Blockchain Working Group
Assessment Interviews Summary
November 11, 2019

This document is a high-level summary of key themes identified by the Blockchain Working Group members and Camille Crittenden, the working group chair. The purpose of the interviews was to inform the group's upcoming discussions on the appropriate application of blockchain technology in the State of California. Members were asked to address four topic areas:

1. Their perspective and expectations for the working group
2. Blockchain definitions and potential overarching challenges and opportunities
3. Blockchain applications – suggestions and criteria for appropriate application areas and examples
4. Working group process – refining the decision-making process and tactics for engagement, especially between meetings of the full group

The key themes identified in this summary will be used as the basis for future working group discussions to support the development of a final report to legislature.

WORKING GROUP MEMBERS PARTICIPATION

Working group members represent diverse perspectives and disciplines and are committed to a dialogue that expands the collective understanding of blockchain and its potential application at the state, local, and private domains. Working group members have differing levels of blockchain knowledge; a select group has blockchain expertise, while other members have entrepreneurial, legal and state government expertise.

Given how quickly technology changes, working group members expressed a sense of urgency for California to establish a clear policy for blockchain application. California is in a unique role, as a thought leader in technology, to consider a path forward for blockchain applications in global, national, state, local, and private domains.

Working group members highlighted the importance of setting ethical guidelines for blockchain application to ensure that blockchain is leveraged to improve people's lives. Blockchain, as with other technologies, should to be evaluated for its appropriateness and efficacy relative to other available technological options.

BLOCKCHAIN DEFINITION AND COMPONENTS

QUESTIONS FOR DISCUSSION BY THE WORKING GROUP:

1. What overarching definition of blockchain can be used to advance community/legislative discussions? (Consider definitions by other governmental jurisdictions.)
2. How can the variety of application contexts be incorporated to blockchain definitions to highlight different aspects of the technology?
3. Consider the consequences of defining blockchain too narrowly or too broadly to ensure we forge an adaptive path forward for its implementation in California. Consider implications beyond legislation.

BLOCKCHAIN DEFINITION: COMPONENTS

General Statement: A fabric that links people together in real time to exchange anything with each other. An instrument for collaborating and exchanging items of value or digital artifacts.

I. Define blockchain relative to specific applications and in relation to other technical solutions

- Focus on blockchain's essential functions and how they may be applied to specific applications.
- Incorporate industry perspective, benefits to individuals/organizations and specific policy areas.
- Types of blockchain systems: Public/Private and permissioned/permissionless. Appropriate type depends on application.
- Define blockchain and its added benefit in relation to other available technical solutions.

II. Fundamental shift from centralized control

- The ledger is distributed. It is not governed by a central entity but rather is run on open-source software by a network of distributed computers.
- Blockchain provides a mechanism for different groups of organizations to coordinate transactions. The same technology that keeps a ledger and record of transaction can be applied to much broader (finite state machine) coordination.

- In some cases a centralized database may be the right mechanism. The blockchain process may be slower and may not be appropriate for all applications.
- Community-driven aspect of blockchain creates an ecosystem of shared vantage points. Allows for diverse set of viewpoints to construct a system that is more thoughtful than centrally controlled databases.
- In a centralized system, the owner of data has power, leading to an asymmetry when participants lack information and see only one aspect of the system.

III. Cryptographically secured ledger

- Blockchain is a secure technology that allows transactions to be recorded in a safe manner, documented in many locations to prevent hacking or manipulation.
- Creates a record that is tamper-resistant, difficult to hack, secure, and serves as source of truth (authentication).

IV. The blockchain's distributed and immutable nature is fundamental

- Distributed ledger technology builds records or a ledger in a decentralized controlled way and is based on predefined rules for revisions. It lacks a central point of failure.
- Explain the role of a miner/transaction writer for blockchain.
- Provides a chronological history.
- Immutability is the real power of the blockchain—the ability to ensure the ledgers based on it can never be changed or manipulated—without the need for third-party verification.

