



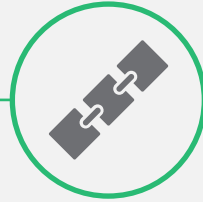
# Blockchain and Supply Chain— Where's the Value?

Presentation to IOTSWC Barcelona

OCTOBER 29, 2019



What we  
want you  
to take  
away from  
this session



1. How **block chain** can be a good solution for supply chain



2. When to consider **block chain** or control tower solutions



3. Use cases (and expected value) for **block chain** in the supply chain



4. Our view on how this will play out over time



5. **Key success factors** for how to develop a supply chain ecosystem

# Blockchain offers many benefits over traditional IT solutions...



## Real-time visibility

Changes to a blockchains are immediately available to all participating parties creating full transparency



## Immutability

Blockchains history can not be altered or deleted outside of consensus protocol which establishes immutability



## Single source of truth

Data is consistent, timely, accurate, and widely available as single source of truth



## Permissioned access

Users and organizations can be in control of all their information and transactions & with whom it is shared



## Trustless exchange

Parties can exchange information without need for oversight by a third party



## Automation

Users can trust that transactions are executed exactly as participants intend, reducing need for trust in counterparty



## Durability and reliability

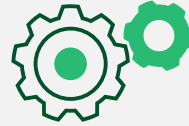
Decentralized networks does not have a central point of failure and is better able to withstand malicious attacks



## Lower costs

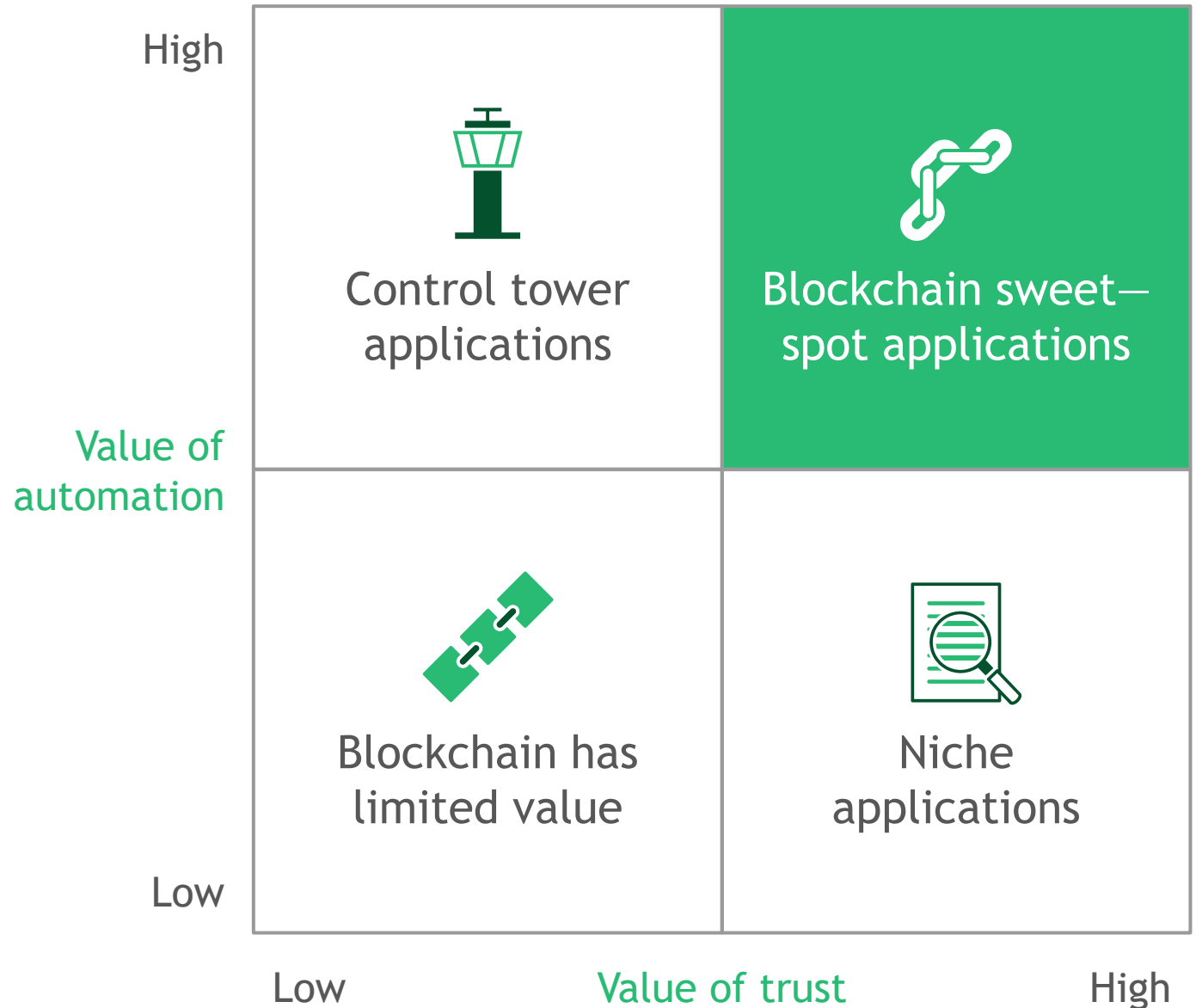
By disintermediation, transactions can be made without need for 3<sup>rd</sup> party transaction fees

