The ESG Blockchain: You change the world. We prove it.

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Introduction Video

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Agenda

- **Current state of ESG:** ***Promise yet compromise***
- Future of verifiable ESG claims: *Blockchain to the rescue*
- The Topl solution: *Available today and built for the future*
- Next steps: *Working with Topl*

ESG a “must have” today & is proving to be good business

Stakeholders demanding more

Consumers demand prioritization of ESG initiatives
- ~90% want companies to go even further
- 75% Gen Z research to ensure brand “walks the talk”

Increasing willingness to pay ESG “premium”
- 75% will pay ~5% sustainability premium

Investors increasingly use company ESG records to make decisions
- 80% use ESG ratings/certifications when investing
- 1/3 of AuM in US ($17T) & >40% globally ($41T) in 2020

Businesses reaping reward for ESG focus

Studies show strong link ESG & company performance
- Margin premiums ~3-8% for ESG initiatives across consumer goods, pharma, O&G, financial services, etc.
- ESG Funds beat market at 1, 3, 5-year horizons (2019)

Companies large and small reap rewarded for ESG focus
- Revenue growth and cost savings drive bottom-line
- E.g. Unilever, patagonia, LuDeim, Walmart, Heineken

Meta-studies confirm link ESG - financial performance
- Analysis of >2000 studies: ESG focus 8x more likely to have positive (vs. negative) impact on equity returns
- Fidelity: high ESG rated companies outperform in both bull and bear markets

Strong ESG credentials foster brand recognition, trust, and customer loyalty

Cone Communications CSR Survey, 2017
Navex ESG Survey, 2020

Despite ESG focus, transparency & verifiable proof remain elusive

Certification bodies and processes highly flawed

Inability to confidently verify claims leads to high level of subjectivity and abuse

- E.g., Nestle to consolidate all certifications with Rainforest Alliance, leaving Fairtrade for a less stringent (and cheaper) process (Oct ’20)

Significant expenses hinder adoption of certification body

- E.g., cost to verifiably trace $12M in coffee (4kT) ~$140K and is 90% variable by volume (UTZ)

Overall lack of clarity on what and how to measure

- E.g., Two different certification bodies ranked Walmart top and third quartile for its ESG record, proving a lack of uniform standards

“Fair trade” chocolate?

Chocolate made with *many* ingredients: cocoa, sugar, lecithin, vanilla, milk etc…

…But fair-trade certification possible if *one* ingredient is certified (e.g., cocoa)

Thus, a company might use child labor to produce one ingredient and still be “fair trade” if another is ethically sourced

Scarlet Letters: Remarks before the American Enterprise Institute, Commissioner Pierce (2019); The Challenge of Rating ESG Performance, MacMahon (2020)

Lack of verifiable proof diminishes true impact of ESG claims

Accusations of ‘greenwashing’ or getting ‘blindsided’ all too common

Greenwashing

HERSHEY'S

2001: pledge to eliminate child labor by 2005
2010: first CSR report, touting its child labor efforts; advocacy groups critical, citing poor relative performance

TRULY

Beauty products claiming 100% certified organic / vegan
Facing ~$2M FTC fine for reliance on fake certifications

RYANAIR

Named top 10 carbon emitter by EU report (2020)
Ad response: “lowest carbon emission for major airline”
Forced to retract for basing claim on business model vs. sustainable actions

Blindsiding

TONY'S CHOCOLONELY

Founded with mission for “all chocolate 100% slave free”
Recently removed from Slave Free Chocolate list due to supply chain association with Barry Callebaut(1)

Unilever

2010: announces sustainability core to mission
2018: Greenpeace found key palm oil suppliers causing mass deforestation; company under investigation for its role

Girl Scouts

Cookies using palm oil labeled “certified sustainable”
Despite certification, recipe uses mix of sustainable and unsustainable oils, with as a little as 1% being sustainable

Insufficient certification costly; 24 ESG controversies erased >$500B S&P 500 (’14-’19)