V. Authentication and fraud mitigation

- Authentication happens by bringing different pieces of the puzzle together to mitigate fraud, misuse/abuse.
- Verification process (mining) or other consensus mechanism (majority of servers validate correctness) are used to validate transactions.
- The architecture promotes transparency.

VI. Shared data and ownership

- Blockchain has many drivers – its very foundation is a shared network/ledger rather than a centralized database. Shared network means that it is designed to be community- or network- driven. Shared ownership means the system allows participants to share data without building relationships and knowing others.

VII. Consensus and decision-making, parties involved

- The consensus layers include:
  - Mechanism for achieving consensus on a record
  - Smart-contract languages: Express intent as to what should be put on a ledger
  - Wide range of applications
- Consider participation parameters: how do entities join/participate/leave?
- Protocol for changes: Committers need their own protocols for changes and agreement.

VIII. Trust and integrity

- Blockchain can serve any transaction where trust is currently lacking between two parties and traditionally a third party (title officers, brokers) is necessary.
- Therefore, it is critical to trust the foundational information and the inalterable process.
- The distributed nature of a blockchain ledger means there is no central point of failure; records on blockchains may be kept on thousands of individual computers scattered worldwide. This leads to a “trustless” system, in which a person can trust the validity of transactions without needing to rely on the integrity of intermediaries such as banks or governments. In addition, a single distributed ledger can be used in the place of multiple private ledgers requiring reconciliation, thereby reducing transaction costs.

IX. Efficiency and reducing friction

- Allows for complex automated transactions. The process is extremely flexible and cuts through much of the friction that is part of current value exchange. Blockchain allows people, institutions, and programs to provide precise direction to the exchanges. Because the system can direct precisely where resources flow and are received, it can save time and money.
- Blockchain may reduce barriers to access.

BLOCKCHAIN OPPORTUNITIES AND CHALLENGES

QUESTIONS FOR THE WORKING GROUP

1. Define the overarching opportunities/challenges as the preamble to presenting the output (use cases) of working group.
2. Identify current applications of blockchain throughout the world (private/public). What are lessons learned from successes and failures?

3. Define blockchain technology in an accessible way for citizens and legislature to engage in conversation. People need to see themselves in these opportunities.
4. Help the State envision the future of sharing through blockchain, moving away from siloed operations to alignment.

OVERARCHING OPPORTUNITIES AND BENEFITS OF BLOCKCHAIN

I. Eliminate the need for third-party verification

- Any transaction that currently requires a citizen/consumer to rely on a third party for verification can benefit from blockchain.
- Blockchain can provide a centralized network to record titles and transactions.
  - Filing through the California Franchise Tax Board
  - Linking transfer of titles (currently done through an expensive escrow process)
  - Rental of property can be tracked with limited exemptions
- Direct approach for issuing and validating licenses.

II. Promote government efficiency, transparency, and real-time notifications

- Although some information must be shielded for security reasons, most information related to the business of running the State of California should be public and can benefit from blockchain application.
- Blockchain can ease the burden of regulators, bureaucracy, and affected parties by providing real-time examination of events.
  - Example: Regulators are tasked with ensuring the safety of products, that taxes are paid, and benefits are available to intended beneficiaries. These activities necessitate a waiting period that may be eliminated with blockchain. Reporting and regulation can be done simultaneously with the transaction.
- California residents can have access to government activities, e.g., government contracts and use of tax money.
- Blockchain can be used to streamline and standardize California's permitting and certification processes across different regulatory areas.
  - Example: Workers' compensation documentation processes involve multiple perspectives, including claims administrators, medical providers, lawyers, injured workers, and employers. This process will benefit from a streamlined approach across parties.

III. Eliminate the need for one-arbiter system

- The system will provide the facts, reduces the need for dispute resolution.
  - Example: Transportation of goods across the state (water transactions can be documented on blockchain).
- Eliminate the need for audit; the system provides proof and audit trail.
- The system can be used to validate compliance with permits.