# ... and these translate to new capabilities in supply chain

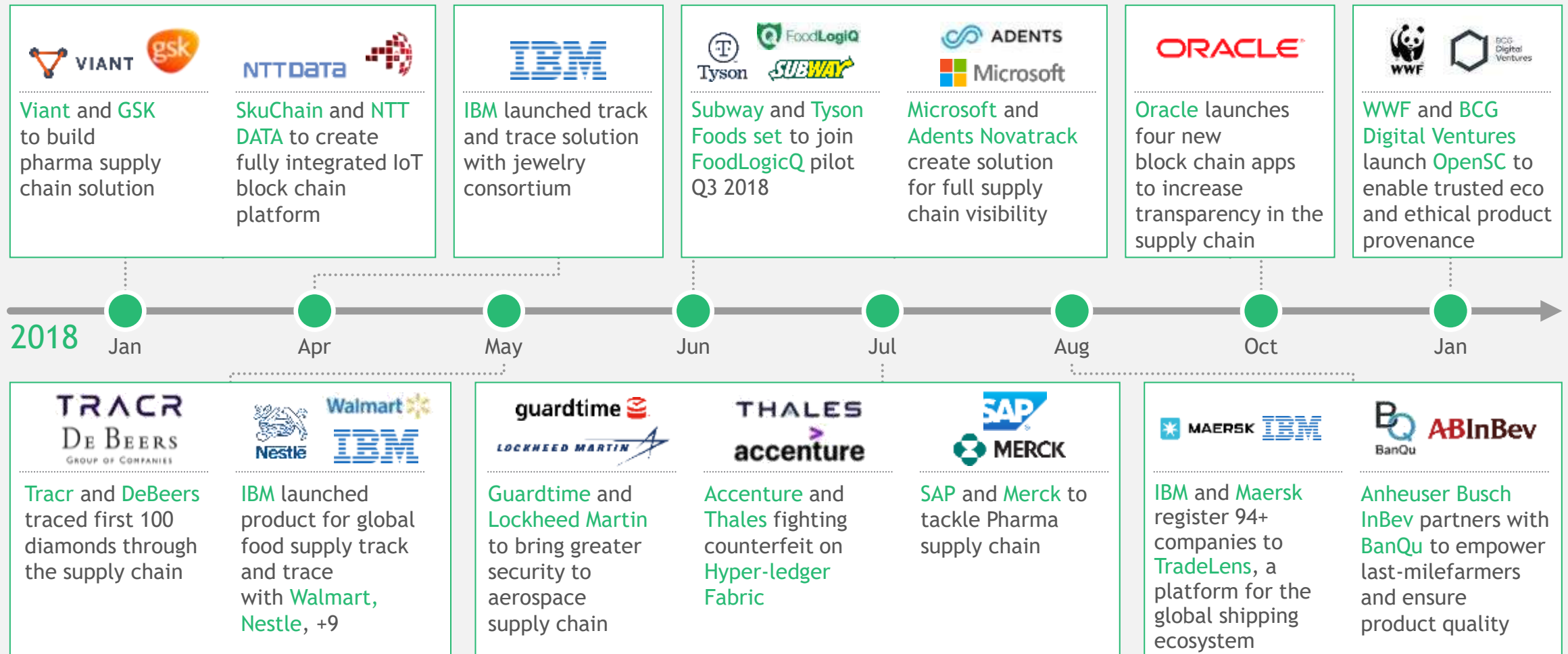


- **Far more visibility**—Can “see” upstream and downstream data if permitted
- **Much simpler integration**—one integration per block chain vs many P2P
- **Highly robust**—if suppliers go bust, merge etc. you don’t lose data
- **No need to trust intermediary**—no danger of 800lb gorilla using your data
- **Facilitates easy transfer of assets**—digital assets (digital twins, bills of lading, digitized paperwork) easily transferred just like in the offline world

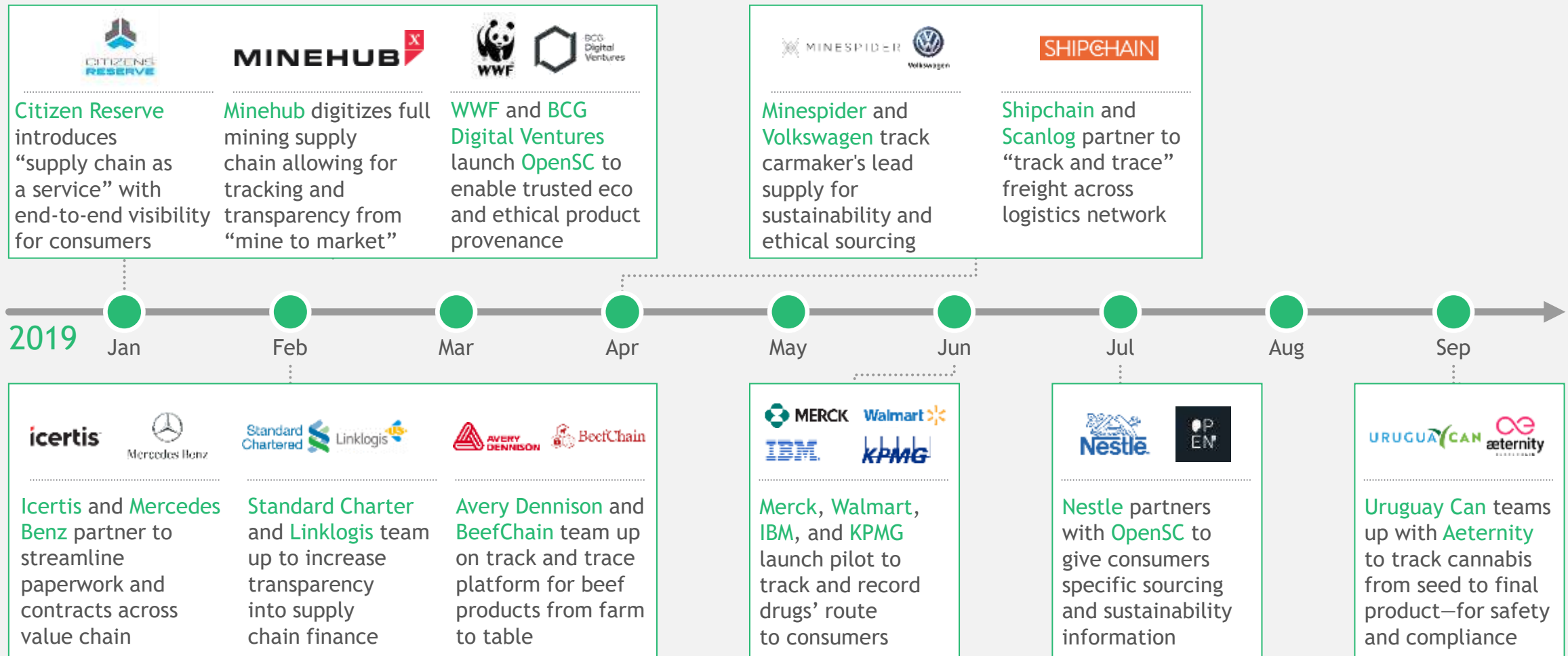
However, we already have “control tower” solutions. Which one is best depends on the value of trust and automation



