6.4 Self Assessment Scorecard

A self-assessment scorecard should be developed to measure the degree of compliance and implementation of best practice. This self-assessment can be presented as a checklist with a score that indicates the degree of implementation achieved. The following example can be further expanded or reduced depending on each company's objective.

Level 1: Identification and Labelling of Products	Score*
a. Products are identified as appropriate using GS1 bar code standards at each level of product hierarchy and step in the supply chain (e.g. consumer unit, box, and pallet).	
b. Logistic units are labeled using GS1 bar code standards in pack houses and warehouses.	
c. Clear information profiles are exchanged upstream and downstream to supply chain partners to ensure end-to-end traceability of products including raw material, ingredients, packaging materials, and so on using the UCPC identifiers.	
d. Risk Assessments have been completed to identify and minimize risk within production and supply chain processes.	



Level 2: Scanning Capabilities combined with Electronic Information Flow	Score*
a. Bar Code Scanning capabilities are implemented in pack houses and warehouses to ensure accurate data capture and improved material and information handling (e.g. scanning of incoming pallets or containers).	
b. A flow of information, which describes the good dispatched / received, is exchanged with trading partners (i.e. electronic flow of information supported by the Dispatch Advice message).	
c. The flow of information on dispatched / received goods contains all of the relevant information for traceability.	
d. The flow of information on dispatched / received goods is processed "just in time" to achieve accurate data integration. This principle also applies to paper based information processing.	
Level 3: Data Recording	Score*
a. All stock movements are recorded electronically and in an internal centralized database in such a way that the information can be easily and rapidly accessed by all of the people who need it to help manage an incident / crisis. Paper based solutions must comply with the same conditions as described for electronic data recording.	

* The scores could be based on the following suggestion:

- 0 = No action taken
- 1 = Plans have been established but the work has not started
- 2 = Implementation has started with a limited scope (e.g. some product categories)
- 3 = Rollout of the full implementation standard has occurred
- 4 = Plans fully implemented

6.5 Electronic Dispatch Advice

The Dispatch Advice is an Electronic Data Interchange (EDI) message specifying details for the goods dispatched with the function of advising the receiver (consignee) of the detailed contents of a consignment. The message relates to a single dispatch point and a single, or multiple destination points and it may cover a number of different items, packages, or orders. The message allows the receiver to know what materials were dispatched and when, allowing them to prepare the reception of the goods and to crosscheck the delivery with the order. It also allows companies the means to extract and store traceability data, ensuring accurate record keeping of relevant information. The data elements in the following table are the minimum information that needs to be shared between different parties (one step forward, one step backward) to ensure product traceability.

Uniform Pallet or Container	Mixed Pallet or Container
Unique identification of Dispatch Advice Message	Unique identification of Dispatch Advice Message
CPIC of the "ship from"	CPIC of the "ship from"
CPIC of the "ship to"	CPIC of the "ship to"
Date of shipment	Date of shipment



Uniform Pallet or Container	Mixed Pallet or Container
CPLI of the pallet / container	CPLI of the pallet / container
Identification of the product on the pallet / container <ul style="list-style-type: none">• CFPI of the Traded Unit packed on the pallet or in the container	For each Traded Unit on the pallet / container <ul style="list-style-type: none">• CFPI of each Traded Unit• UCPC for the batches container• Quantity
UCPC	
Quantity	

6.6 Lot / Batch Definition

Lot / batch composition is a critical point in the traceability process. It determines the accuracy of any traceability system. The more homogenous the lots / batches are, the more accurate the traceability system. Generally, being able to trace the detail (product or a small batch level) will increase the costs in the traceability system. Deciding on large heterogeneous batches will probably make the system less costly, but will increase the risks because if a defect arises, more products will be involved than would have otherwise been necessary. Based on the cost / benefit analysis the ideal balance should be sought between present and future costs. This analysis should be taken into account in the design of the traceability system.

It is difficult to recommend a suitable traceability model for cannabis producers and retailers by looking at the most cost efficient process and the reliability of the links throughout the supply chain. Situations vary from case to case. In case of a product recall, a retailer may not necessarily take the smallest possible batch / lot off of the shelves. Retailers will often withdraw all similar products, whether they belong to the affected batch / lot or not. This is more efficient for the retailer, as mistakes can be avoided in-store and consumers are provided with the reassurance that everything is under control.