IV. Reduce fraud and promote trust

- Provides assurance that recorded data is correct and not tampered with or corrupted. The distributed nature of blockchain makes it less attractive to hack or attack.
- Because blockchain is decentralized and nodes are not controlled by one entity, it reduces the need to trust a given entity.
- Useful for state distribution of funds: tax refunds or unemployment benefits.
  - Linking all state agencies (DMV, FTB, unemployment, disabilities) to confirm entitlements.
  - Could be employed in automated transit, reduces risk of transit grid hacking.

V. Promote a digital asset system

- Provide a structure for distributing micropayments.
- Serve as an alternative to bank accounts (potential equity issue with vulnerable populations).

VI. Increased efficiency and access to information

- Complicated documents can be more accessible to user.
- Efficient use of time and money.
- Lower expenses and time expediency – reduces need for regulators.
- Frictionless transactions translate into better services that could be cheaper and more efficient.

VII. Support sustainable markets

- Lower barriers to engage in new markets by automating payments/transaction. Chart out investment opportunities and raise money to promote new sustainable markets.

VIII. Promote civic engagement, collaboration among agencies and businesses

- Residents may become more engaged when they know how money is spent and public agencies are held accountable.
- Allows for local-scale investment and human-scale investment in community assets that are previously unreachable.

IX. Currency

- Could be an alternative means to exchange value, especially when currencies in other countries are unstable.
- Efficient way of transferring money overseas.
- Could also be used to track exchange of goods outside of conventional systems, e.g., cannabis.

X. Support consumer privacy and choice. Digital identity - Prove who you are without revealing too much.

GUIDING PRINCIPLES FOR IMPLEMENTION OF BLOCKCHAIN

THE ROLE OF GOVERNMENT AND THE DEVELOPMENT OF APPROPRIATE REGULATIONS

- Blockchain is a global issue. Clarify how we carve out the role of the State within it and how blockchain serves California.
- Consider the development of a state template for blockchain application that can be used at the local level.
- Should the State create a regulatory agency specific to blockchain? Should software developers be educated, certified, or licensed?
- Address the role of government in both establishing blockchain and the mechanism to ensure its stability over time. What should be government's role?
  - Develop governance process (constitution)
  - Address potential conflicts (e.g., what happen to splits in a single chain)
  - Develop rules of conduct and guidelines for investigating malicious players
  - Guidelines for participation and the technology's evolution
- Components of regulations:
  - Address bias and conflict of interest
  - Traceability and transparency
  - Data backup and tracking
  - Requirements for private/public information sharing
  - Application-based regulation
  - Consolidation to promote interoperability and consortia building

- Reviewing and making recommendations for legislation changes – what terminology needs to be revised to promote blockchain? Is there language in legislation that would prohibit blockchain application?

KEEPING THE TECH INDUSTRY IN CALIFORNIA

- Government and technology companies operate along different timelines.
- California needs to continue to be an innovation hub.
- Use regulations and policy to promote a technology-friendly environment.
  - Examples: Wyoming and Ohio are blockchain-friendly while Illinois failed to pass legislature to support blockchain.
  - California is a leader in emerging technology. We should maintain this position for blockchain applications and regulation as well.

I. Developing technical standards

- Some sense there are too many choices and approaches to blockchain. Currently, blockchain is not converging in a meaningful way, making it confusing to enter and build when things change.
- The lack of a cohesive approach complicates a competitive landscape. Need to balance that dynamic with some level of standards.
- Procurement questions for these types of projects – need to develop compatibility to avoid falling into vendor-specific trap.
- Scalability to millions of customers – how does data sharing happen?
- Consensus model is needed to ensure that governance is upheld.
- How do we deal with a breakdown of a contract? How is fault being determined and what is the role of the coder?
- Need to understand how blockchain's digital data maps to physical infrastructure and how the physical system representation is validated (e.g., utilities, water meters).
- Need standards for interoperability.

II. Ethical considerations

- How do we prevent blockchain from being used in malicious ways?
- We should be taking incremental steps when making recommendations to solutions to avoid harmful effects and minimize unintended consequences to society. (Pilot and proof-of-concept projects should be designed as parallel measures to make sure that whatever we are testing doesn't harm existing processes.)