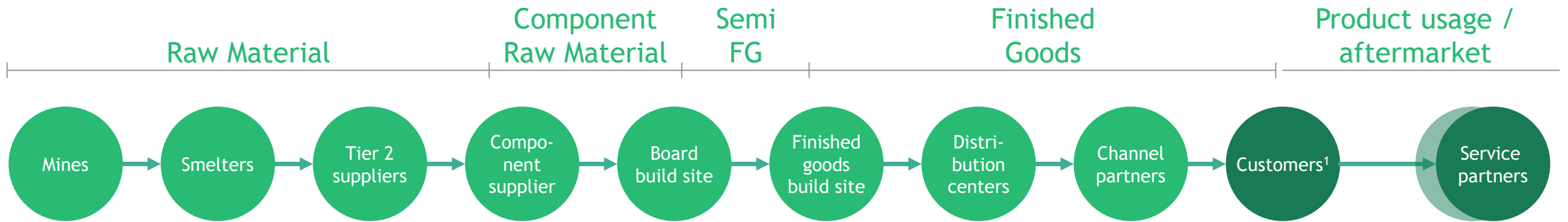
# ... and as a result there has been lots of momentum in supply chain and block chain solutions—2018 examples ...



# ... and for 2019



We see nine major use case categories across blockchain - almost all of these have active, in production examples (electronic supply chain example)...



TRACK AND TRACE USE CASES

1 PROVENANCE / CONFLICT RESOURCES

2 PROVENANCE / ANTI-COUNTERFEITING

3 QUALITY + RECALL MANAGEMENT

4 LOGISTICS (TRACK & TRACE, CUSTOMS, PAPERWORK)

5 SUPPLY CHAIN ORCHESTRATION (FORECASTING, PLANNING, BUY/SELL PRICING)

6 SUPPLIER RATINGS / SOURCING

7 PLM / SERVICE HISTORY

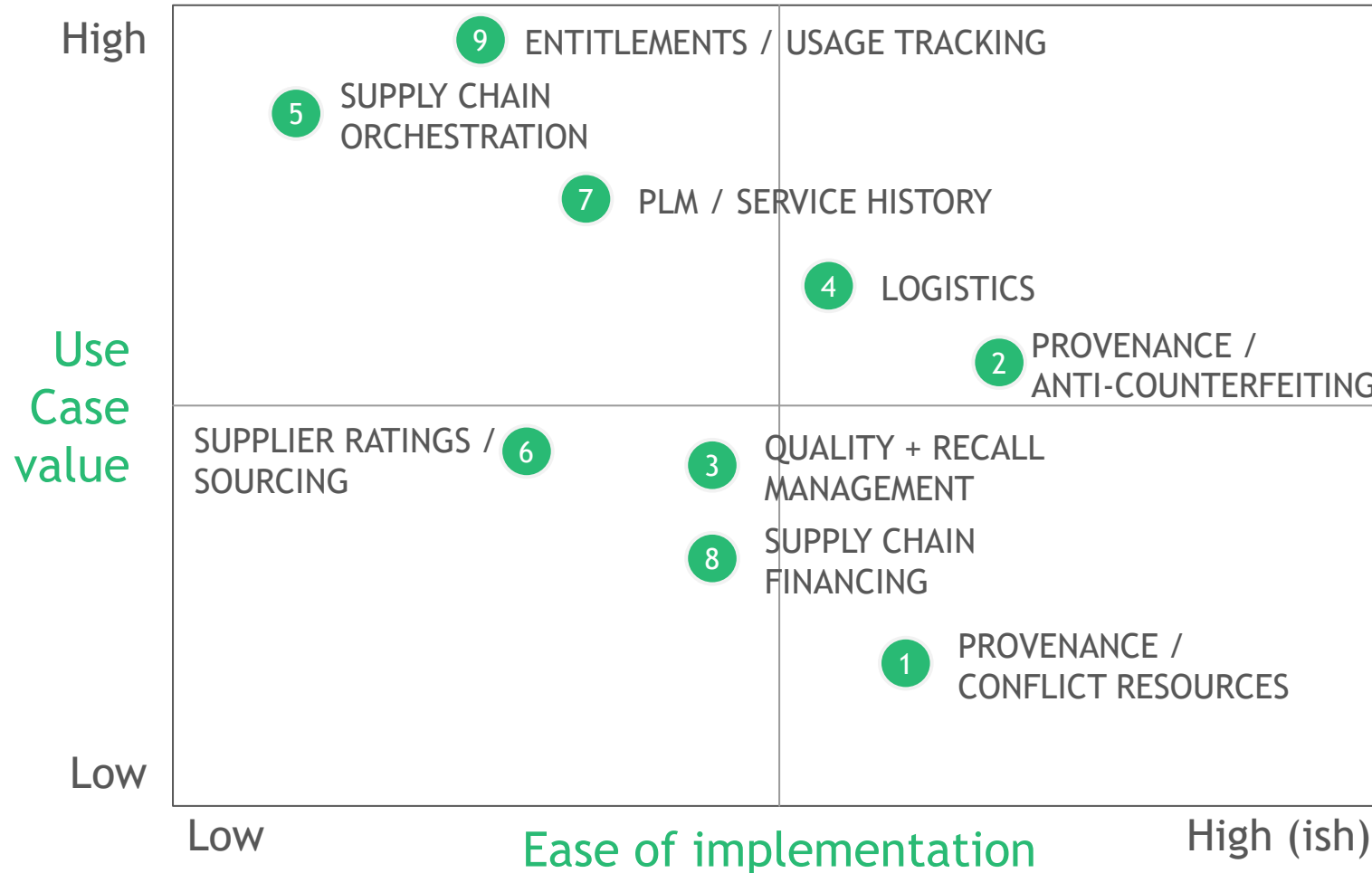
8 SUPPLIER FINANCING

9 ENTITLEMENTS / USAGE TRACKING

1. Potentially multiple customers over a product's lifetime  
Source: BCG analysis



... however, each have very different value to the ecosystem (electronics supply chain example, other industries will vary)