(1) Logistics partner the subject of International Rights Advocates lawsuit; *Industry reports, web research; Financial Times, “*ESG controversies wipe $500B off value of US companies”

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Blockchain uniquely positioned to provide trust & transparency for ESG claims

Blockchain: a digital ledger with transactions recorded chronologically and verifiably in tamper proof manner

Basic Principles of Blockchain

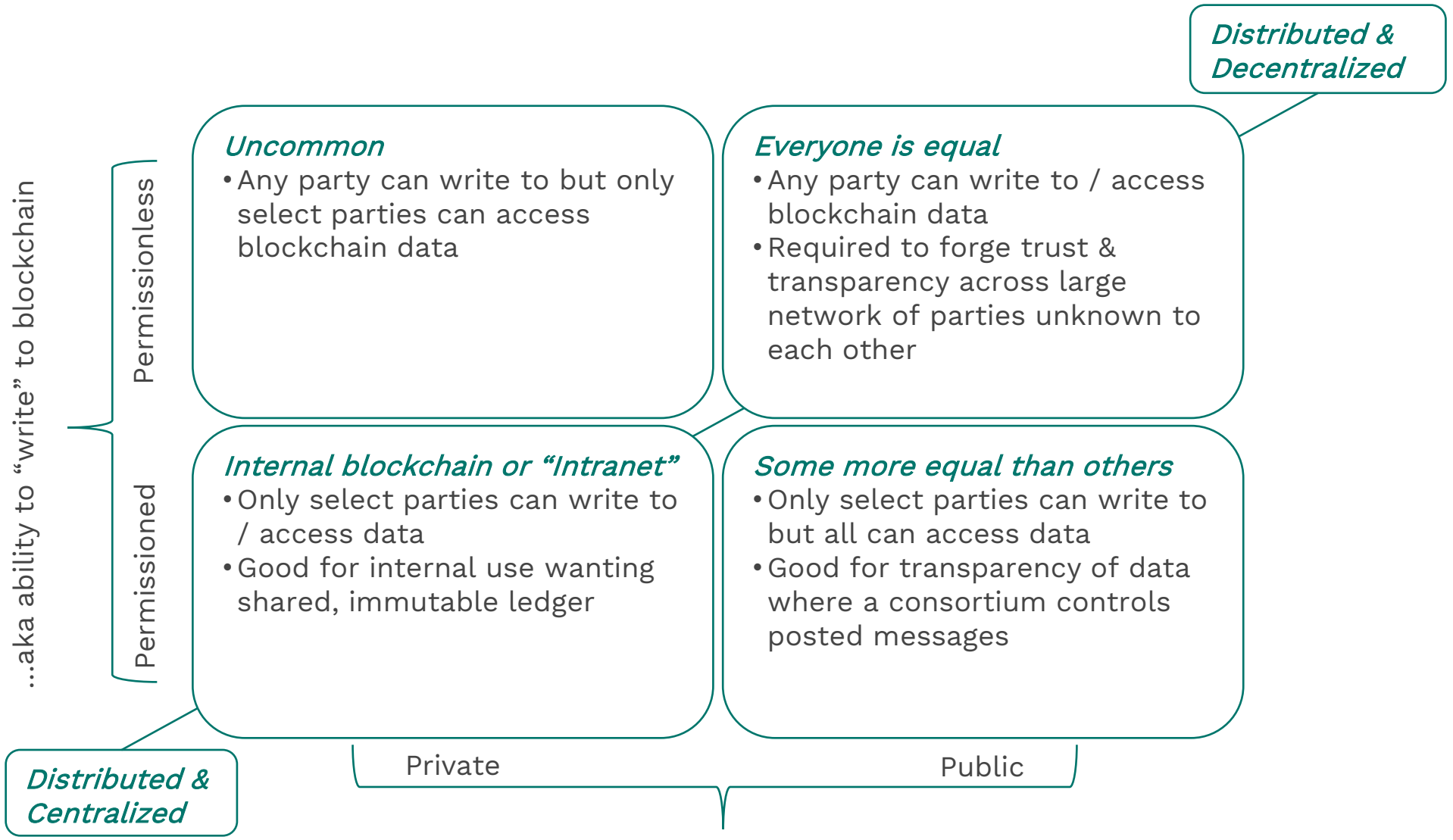
Transparent
- Detailed list of every transaction ever recorded
- Anyone can verify (public) or only a chosen group (private) network