- We must ask questions and anticipate potential risks should the system go off the rails; what scenarios demonstrate worst case and best case?
- Considerations for digital identity: digital ID is foundational to many applications and we need to think about appropriate and safe implementation. (Examples found in Estonia, among others.)

III. Education and outreach about blockchain

- What do the various stakeholders need to know about blockchain? Public, state agencies, legislators?
- Define the difference between blockchain and other database technologies.
- How does an individual take action if personal data is compromised in a blockchain system?
- The complicated nature of blockchain technology results in challenges for messaging and communication that should be addressed.
- Education and outreach should go alongside implementation of specific use cases.

IV. Potential areas of friction: Help State government employees identify areas of friction and fragmentation.

V. Lack of trust in the data and potential problems for its immutability

- How can we ensure that the verification process works?
- Reliability of original data that is foundational for a blockchain (fraudulent initial data will be replicated throughout the system).
- Considerations about the longevity of a blockchain (for example: supply chain for food safety, how is withdrawal of a member being handled?)
- Verification of a valid transaction: How do we go about determining valid transaction – how do we know that we have the money to spend?
- Blockchain ability to resolve trust and provide long-term record/ledger.
- Many of the application areas mentioned have a retention period for the data. Once it's in a block it is there forever. How do you handle retention time mandated for deleting various types of information, especially personal data? (Ex: Tax records for example – mandated 5-7 years and cannot be kept longer than that.)

VI. Privacy considerations: As personal records become increasingly digitized, how do we maintain an acceptable level of privacy and balance innovation and public protection? How might blockchain intersect with requirements of CCPA?

VII. The cost of implementing and running blockchain. Financial considerations and energy consumption. Bitcoin mining is energy intensive. Do other applications require the same level of computation?

VIII. Overall process of adopting new technology

- Any IT project introduced at the State level goes through an application. Generally, technology is applied to a specific problem rather than considering an application first and then identifying the problems that it may solve. This is a different process.
- Need to consider how to explain the new technology to ensure that it is not overregulated.
- There are consequences and opportunities that we may not be able to foresee. Consider the approach of "agile governance" – how do we create a system that can be flexible and allow for change. (Ex: Regulatory sandbox: way of experimenting with technologies, try things without being penalized.) Engage civil society organizations.
- Ensure that we consider the application rather than technology for its own sake. Why is blockchain needed? Appropriateness needs to be identified and related directly to blockchain.
- Adoption/deployment of any technology requires looking at shared understanding of value proposition.
- Consider maturity of governance and capacity to implement.
- Identify end users and any required management changes as a result of new technology. How would current policies be implemented through new technology?

IX. Security and risk

- The technology is still new and many are still skeptical. How will we respond if something goes wrong? How will code errors be addressed?
- Knowing that our current systems get compromised, how can we assure the public that blockchain is better?
- We need to balance efficiency with security.

X. The role of the Federal government and other states

- How will we address interstate competition? Other states are also creating taskforces. Do we want to collaborate with or compete against other states?
- Will the Federal government become involved with security related to blockchain?

XI. The politics of change

- Adoption of blockchain can present political challenges. The State's role is to protect residents from negative actions, even when counties opt-in to blockchain. Should individuals be allowed to opt in? At which point is it appropriate for the State to authorize opting in?
- Current establishment has a hard time adopting new ways of doing things. Legacy systems may prevent rapid adoption of new technology.
- Efficiency automatically means diversion of income from one group to another.
- Incumbency means very little incentive for transparency.
- Blockchain applications may find more receptive proving grounds at the local rather than state level.

XII. Countering the dark side of blockchain

- The bitcoin industry has a dark side and bad PR; it is linked to volatility, avoiding regulations, overblow expectations, and associated crimes. These perceptions about cryptocurrencies have shaped, to some degree, public understanding of blockchain.
- Blockchain has a reputation as an overly complicated technology that serves as a techie's playground.
- The general public does not need to know the technical details of blockchain and what a ledger is. The public need to understand how it can be used for investment and transparency.
- Is there a value for anonymity? E.g., healthcare applications, research.