### Emerging KSFs



**Business value**



**Aligned incentives**  
across entire ecosystem



**Ease of critical mass**  
(aka MVE or minimum viable ecosystem)



**Simplicity**  
(relatively anyway)

# Example 1: Provenance in diamond industry

Blockchain solution specific to diamond industry in order to record a diamond's provenance through the supply chain, reduce compliance costs and address consumer demand for transparency

## Approach



Tracked diamonds from mine (rough) to polished stone through entire supply chain, following Kimberley process



Created unique digital fingerprints on the blockchain, leveraging each diamond's unique properties



Allowed easy integration with existing SCM systems to minimize disruption



Developed a clear governance mechanism and privacy controls to encourage third party wholesalers to join

# Example 2: Provenance/anti-counterfeiting in electronics

Large electronics company developed anti-counterfeiting solution for highly counterfeited components, saw this as a stepping stone to end-to-end supply chain orchestration solution

## Approach



**Selected limited number of high-value components to secure**



**Identified critical mass of suppliers to collect data from—and made onboarding easy**



**Built mobile app that can scan product QR codes to make it easy to read from blockchain in real time**

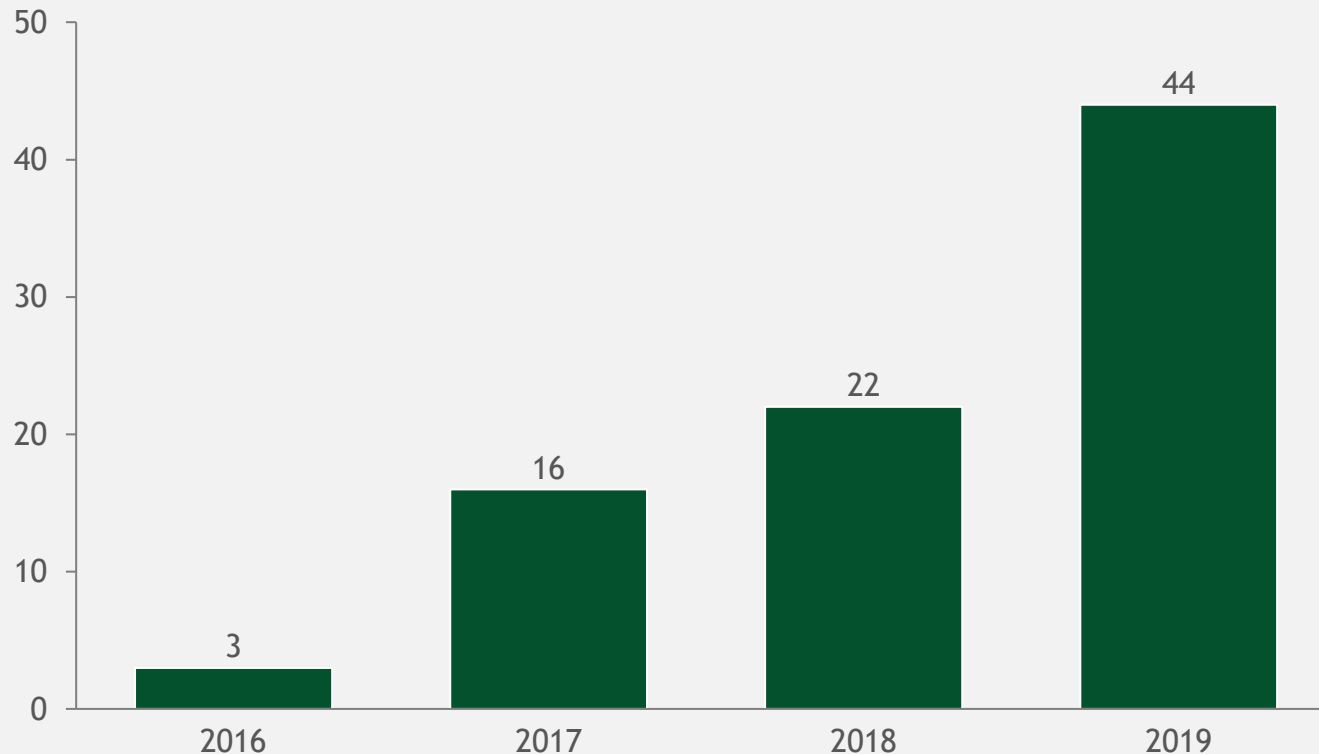


**Trained brand protection and other staff on using new app**

# Example 3: Quality/recall management in food and beverage industry



Number of traceability Blockchain pilots in Food and Beverage industry (2016-2019 YTD)



1. See Walmart's September 2018 announcement to suppliers:

2. <https://techcrunch.com/2018/09/24/walmart-is-betting-on-the-blockchain-to-improve-food-safety/>

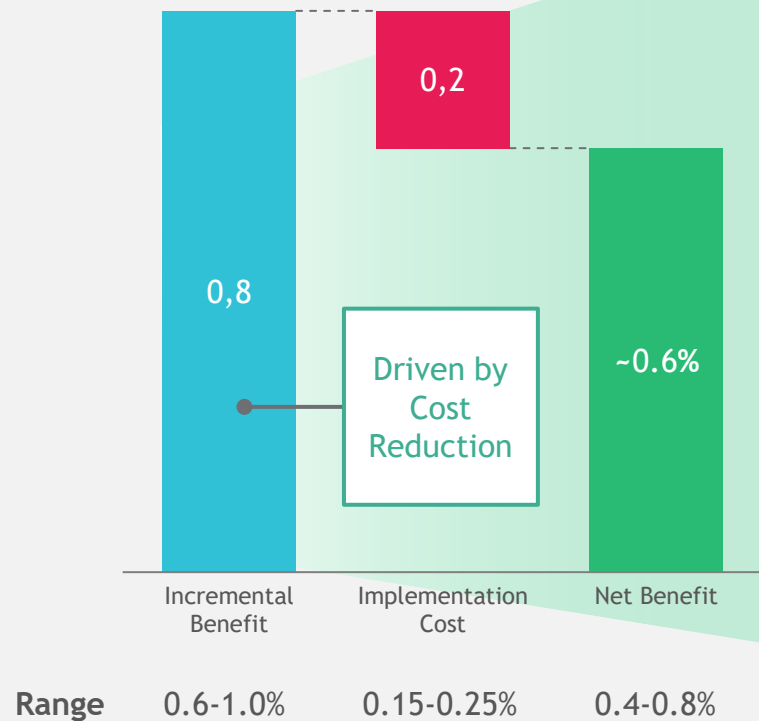
Note: Not exhaustive—data includes publically announced corporate pilots