6.7 Stock Withdrawal and Product Recall

Withdrawing or recalling a product is an organizational procedure that relies on accurate information extracted from the internal traceability system / database and requires close collaboration between all the parties involved. Food / medical safety and quality assurance functions control the status of the products and communicate these to supply chain distribution, which is responsible for applying this status and treating the products accordingly.

The objective of a lot withdrawal process is to prevent availability of the product at the point of sale. Lot withdrawal requires total control of the stock. This means all supply chain partners implicated in the stock withdrawal process must be able to correctly identify the product (CFPI) and the batch / lot involved (UCPC - Sec 4.1), its location, and the quantity stored there. The traceability process ensures that trade partners can answer these questions.

Best practice for stock withdrawal is based on the following principles:

- Stock withdrawal management is based on the logistic unit using the UCPC as the identifier
- Pallet and container contents are identified using the CPLI and CFPI / UCPC codes



- Pallet and container tracking within the area controlled by the brand owner means from internal / external origin to internal / external destination
- Targeted withdrawal at all destinations, which have or may have received the affected goods that need to be withdrawn
- Companies must define procedures for the identification of blocked goods, communication and instructions for withdrawal
- Regular training and periodical exercises

Traceability of cannabis at batch / lot level ends at the retail distribution center. Batch / lot tracking forward in the retail distribution center is complex and expensive due to its large portion of mixed pallets sent to points of sale and received from suppliers. Due to the lack of tracking in the retail distribution center, all of the stores of the implicated retailers must be included in the recall. The brand owner must therefore assume that the product is already available at the point of sale and initiate a recall after delivery to the retail distribution center. Depending on the nature and severity of the quality or safety issue, a recall could include the involvement of trade media. The implicated product and batch / lot must be identified and exchanged if not already consumed.

6.8 Developing Internal Competencies and Skills

Regular training should be given to all of the employees who may be involved in product traceability, incident and crisis management. The scope of this training should include:

- Traceability processes implemented by the company, based on the best practice documented in this document
- Instruction on incident / crisis management
- Role of the Incident / Crisis Management Team
- Role of the person being trained
- Whom to contact
- The importance of coordinated actions and communication within the company
- What to do and what to avoid doing
- How to use the traceability documentation
- How to use internal product traceability and record systems

The training should also include simulated exercises on:

- Crisis Management
- Product Traceability
- Product withdrawal
- Product recall
- Management of quarantined stock



7. Annex

7.1 Contacting Cannabis Reports

Please consult <https://www.cannabisreports.com/contact-us>

7.2 Bibliography

- Wine Supply Chain Traceability, GS1, 2014
- GS1 Traceability Implementation, GS1 (EAN International), 2003
- General GS1 Specifications V5.1, GS1 (EAN International), 2004
- Implementing Traceability in the Food Supply Chain, CIES, 2004

7.3 Getting Started

- **Where do I start?**

Contact your local Cannabis Reports organization member and register with them. Receive and utilize your CPIC, CPLI, UCPC, and UPC-A codes. Communicate your intentions to all trading partners and software services that will read GS1 bar codes and QR codes representing the above identifiers.

- **What does it cost to become a member of the Cannabis Reports Organization?**

Membership costs vary from one country to another and, in general, depend on the production or distribution capacities of your organization. The membership fees usually consist of a monthly or annual fee.

- **What do I get in return?**

A member company receives Cannabis Reports Company Prefix, a capacity to number its products, and basic support in implementing the Open Cannabis System. The numbering capacity given to member companies depends on their requirements. Should a company wish to utilize the API and EDI messages, it can request the necessary information from Cannabis Reports.

- **How do I print GS1 bar codes or QR codes on labels?**

Label composition software should permit you to use desktop laser or ink jet printers, or you can use specially designed high performance thermal direct or thermal transfer printers. These may be self-contained units able to print pre-programmed label formats, or may require the use of a personal computer.

- **Do I have to become a member of a Cannabis Reports Organization in every location I operate in?**

No. One Cannabis Reports membership should meet all of the identification and communication needs of a company. However, if there is a need for continuous Cannabis Reports Member Organization support in other countries (i.e., in the local language) it is then advisable to seek assistance and membership in those countries too.