CONSIDERATIONS FOR USE CASES, APPLICATIONS

QUESTIONS FOR THE WORKING GROUP

1. How should regulatory standards be established for industries' use of blockchain, in California and across the country? What is considered reputable use and legitimate? What is the appropriate regulatory framework? How will these regulatory standards stimulate the blockchain industry?
    - Corporate articles of incorporation (state filing): A lot of room for government to work with private sector to understand how it works.
    - Consult with large corporations and financial institutions such as JP Morgan and Wells Fargo to identify their impressions of blockchain's potential impact and how the State should regulate it.
    - State agencies need guidance on how to work with and regulate industries that are transitioning into blockchain. What does the State need to know?
    - Review work being done in other states, e.g., New Jersey.

- Beware of how the working group makes recommendations without specific information about an industry – this will make determination of uses difficult.

2. Clarify for legislators when it's appropriate to use a distributed ledger technology (DLT) and when a traditional technology would be a better fit.
3. How can blockchain be used to **improve government operations** and the links among government levels, between government and businesses, and between different levels of government and individuals? How might the different types of blockchain systems address the State's needs?
4. How do we define a **low-hanging fruit** use for blockchain?
5. What is the State's **roadmap** for blockchain development (current efforts, partnerships, digital identity)?
6. What can we **learn from other blockchain working group efforts**?
7. What **guiding principles** should be adopted by the State for blockchain application decisions? ("Do no harm.")

POTENTIAL CONSIDERATIONS

I. Readiness and political climate

- Consider the political climate and potential partners for a given application.
- Evaluate existing applications and pilots to understand how well they work, maintenance needs, and cost.
- We are going to learn from these experiments; every agency may want to experiment, and we should encourage them, with assessment of risks and mitigation to ensure no harm.
- Begin incrementally to allow for ongoing iteration and learning.
- Identify use cases that will require minimal changes to the backend enterprise
- Consider a blockchain readiness assessment for agencies to ensure that in transitioning to blockchain, they have clean structured data.

II. Need for intermediary

- When is an intermediary necessary? To remove gate keeper or create peer-to-peer access, blockchain is the best approach.

III. Cost effectiveness

- Consider initial cost to establish a blockchain system as well as long-term operation and maintenance costs. What are the potential benefits? How does it affect workload? Does it reduce likelihood of litigation? Need to identify costs and

benefits based on existing efforts and pilots. Create a matrix for anticipated workload and financial obligations, based on the experience in other States.
- Integrate opportunities/considerations (from previous section) when advising on a particular approach. Can we express the value proposition or opportunity cost of not pursuing the change? What is the return on investment? Other measure of impact?

IV. Risk assessment and considerations

- Encourage an iterative and adaptive process to mitigate for risks.
- Consider a parallel process for high-risk areas to alleviate the risk – continue with existing system as a backup and gradually transition to blockchain, if indicated.

V. Improve efficiencies in government and industry

- Could be used for vital services where bureaucracy is slow or economy is lagging.
- Implement in areas of low investment.
- Retailers could use it to track their goods, but small business owners may not like it.
- Consider contexts of exchange of value (transferring and tracking goods, tax credits, emission credits, or exchange of value where there is registry).
- Organizational readiness for net, new, replacement of existing processes?
- Opportunity to rethink regulations and auditing from government perspective. Eliminate extra verification steps and access permission. Potentially, this will result in increased visibility to regulators with less intrusiveness.
- Coordination among state agencies of shared information. This may be difficult to implement due to legal reasons.
- Promote innovation while addressing concerns about privacy and security.
- Laws related to blockchain are changing quickly. Consider how the state is affected by Federal requirements.
    - Potential application: Workers compensation, requires coordination between private industry and state regulation.

VI. Improve access and transparency

- Need for improved transparency.
- Degree of bureaucracy and lack of trust has been barrier to digitalization; examples include permits, real estate, home improvement.
- Multi-party access: room to experiment. Regulator authority may want real-time access to records. Once a transaction is recorded it cannot be altered. Could

save compliance costs and reduce need to document. Some companies would not want this quick access.

