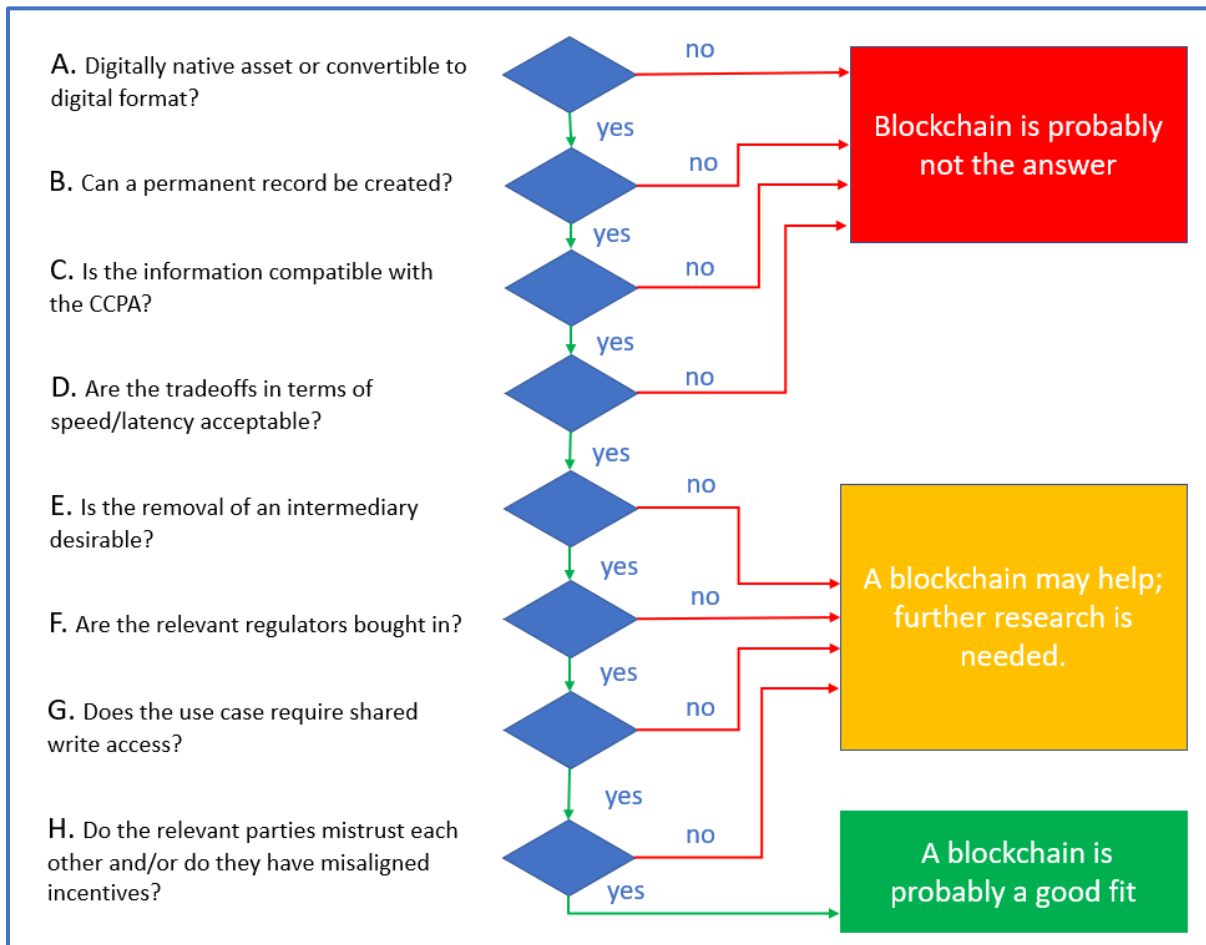## Section III. Blockchain definition

Blockchain is a domain of technology used to build decentralized systems that increase the verifiability of data shared among a group of participants that may not necessarily have a pre-existing relationship. The intent is to bring increased trust and/or disintermediation in the overall system.

Blockchain technology includes "distributed ledgers," specialized datastores that provide a mathematically verifiable ordering of transactions. It may also include "smart contracts" that allow participants to automate pre-agreed business processes. These smart contracts are implemented by embedding software in transactions recorded in the datastore.