- **Do I need to become a member of the Cannabis Reports Organization to use the barcodes and identifiers?**

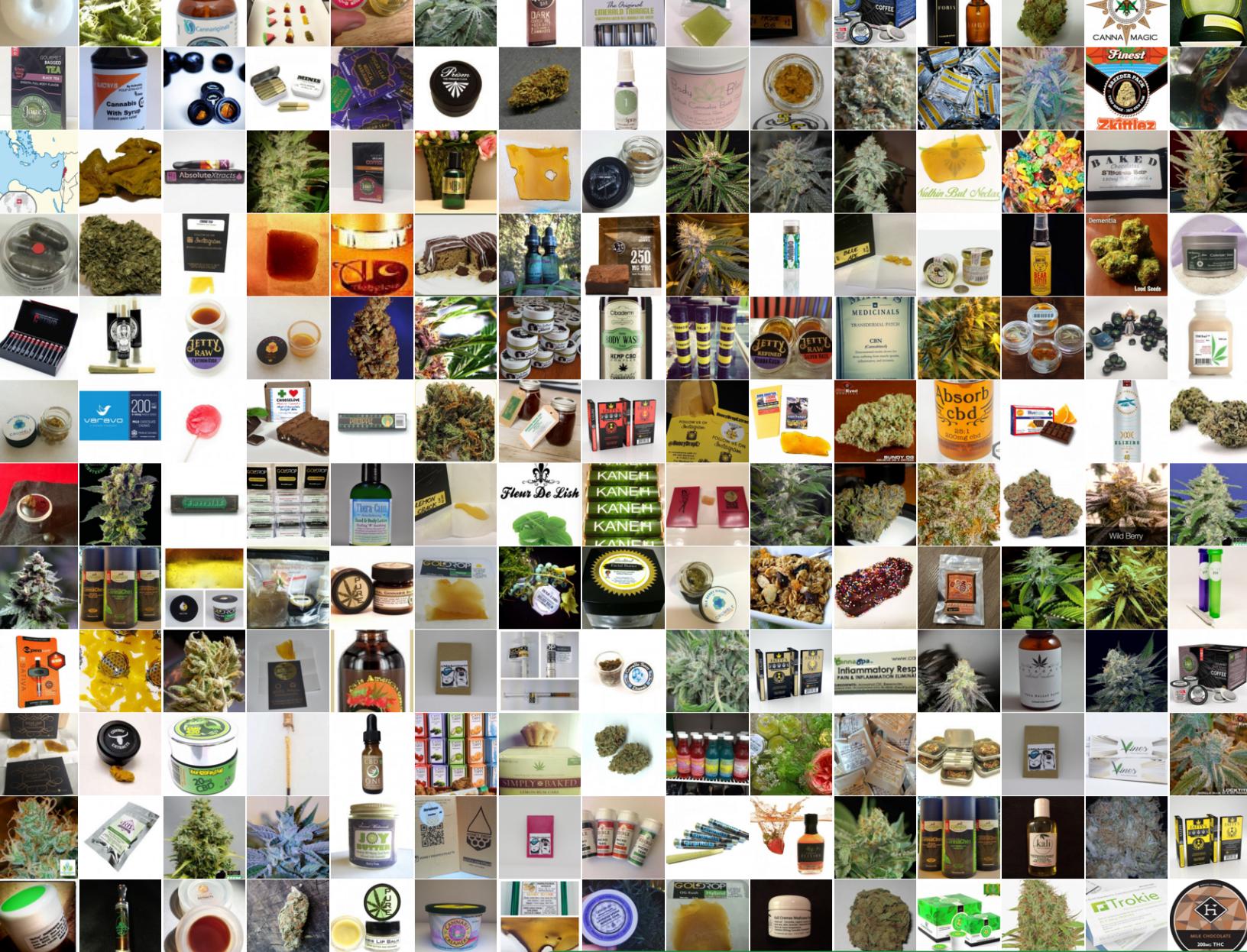
Yes. Membership in the Cannabis Reports Organization is required to use the Open Cannabis System data structures and maintain access to changes and updates in the Open Cannabis System. If you are not already a member of the Cannabis Reports Organization, you may have already been assigned identifiers to allow for continued tracking and identification throughout the cannabis industry. If you are not already a member of the Cannabis Reports Organization and you want to utilize the identifiers and data exchanges outlined in this document, you should apply for membership. If you are already a member of the Cannabis Reports Organization, your fee includes support concerning all identification and data standards.

7.4 Submitting Changes to this Document

This document is intended to remain an open source document with the ability for changes to occur from input across the entire global cannabis industry. With the [Creative Commons Attribution-NoDerivatives 4.0 International License](#), distribution and reprinting of this document is allowed with attribution of source. However, changes to this document will occur over time so you are encouraged to check back often for updates.

For more information on how to submit changes to this document using GitHub, visit the following link:

<https://github.com/CannabisReports/Cannabis-Supply-Chain-Traceability>



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