VII. Improve security/privacy issues

- Security is a huge question. Danger of persuading organizations to change their systems that may then get hacked.
- Does the system contain sensitive and identifiable information? What protections should be in place for data retention, anonymization?

VIII. Decision matrix

- Decision points should address the challenges.
- Three pillars for blockchain application: Critical question – what problem are you trying to solve? Distinguish cases where characteristics determine that blockchain is appropriate vs. cases where blockchain is just one of many options.
  - Within company – between branches it may be more efficient, easy, and simple
  - Enterprise blockchain
  - Security – blockchain is the most resistant system to hacking, but this may change.

IX. Incentives for adoption: Added benefits from moving away from centralized approach

- A centralized system is easier to manage.
- Blockchain may avoid the need for a database keeper. Still, a governance structure will be needed which adds 'friction' (an added structure, more effort).
- Decentralization of trust may provide added value. This is beneficial when parties don't fully trust each other or need their own sovereignty. It is important to define benefit and values here.
  - Potential benefits/values: removal of friction, e.g., food safety: set up consortium and reuse similar technology used by others. Shared records mean lower costs, less time.
- When there is an existing trusted third party, but technology is outdated and in need of a refresh, it might be an opportunity to adopt a blockchain technology to improve benefits to members. We may find interesting and surprising places where early adopters are leaders in investment in technology infrastructure and rethinking business approaches.

X. Piloting blockchain

- When moving into the blockchain realm, it is a good practice to run the old system in parallel with the new system. Stress test or pilot the new system.
- Scalability: nodes on the tree, anticipated return on investment, putting ideas on minimum viable product. What does success look like, what can we learn from failure? Do the exploration to learn and make better decisions. To do that will require transparency, engagement, and documentation. Assess return on investment – need stakeholder engagement and peer review.
- Which type is most appropriate in a given context? Considerations of permission/anonymity/private-public/interoperability/interface elements.

BLOCKCHAIN APPLICATIONS

A PILOT APPROACH TO BLOCKCHAIN IMPLEMENTATION/LOW-HANGING FRUIT PROJECTS

I. Iterative process

- Design and implement pilot projects to inform future decisions for state implementation and build confidence and credibility.
  - Review (limited and in depth) existing use cases and other governments' efforts
  - Evaluate costs: both initial set up as well as operations and maintenance long term costs
  - Impact on resources and workload
  - Identify benefits
  - Legal issues

II. Where to start?

- Look for easier applications first before attempting more complex applications.
- Identify urgent problems that currently do not have an acceptable solution.
- Need to focus on the broken areas which the governor and staff will be interested in.
- Consider blockchain where we identify a broken system, where it is inefficient, underfunded, and problematic.
- Blockchain has broad application and there is not yet a clear application to avoid.
- Identify systems that need a refresh and reboot present an opportunity.
- Start with applications that have State jurisdiction and then empower locals to adopt.

BLOCKCHAIN APPLICATIONS

I. Database application

- Considerations: When looking at database applications, it is important to consider the added benefit of using blockchain.
- Examples: Archiving services via blockchain. Some State departments/offices use a type of blockchain technology and may need state authorization.

II. Identity

Considerations:

- Clarification is needed to prove a digital identity. Digital identity can then be used in many other areas.
- Very complex, but we are not starting from ground zero as we can recommend trusted partners who can be a part of the solution.

Examples:

- Alcohol vending machines – Scan to verify age over 21. This is an example of granular access to identity components for specific purpose.

III. Supply chain

Considerations:

- Provide transparency and visibility regarding points of origin.
- Exciting application in the context of sustainability and ethics.
- Current regulatory requirements are in place regarding produce growing, transport, organic certificate, and labeling. This is a good opportunity for California given the importance of agriculture. Blockchain application projects are already underway (e.g., Walmart food trust network: retailer working with growers and distributors of leafy greens; half of U.S. greens are grown in California). The wine industry and emerging cannabis industry are two more high margin signature crops for California.
- This requires work with a lot of different agencies by definition and therefore it requires a multi-party coordination. The difficulties for this application are in the coordination (blockchain tool kit will be out in January) and developing standards for engagement.