Blockchain technology is the most widely recognized approach to building co-operative, auditable, multi-stakeholder information systems that avoid the need for a single organization to operate and own the center of the datastore. This has positive implications for government roles in market regulation, processes to issue permits, manage digital identities, and many more use cases. Through blockchain technology, California can pursue a highly agile approach to enabling businesses and residents to participate in the digital economy.

Section IV. Decision Matrix

A. Digitally native asset or convertible to digital format? → no → Blockchain is probably not the answer / yes

B. Can a permanent record be created? → no → Blockchain is probably not the answer / yes

C. Is the information compatible with the CCPA? → no → Blockchain is probably not the answer / yes

D. Are the tradeoffs in terms of speed/latency acceptable? → no → Blockchain is probably not the answer / yes

E. Is the removal of an intermediary desirable? → no → A blockchain may help; further research is needed. / yes

F. Are the relevant regulators bought in? → no → A blockchain may help; further research is needed. / yes

G. Does the use case require shared write access? → no → A blockchain may help; further research is needed. / yes

H. Do the relevant parties mistrust each other and/or do they have misaligned incentives? → no → A blockchain may help; further research is needed. / yes → A blockchain is probably a good fit

Section IV. Ethical Considerations

1. Consider how best to educate Californians about blockchain, to ensure a base-level understanding as the technology is introduced in the public and private sector.

2. Encourage environmental sustainability as use cases are being developed by offering incentives to blockchain companies. For example, tax incentives and penalties could serve as motivators to promote sustainability goals. California could also prioritize sustainable practices in evaluating vendors for government contracts related to blockchain technology.

Section IV. Digital Identity
To be added

Section IV. Cybersecurity and Risk Management

Rec 1 – Evaluate blockchain appropriateness based on the specific use

Rec 2 – Government regulations have an important role in addressing security problems.

Rec 3 – The State of California should regulate the practice of certifying and/or licensing   blockchain application developers who develop for or supply blockchain applications to the State of California.

Rec 4 – The State of California is encouraged to adopt the suggested Disruptive Defenses   described in this section.

- Eliminate weak authentication technology

- Ensure the provenance of a transaction before it enters the blockchain

- Preserve the confidentiality of sensitive information within and outside the blockchain

- Preserve the integrity of transaction data even when outside the blockchain

- Use cryptographic hardware wherever cryptographic keys are used

- Ensure application access to cryptographic services remains within a secure zone

Rec 5 – Convene Agency-specific Blockchain Advisory Groups

Rec 6 – Convene Online Academic/Industry Security Advisory Group

Rec 7 - Publish Forensic Report of Data Breaches

Rec 8 - Use different blockchains for different application contexts to manage financial and operational risk

Rec 9 - Adopt an experimental period for blockchain application

Section IV. Privacy Infrastructure

1. At present California's privacy laws need not be amended to enable adoption of blockchain technologies and use cases. Still, it will be important for the legislature to monitor for potential new issues in blockchain applications related to protecting individuals' privacy that are not addressed by technical measures or the existing legislative framework.

2. Additional education about how to use blockchain in a privacy-compliant and enhancing way is needed.

Section IV. State Process for Adopting New Technologies
<mark>To be added</mark>

Section V.A. Vital Records

1. The State should deploy a permissionless public blockchain to create and verify tamper-resistant digital certificates.

2. New legislation should be considered to amend the Health and Safety Code sections 102400, 102430, and 103525 to include blockchain application.

Section V.B. Health Records

1. Engage with diverse stakeholders including patient advocacy groups, health consortia, health systems, hospital CIOs, executives at payers, and blockchain-for-healthcare platforms to **understand the viewpoints and technical considerations of all stakeholders.**

2. Current health systems present challenges of data fragmentation and silos, lack of cohesive patient identity and privacy, and security vulnerabilities. Healthcare remains a volume-based, one-size-fits-all model, despite calls for value-based care. **A framework for providing patient identity and data interoperability will improve this context.**

3. **The adoption of blockchain-based systems, combined with other advanced technologies such as AI/ML and IoT, could help to construct a modern, personalized healthcare system for California.** A convergence of these technologies will put the individual at the center of the care continuum, with control over a complete health record that is selectively shared with healthcare providers to improve outcomes and care.