## Example: Walmart Food Traceability Initiative<sup>1</sup>

- Launched in **September 2018**
- Partnership with IBM's **Food Trust Solution**
- “**Increase transparency in the food system** and create shared value for the entire leafy green farm to table continuum”<sup>1</sup>
- **End-to-end supply chain required to upload data to blockchain by September 2019**
- **Reduced time to identify source of food from 7 days to 2.2 seconds**<sup>2</sup>

# Example 4: Logistics and storage; estimated net benefit of ~0.6% from an IoT with Blockchain implementation

IoT with blockchain solution delivers an average net benefit of ~0.6% of revenue



Range 0.6-1.0% 0.15-0.25% 0.4-0.8%

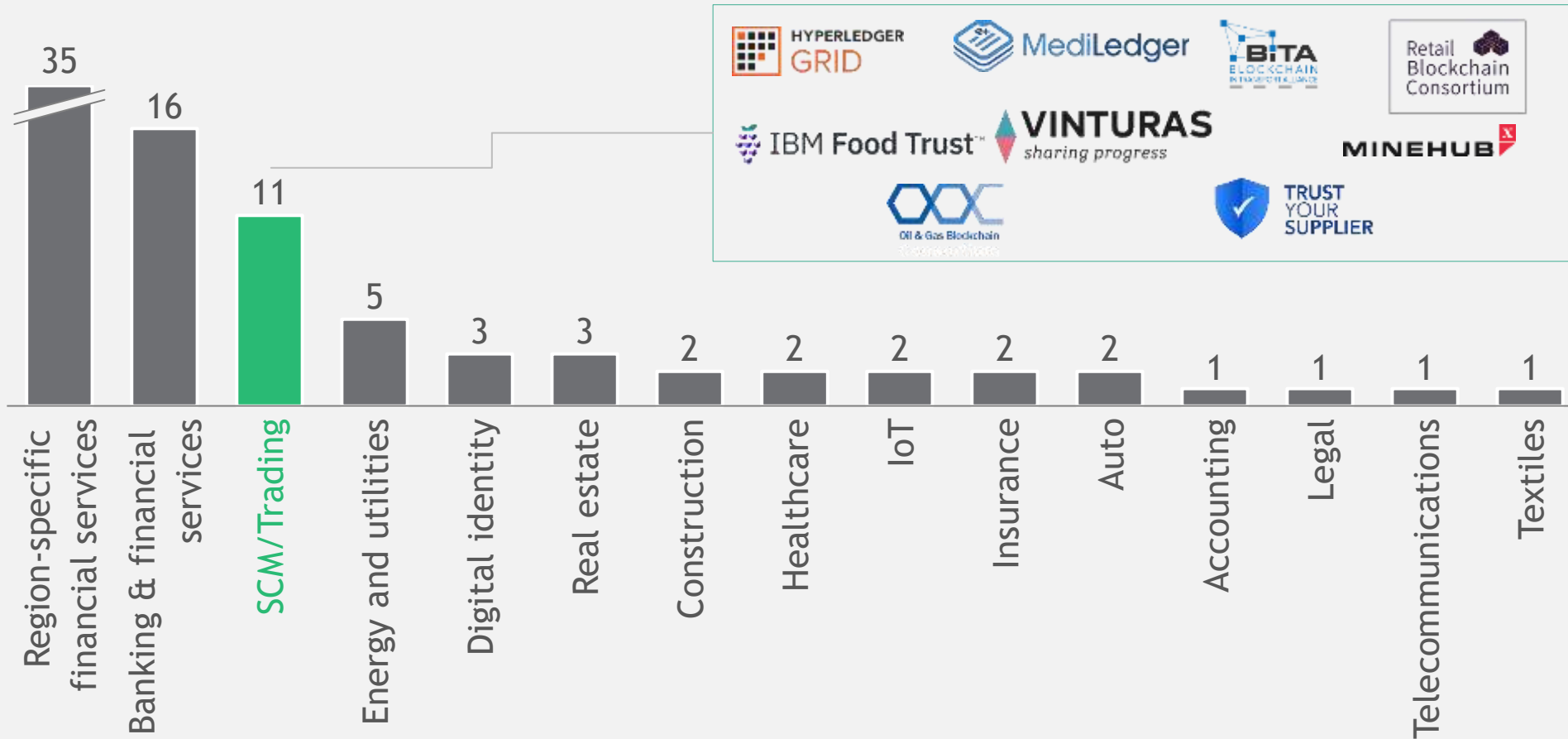
Breakdown of Incremental benefit				
	Range	Economic impact	Driver (% of Revenue)	Optimization possible
1	0.22%	0.17-0.26%	Inventory holding cost ↓	<ul style="list-style-type: none"> <li>Inventory carrying cost: 2-2.5%</li> <li>Optimization with real-time tracing on BC: ~10%</li> </ul>
2	0.42%	0.28-0.56%	LC <sup>1</sup> fees ↓	<ul style="list-style-type: none"> <li>LC transaction fees: ~0.56%</li> <li>Portion that can be eliminated: 50-100%</li> </ul>
3	0.02%	0.01-0.02%	Blocked working capital ↓	<ul style="list-style-type: none"> <li>Probability of damage per shipment: ~2.3%</li> <li>WC days at stake: 40-60 days</li> <li>Reduction in dispute resolution time = ~75%</li> </ul>
4	0.03%	0.00-0.06%	Broker fees ↓	<ul style="list-style-type: none"> <li>Customs brokerage per shipment: 0.01-0.13%</li> <li>Reduction through BC use: 50%</li> </ul>
5	0.11%	0.07-0.15%	Pilferage Fraud ↓	<ul style="list-style-type: none"> <li>Probability of theft per shipment: 0.14-0.19%</li> <li>Savings with BC: 50-80%</li> </ul>
6	0.02%	0.02-0.02%	Container cost ↓	<ul style="list-style-type: none"> <li>Container cost per shipment: ~0.2%</li> <li>Optimization through container sharing: ~10%</li> </ul>
	<b>0.82%</b>	<b>0.6-1.0%</b>		