Examples:

- Apparel: hold your phone to a shirt and scan where it came from, how it was made, transported. Also applies to jewels and accessories coming from emerging markets.
- Food: tracking to identify contamination sources. Sheer magnitude for implementation – may be too ambitious for an early-stage pilot.
- Firearms: Tracking firearms (State regulations/permitting; not sure if industry is ready for this).
- Inventory and purchase orders: Financial risk moves among different players. May be able to gain efficiency.
- Tobacco products: vaping issues tracing sources.
- Logistics: Shipping and tracking, already implemented by Walmart and other large operations, e.g., commerce through California ports.
- Pharmaceuticals: Opportunity to reduce fraud.

IV. Property

Considerations:

- Tracking property transactions is a candidate for early adoption. If successful, it would be a good way to demonstrate benefits of the system. Illinois has completed a pilot project. Reduced confusion regarding deeds and fraud.

Examples:

- Land title
- Vehicle registration
- Property registration may be easier than utility use cases.

V. Financial inclusion

Considerations

- Opportunity to promote equity

Examples:

- Crowdfunding of projects.
- Remittances

VI. Finance, payment, commercial business

Considerations:

- Need clarity on what this would include.
- Need to address credibility, trust, and public support. May be a longer-term application.
- Record-expunging process (potentially use different levels of anonymity of information). Is this at odds with blockchain's fundamental characteristic of immutability?
- Opportunity to reduce friction of transaction.
- Addressing taxes would have a far-reaching impact as they affect everyone (personal, sales, business). This may be a good application to start with since everyone can agree that financial information needs to be secured.

Examples:

- Property taxes
- Personal tax returns filing and refunds are publicly available so there may be a way for this but unlikely to have much public support. Some people feel skittish about privacy implications and trust in the system.
- Sales tax collection and payment – could be automated at point of sale. (Ben Bartlett example on cannabis purchase.)

VII. Civic engagement and accountability

Considerations:

- Provide increased visibility and transparency on how tax dollars are being spent by the state and municipalities.
- Reduce opportunities for corrupt activities.
- With cellphone available to most, digital currency is easily accessible.
- Politically, it may not be a good idea to begin with anything related to election. Election security is managed at the district and local level, not State.

Examples:

- Public contract for large projects: track payments and track supplies.
- Homeless: Could offer digital currency to support individuals who are experiencing homelessness, for food and basic needs. Could also be used to keep track of health records electronically on a personal mobile device (researchers at UT Austin Health System are piloting this).

VIII. Utilities

Considerations:

- Potentially high risk and sensitive impact if an experiment failed. Ratepayers and regulators would be skeptical and cautious.
- Utilities are already facing political and technological challenges. A new technology would make it more difficult.
- Natural resources are a long shot because in California they are deeply complicated. Utilities, on the other hand, would be easier.

Examples:

- Utilities, and natural resources: combined with supply chain, trace ownership of different resources.
- Track exchange of renewable energies. Provide better traceability for microgrids.
- Utilities are already metered, could be updated to a blockchain.

IX. Health records

Considerations:

- Healthcare transferability of records, currently cumbersome where computer systems are not linked.
- Opportunity for portability and reducing paperwork.
- Could make insurance companies unhappy, perceived as a step toward centralized healthcare. Need to clarify the relationship between the State and insurers. Application may focus on the regulatory aspect to guide how insurance is regulated given the health insurance market.
- Ethics issues need to be addressed.
- Smart contract approach: This will require identifying what is on the blockchain (verification) vs. off-chain (private information). The actual credential would be somewhere else due to privacy. Must conform to HIPAA regulations.
- Health records may be a Federal rather than State effort.
- Consider retention time of health records
- What is the legal landscape for this and pilot at different level and risk?

Examples:

- Individualized access for selecting details to share with healthcare providers as well as outside entities (e.g., ancestry/personal DNA firms, disease-specific research organizations).
- Public health system: Could be used to report infectious disease outbreaks while maintaining privacy.