Section V.C. Supply Chain

1. *Tracing Food Contamination:* Work with the California Department of Food and Agriculture and the U.S. Food and Drug Administration to establish a pilot to use blockchain technology, to collect and organize data from growers, transportorters, wholesalers and retailers to more quickly trace the source of food-borne contamination and where the products are in the distribution system to speed recall and consumer notification. Explore the use of federal grant money to support the California-based pilot.

2. *Food Freshness:* By using blockchain combined with IoT sensors and artificial intelligence (AI), growers will be able estimate the shelf life of the product

and optimize transportation and logistics to ensure that produce can be delivered to destinations within the shelf-life periods.

3. *Small Farms:* California policymakers could support small farms in their exploration of the use of blockchain technology by identifying opportunities for pilots for California's specialty crops and organic produce where "tip-the-farmer" initiatives could help increase margins and sustainability. California policymakers could also expand their oversight of agricultural co-ops and evaluate opportunities to revise their accounting practices and operations using blockchain technology.

4. *Cannabis Supply Chain:* California policymakers could direct the California cannabis licensing authorities to accept blockchain-based verification and reporting mechanisms for the cannabis supply chain.

5. *Labor Rights and Social Services:* California policymakers could encourage the development of privacy-centric (CCPA-compliant) identity registration in the agricultural and migrant workforces, along with training and education programs to explain how these systems operate differently from driver's licenses or social security numbers. California policymakers could also investigate using blockchain technology as a platform for employers to submit labor compliance reporting data for the benefit of not just regulators but also workers and worker advocates.

Section V.C. Food and agriculture
Potential applications of blockchain technology for the food and agriculture industry include:

- Supply chain traceability (specifically provenance tracking, logistics, and safety)

- Supporting small farms and the circular supply chain

- Supporting the emerging cannabis industry, particularly with regulatory conformance

- Protecting the rights of farm workers and providing them social services

Section V.C. Pharmaceuticals
Develop a pilot program that brings together a broad group of California partners, including state government, pharma manufacturers, distributors, retail pharmacies, technology companies, healthcare providers and payers, patient advocacy groups, universities and other research facilities. This approach can combine practices of PharmaLedger with consortia in the U.S. private sector.

Section V.D. Property – Real Estate

1. Continue to monitor ongoing efforts for potential applications in land titling.

2. Explore issuing real estate licenses on a blockchain system while continuing to run the existing process in parallel until a new system is proven.

3. To the extent that emerging technologies have the potential to make title search, record validation, or detection of error or fraud cheaper, faster, or more accurate, we encourage counties and stakeholders to consider blockchain technologies on an equal footing and to be forthcoming in providing technologists the data they need and encourage all parties to pass savings on to the end user.

4. There could be benefits to digitizing records and making them more accessible.

5. The state should consider whether to explore partnership with the Real Estate Standards Organization (RESO) and Consensys to pilot the blockchain unique identifier real estate license proof of concept.

6. Consider further investigation into recording only new construction real property onto the blockchain to test a blockchain real estate recording system.

7. Allow vendors to describe the system they can build and the costs, let them choose the underlying technologies to employ, and let the state's procurement officials select the most competitive bid. We recommend the procurement officials have access to skilled and unbiased technical review and assistance in order to evaluate proposals effectively.

Section V.D. Property – Vehicles and Parts

1. Further investigation is needed to identify whether there are specific regulatory barriers to applying blockchain technology to vehicle and parts use cases. None are known at this time.

2. Discussions with the Department of Motor Vehicles should continue to determine whether registration of vehicles and parts is an appropriate use case for blockchain technology.

Section V.D. Property – Insurance

1. Since streamlining insurer operations could have significant benefits for constituents in terms of pricing, access, and convenience, the state should encourage private industry to adopt blockchain technology as appropriate.

2. California should also keep an open dialogue with industry to advance legislation and policies that might encourage and enable benefits to the consumer while minimizing potential risks such as potential loss of privacy.