1. LC—Letter of Credit

CR Cost impact

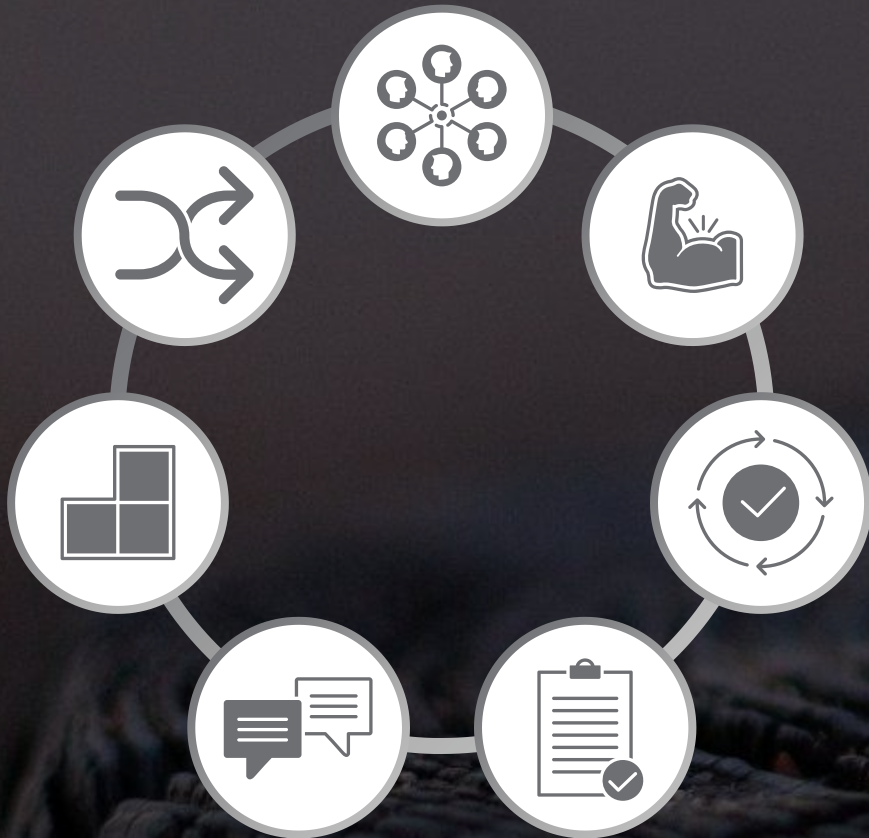
# To facilitate coordination, blockchain consortia are emerging across industries

Number of Blockchain consortia by industry





# How we see the market evolving



# How we see the market evolving



1-3 major blockchain ecosystems per industry will emerge



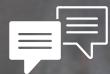
Ecosystems led by “800lb gorillas” more likely to succeed ...



... but ease of use is the other way to win



“Minimum Viable Ecosystem” will enter our lexicon



Blockchains need to talk to each other already



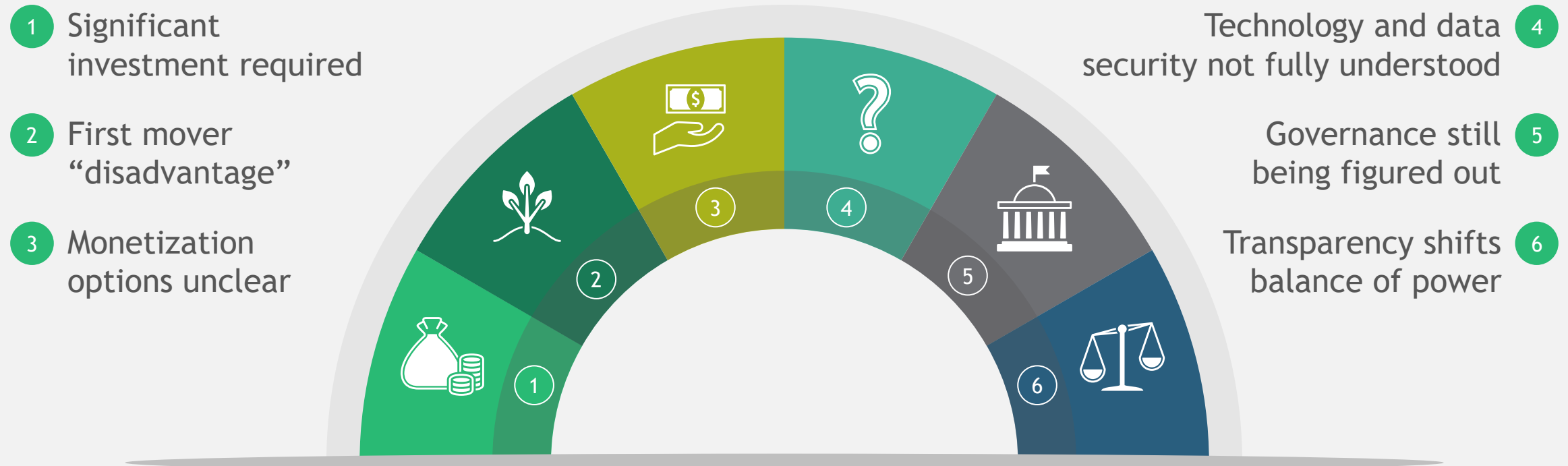
Blockchain will be complementary to SCM software and eventually embedded



EDI spaghetti will slowly go away, blockchain becomes the default SVOT



# However, there are several barriers for Blockchain implementation



# Significant investment required and “first mover disadvantage”: Barriers and solutions



## Developing a blockchain platform is expensive and time-intensive

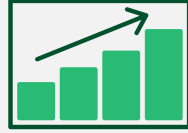
- Development is expensive
- The tech is not fully mature
- Convincing others to join is time-consuming



## ... and if I do all this, do I make a return?

- Are competitors benefiting from my effort?
- How do I get paid for the extra effort?
- So should I lead or follow?