X. Civic records, Vital records

Considerations:

- Relatively low risk because the information is already available. Principle of do no harm is satisfied; if system fails, the existing system persists, at least for historical records.
- It's been done and therefore it is easy to evaluate pros/cons. We have clean records so it would be easy to implement and experiment with this technology without much risk.
- Consider accessibility issues. Need to make access to the technology available for all if vital records are moving exclusively online.

Examples:

- Certificates of birth/death are recorded in binders at the Counties. These events are public information that should be visible to anyone walking into a county office. This application would be a great experiment without eliminating the existing system. Could be done as a duplicate that anyone can use and see what we learn from that. Even if it fails or is compromised, the regulation around this system, if there is conflict between blockchain and existing systems the existing systems will prevail.
- Census: Could the census leverage this technology and ensure that everyone can participate while protecting for privacy?

XI. Education

Considerations:

- Credentialing: would reduce cost and burden for students who need transcripts from various institutions or to show various organizations (graduate schools, employers, etc). Could reduce overhead for institutions.

Examples:

- University records, other training programs.
- The State has an interest in certifying on-the-job training, documenting apprenticeships. Could keep the current process in place and introduce in parallel.
- Gig economy. Credentials on the blockchain can prove experience and build resume.

XII. Justice system

Considerations:

- Good local testing grounds at municipal and State levels.
- Could have implications for civil and criminal systems.
- This may be a long-term application, but it is a very important investment.

Examples:

- Police justice: body camera footage could be reliably stored to help identify trends and practices in good/bad policing.
- Tracking documentation and required disclosures. It would be beneficial to get rid of snail mail.
- Tracking chain of evidence. Could increase reliability and ease the overburdened system.
- Bail payments on blockchain?

WORKING GROUP PROCESS

DECISION-MAKING PROCESS

- Working group members recognize that consensus on all recommendations may be difficult to achieve. Instead, it was generally suggested that the final report present majority opinions as well as dissenting/minority opinions for legislature consideration.
- Working group members suggest the use of discussion tools such as 'gradient of agreement' or color-coded opinion matrix to assess level of agreement and identify areas for further discussion or research. In addition, public comments should be considered throughout the process to ensure that perspectives of those who do not support blockchain implementation are identified and discussed.

DEVELOPMENT OF THE WORKING GROUP REPORT

Working group members offered to support the development of the final working group report to legislature. The report should address the key areas identified by the legislation including: the potential uses, risks, and benefits of the use of blockchain technology by state government and California-based businesses and recommendations for modifications to the definition of blockchain in Section 11546.8 and recommendations for amendments to other code sections that may be impacted by the deployment of blockchain. Working group members expressed a desire for the report to be useful to diverse stakeholders in California to better understand blockchain and necessary considerations for its future application. The table below provides a summary of assignments.

Contribution	Working Group Members
Overall editing	Meredith Lee Ben Bonte David Tennenhouse
State perspective	Ben Bonte Kem Musgrove Senator Hertzberg (Government efficiencies) Ted Ryan (State budget and financing considerations)
Blockchain Definition, Foundational Building Blocks, and Overarching Considerations	Brian Behlendorf David Tennenhouse (Classes of application) Michele Neitz (Ethical considerations) Sergio Gutierrez (Decision making)
Regulatory Framework, pilot-sandbox	Ben Bartlett (pilot, sandbox) Liz Chien (tax rules)
Cyber security, privacy, risk management	Arshad Noor (risk management) Jason Albert (Privacy)
Digital identity	Radhika Iyengar-Emens Jason Albert
Civic Records: Birth, Death, Marriage	Senator Hertzberg
Health Records	Radhika Iyengar-Emens
Supply Chain	Sheila Warren
Property	Audrey Chaing (registering)
Utilities, Natural Resources	
Financial, Payments and Commercial Business	Audrey Chaing (top choice) Ben Bartlett Liz Chien (increase financial inclusion) Michele Neitz Kai Stinchcombe (access banking, remittances)
Infrastructure development	Ben Bartlett
Justice and Civic Participation	Michele Neitz (Voting) Sheila Warren (overburdened justice system) Kai Stinchcombe (voting, registration)
Education and Workforce	Audrey Chaing Michele Neitz