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Section V.D. Property – Firearms

Blockchain technology could be applied to firearms-related data in California, but no opportunities have presented themselves at this time.

Section V.E. Utilities/Natural Resources

1. Additional discussion and research is required to understand whether regulatory sandboxes are feasible in California. Review additional literature and interview government experts from

   a) The National Association of Regulatory Utility Commissioners (NARUC)

   b) National Association of Chief Information Officers (NASCIO)

   c) The National Governors Association

   d) The International City/County Management Association (ICMA)

   e) The National Conference of State Legislatures.

2. In the case of water management, we recommend that the state evaluate the opportunity for blockchain-based technology to support a more efficient framework that further leverages the momentum from recent California water data efforts.

   a) Address the needs of different stakeholders to control and monitor how they responsibly share water data in efforts to enhance the efficiency of regulatory efforts, support more transparent decision-making, and ultimately, increase trust among stakeholders.

Section V.F. Finance, Payments and Commercial Business - Bonds and Public Finance

1. **Create a consortium**. The State of California should research the creation of a consortium to manage the negotiation of the bond issuance fees for the State of California. These universal fees would be implemented via blockchain.

2. **Consult with the following:** Finance department officials at the State, County, and City levels; Municipal advisors already engaged by Municipal debt issuers; and Municipal bond counsels. Perspectives should be collected from *issuers* (both large state and small infrequent issuers), *Investors (*Institutional investors, community banks, registered investment advisors, individual investors and retail); and *Service Providers (*Municipal advisors, bond counsel, underwriters, clearing and settlement agents, custodians, banks).

3. **Monitor existing efforts**. For example, the Berkeley Microbond Financing Program, currently at the RFP stage.

4. **Address the challenges for small municipalities**. By expressly supporting the adoption of blockchain-based digital municipal bond issuance programs, the State can help address communities' inevitable financial stressors, while supporting enterprise-class adoption of blockchain technology in California.

Section V.F. Finance, Payments and Commercial Business - Public Banking-

1. **Engagement**. When the first public bank prospect is identified, all interested parties should be invited to submit public comments.

2. **Blockchain technology integration**. As California implements its new public banking law, opportunities will abound to integrate blockchain technology into the underlying regulations, particularly as a means to achieve CPRA transparency requirements. Therefore, the State of California should monitor developments in public banking.

3. **Pilot with Community Development Finance (CDF)**. CDF is excited to discuss partnership with public banks. CDF aspires to scale their operations in order to reach more vulnerable CA residents; process automation and online service platforms can both be expected to help them achieve this admirable goal.

Section V.F. Finance, Payments and Commercial Business - Digital Asset Banks

1. **Regulatory reforms**. California would benefit from enacting regulatory reform to become an attractive destination for innovators and investors. Defining a framework for Special Purpose Depository Institutions, or SPDI's, and subsequently granting existing banks a charter to bank Digital Assets would enable greater monetization and overall growth of these exciting new technologies. California should endeavor to lower the bar of entry to smaller companies who are still able to meet AML etc. requirements.

2. **Create a Charter**. California can derive significant economic growth by creating a charter for Digital Asset Banks.

3. **California Digital Asset Banks offering should include**:

    a) Compliant banking services for the blockchain business community

    b) Structured investment in digital asset products

    c) Promote market adoption of blockchain technology solutions

    d) Increase revenue generation to aid economic recovery.

Section V.F. Finance, Payments and Commercial Business - Cannabis Banking

1. **Blockchain fintech benefits**. The state licensed cannabis industry would benefit from blockchain fintech innovations and statutory changes being advocated by non-cannabis stakeholders including public banks, digital asset deposit and/or custodial institutions, and regulatory sandbox for blockchain and cannabis innovators.

2. **Improve safety and efficiencies**. California should empower entrepreneurs to create technological and legal solutions to improve the safety and efficiencies of payment and settlement of legal cannabis product transactions.