# Path to monetization is unclear



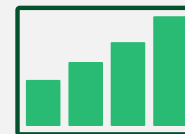
## Direct business benefit

- Promises real-time data, single version of truth, increased customer responsiveness and transparency, compliance with regulation



## ICOs

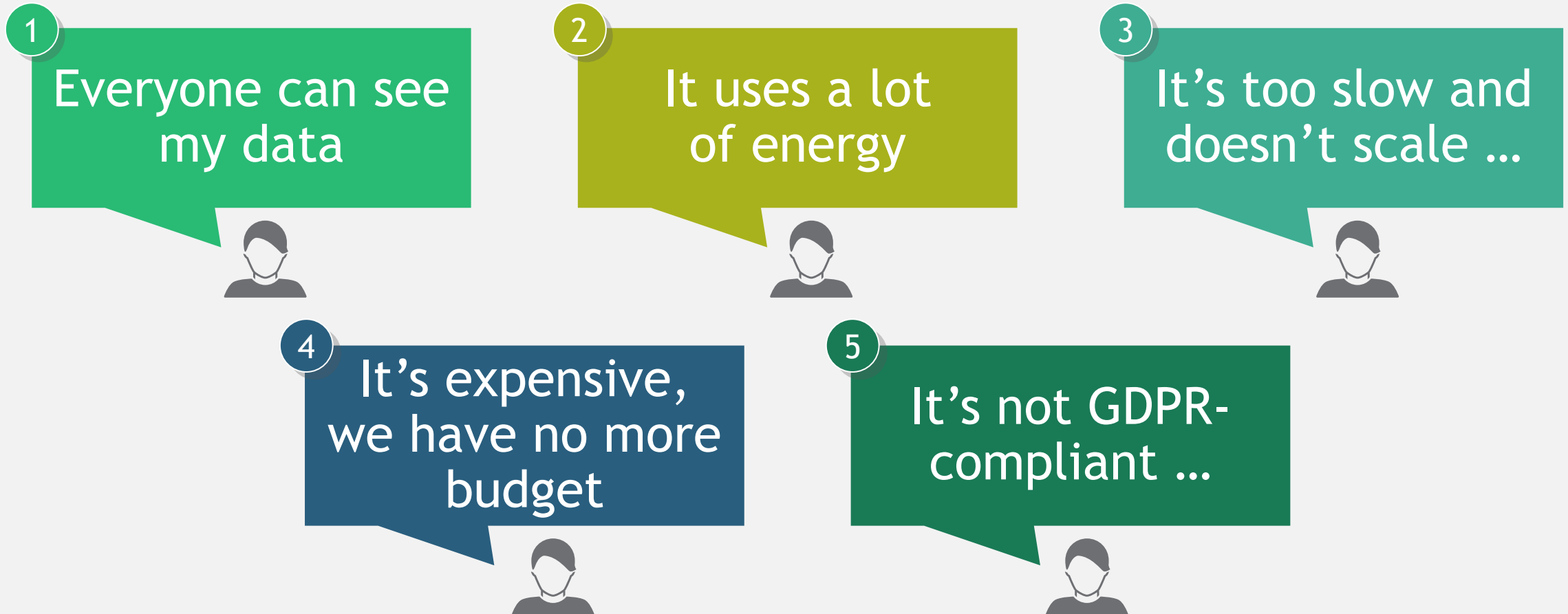
- Initial coin offerings tried as “gas” for business applications, but little appetite from enterprises



## Subscription or transaction fee

- Multiple models being tried (per node, per tx, flat fees)
- Challenging to price correctly, as value of different assets varies widely

# Blockchain is still not fully understood: Bridging the understanding gap



# Governance for blockchain is still being figured out: What needs to be considered



## Leadership and decision makers

- Who are the **decision makers**?
- Who has **voting rights**?
- How is **consensus** achieved?



## Participants and partners

- How to **incentivize early adopters**?
- How to **address bad behavior**?
- Will participants need to **pay for access**?
- How will new participants/partners be **onboarded**?



## Data and development

- What are the **governing data standards**?
- Where is **data stored**?
- How do **local regulations** affect data sharing?
- How much **IP sharing** will exist?
- Which **use cases** will be addressed?
- What is response to **edge cases**?

# Transparency shifts balance of power



Successful implementation of Blockchain in supply chains **requires participation** along the entire value chain



However, increased transparency provided by Blockchain **does not benefit all**



Those standing to lose power with enhanced transparency **need to be incentivized to participate**—finding effective incentives critical to success

# Your checklist for success—all of these need to be addressed for adoption success



## Customer vision

- Value proposition
- Customer targeting
- Driving adoption



## Ecosystem value

- Aligned strategic goals
- Value creation
- Value sharing



## Partnerships

- Partnership needs and partnership models
- On and off-boarding partners
- Ecosystem community



## Organization and talent

- Organizational set up
- Talent and skills
- Culture



## Rules of engagement

- Decision making
- Protection of intellectual property
- Quality management



## Data and processes

- Process mapping and interaction
- Data management
- Tools and infrastructure



Questions



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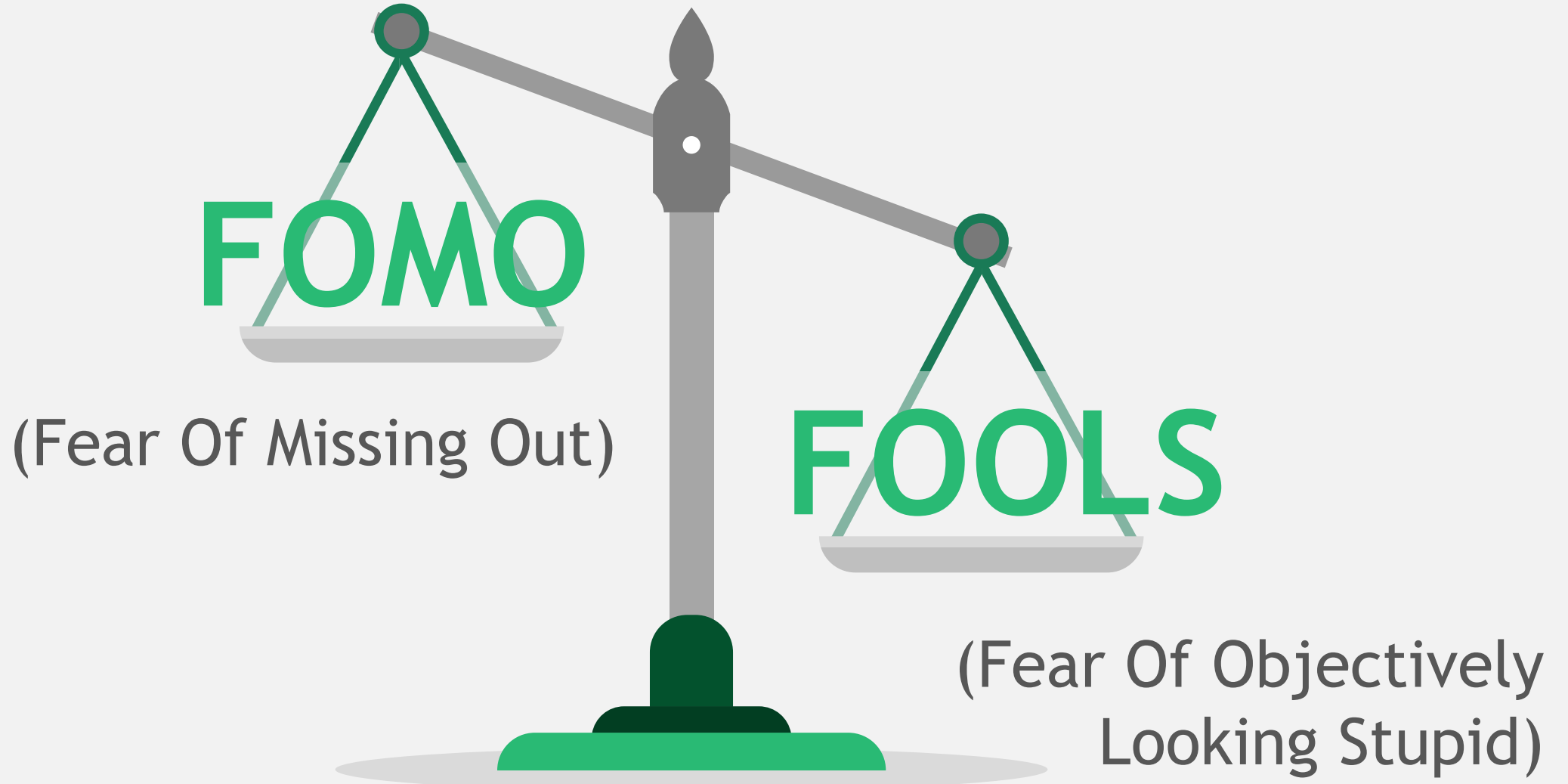
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# Appendix

- Additional detail on control tower vs. blockchain approach
- Other supply chain use cases seen

# What's really happening in the background



# Additional detail—control tower vs. blockchain approach (1/2)







Control tower approach



Blockchain approach

What this means for supply chain

	 <b>Real-time visibility</b>	 <b>Immutability</b>	 <b>Single source of truth</b>	 <b>Permissioned access</b>
Control tower approach	<ul style="list-style-type: none"> <li>Data often lags between control tower and participants from batch processing etc.</li> </ul>	<ul style="list-style-type: none"> <li>Data stored can be altered retrospectively (not that common)</li> </ul>	<ul style="list-style-type: none"> <li>Versions of data between control tower and participants vary, reconciliation req'd</li> </ul>	<ul style="list-style-type: none"> <li>Participants usually maintain own data</li> <li>Limited access to control tower data by 3rd parties</li> </ul>
Blockchain approach	<ul style="list-style-type: none"> <li>Can be close to real-time, with all participants able to see same data within seconds (speeds vary)</li> </ul>	<ul style="list-style-type: none"> <li>Historical data can't be altered, but updates can be appended; history of changes visible</li> </ul>	<ul style="list-style-type: none"> <li>Identical, single version of truth stored on every blockchain node</li> </ul>	<ul style="list-style-type: none"> <li>Participants can control who sees what data (to field level) using "selective disclosure" capabilities</li> </ul>
What this means for supply chain	<ul style="list-style-type: none"> <li>Real time view of inventory, shipments etc. across entire supply chain possible</li> </ul>	<ul style="list-style-type: none"> <li>Improves trust</li> <li>Easy to see if and when price sheets change etc.</li> </ul>	<ul style="list-style-type: none"> <li>Process automation. If you have a SVOT, you can trigger transactions (for payment etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Company A can see B's shipments with price lists, but X-Y can only see shipment weights</li> </ul>

# Additional detail—control tower vs. blockchain approach (2/2)







Control tower approach



Blockchain approach

What this means for supply chain

	 <b>Trustless exchange</b>	 <b>Automation</b>	 <b>Durability and reliability</b>	 <b>Lower costs</b>
Control tower approach	<ul style="list-style-type: none"> <li>Participants must trust control tower not to change data or use it for own purposes</li> </ul>	<ul style="list-style-type: none"> <li>Automation distributed either in control tower or with participants' SCM systems—potentially messy</li> </ul>	<ul style="list-style-type: none"> <li>Control towers and participants will have backups, but hard to put back together if necessary</li> </ul>	<ul style="list-style-type: none"> <li>Control towers can charge rent</li> <li>IT complexity similar to blockchain</li> </ul>
Blockchain approach	<ul style="list-style-type: none"> <li>Don't need to trust anyone/anything</li> <li>Data, transactions made happen between entities on P2P basis</li> </ul>	<ul style="list-style-type: none"> <li>Automation happens on the blockchain using SVOT data—ironically looks more like a centralized system</li> </ul>	<ul style="list-style-type: none"> <li>Every node has identical copy of data, so network inherently resistant to outages</li> </ul>	<ul style="list-style-type: none"> <li>Harder to charge rent</li> <li>SSOT means lower costs in reconciliation and automation</li> </ul>
What this means for supply chain	<ul style="list-style-type: none"> <li>Should be no (real) concerns of joining bc network with multiple competitors</li> </ul>	<ul style="list-style-type: none"> <li>Opportunity to simplify, over time more logic would live on blockchain not SCM</li> </ul>	<ul style="list-style-type: none"> <li>Longevity—provenance records always there even if cos. Who made or touched it go bust</li> </ul>	<ul style="list-style-type: none"> <li>Lowers participation risk given less chance of rent seeking behavior</li> </ul>