Section V.F. Finance, Payments and Commercial Business - CalCoin

1. **Blockchain application**. California should utilize blockchain technology to create a public payment and benefits distribution system for its struggling families.

    a) California could begin by performing a digital cash and voucher assistance ("CVA") pilot project, to meet the increased needs of low-income families in emergency conditions, and then scale this digital

CVA program over time in order to smoothly integrate with existing programs.

b) In order to accommodate regulations, CalCoin's use should be restricted to the purchase of pre-approved products and services with, initially, a limited set of partner vendors. Such restrictions could be gradually lifted over time as new use cases present themselves. It may also be of mutual benefit to partner with nonprofits that serve similar populations as those that currently use assistance programming, especially in early stages of the program.

2. **CalCoin Working Group**. The State of California should impanel a working group to explore implementation of CalCoin and related programs.

Section V.F. Finance, Payments and Commercial Business - Remittances

Government role. Since California has one of the largest remittance flows among US states, state residents could hugely benefit from new, blockchain-based technologies that reduce the cost and improve the speed of transactions. However, since most of these technologies are built by private companies and are utilized by private citizens, the state government has very little role to play in the remittance market.

Section V.G. Justice and Civic Participation - State Archives

1. **State Archives**: The Secretary of State's State Archives would be an effective first blockchain pilot project. The California legislature should work with the Secretary of State leadership to determine how best to move the state's archives online with blockchain technology. This agency is excited to further explore blockchain application and has been successful with most previous technology pilots. This use case provides for a relatively low risk pilot project with great benefits.

2. **Business Programs**: The Secretary of State's business programs section may be a potential use case in the future, as the Secretary of State's employees deploy a new technology when developing future modules for the new portal.

Section V.G. Justice and Civic Participation – Internet Voting

1. **Internet Voting Pilot**: Security experts generally agree that internet-based implementations of voting systems, blockchain or not, have not surmounted the inherent challenges in implementing a voting system, particularly security challenges. California should consider small-scale or low-stakes pilots,

especially those designed to enable more people to vote, to provide transparency around the pros and cons of internet voting, to advance the state of voting technology, and to leverage the unique resources of California's universities, nonprofits, and technology companies.

2. **Technology Considerations**: In reviewing pilot projects, blockchain systems have not been shown to be inherently better at achieving the goals – authentication and authorization, auditability, anonymity, failure reduction, and increased participation – of an internet-enabled election system. In their applications to date, blockchain-based systems rely on factors other than blockchain, such as centralized voter databases, facial ID or postal delivery, cryptographic mixing, dual-device vote validation, etc., to solve these problems. Those experimenting with new voting technologies in California are encouraged to evaluate the quality of these solutions as a whole, rather than relying on a specific technology.

Section V.H. Education and Workforce

1. The State of California should emphasize interoperability, security, and scalability when piloting the use of blockchain for education and workforce records.

2. The Future of Work Commission should adopt recommendations on skills-based hiring and credentials, ensuring workers have the means to control and electronically share credentials in a secure and verifiable manner.

3. The State of California should enable and facilitate a results-focused forum for technology demonstrations that advance public sector applications, leveraging opportunities to re-use, re-purpose, and build upon existing efforts.

4. A natural role for the State would be to publish a framework of key questions, considerations, and paths forward for groups interacting with the California public school system and public service. These could help identify additional blockchain-based pilot projects, as well as provide an inventory for interested agencies to leverage for their own efforts.

5. The State could encourage creative "cross-pollination" from other sectors and application areas by incentivizing and providing a safe space for transparent discussion of lessons learned and best practices.

Section VI. The Role of State Government

To be added: Fostering a welcoming business environment - Vision

1. Amend the statute related to vital records: *HSC§103526.5(a)*

a) A county recorder may issue a certified copy of a marriage record pursuant to Section 103525 by means of blockchain technology.

b) For purposes of this section, "blockchain technology" means a mathematically secured, chronological, and decentralized consensus ledger or database.

2. Consider establishing a Blockchain Innovation Zone to incentivize and provide safe harbor to blockchain companies working to solve California's most pressing problems.

3. Promote collaboration through:

a) Creating a multi-stakeholder governance model for regulating blockchain technologies that would include government regulatory agencies, together with consumer advocacy groups and other industry stakeholders.

b) Create a resource for best practices to be shared and co-created among businesses of various sizes and types.