Immutable
- Each transaction builds on entire history of previous transactions
- Cannot “amend” without changing entire blockchain history

Secure
- No single point of failure, as ledger replicated (decentralized) across all computers (nodes) in network
- Decentralized nature makes it tamper proof as corruption would require gaining control of >50% of network

Ideal use case allows many disparate actors to transact in transparent, trustless manner

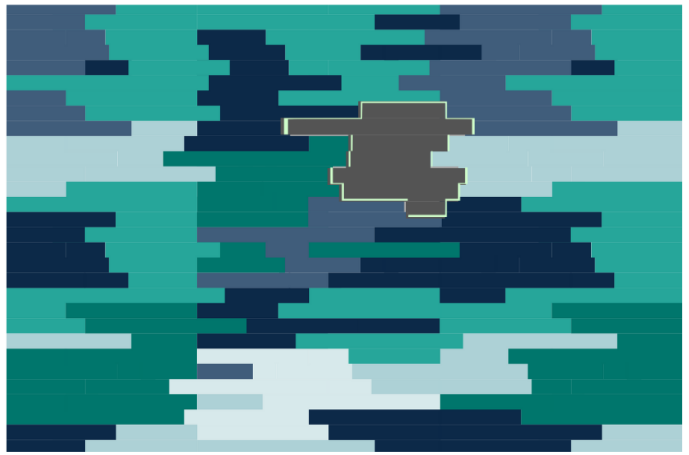
Key architectural design choices define best use for any blockchain



Caution: a “public” blockchain doesn’t lack for data confidentiality

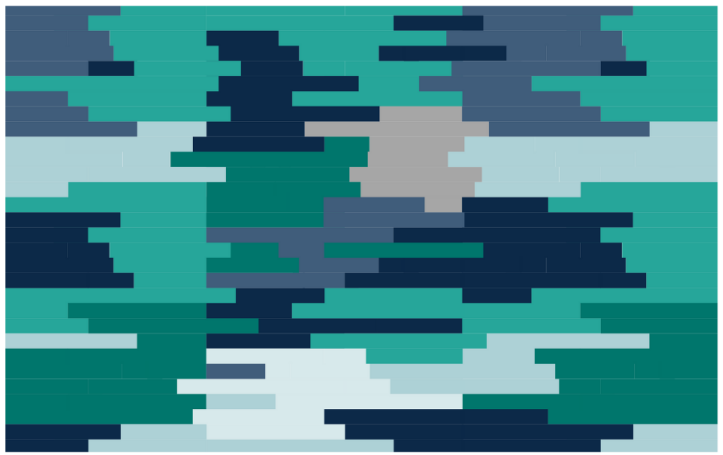
But public is idea where disparate actors want to transact in transparent, trustless manner

Record added to blockchain...



- When a record is added to blockchain, the impression or shape is added...not the data
- The resulting shape is public...not the data

...exists confidentially...



- On a public blockchain, anyone can see the entry exists, but cannot access the details

...& can be publicly verified w/o sacrificing confidentiality

- Info verified by comparing shape (where data is known) to one on the blockchain
- An exact match verifies info is identical

Based on a cryptographic proof protocol, which offers a way for a “prover” to convince a “verifier” that a statement about a secret is true without revealing the secret publicly

Six key characteristics define ideal blockchain for ESG claims

		Description	Relevance for ESG
Key to all blockchains	**Secure**	• How robust is it against attacks? • What would be required to manipulate or corrupt it • Do smart contracts have any major vulnerabilities?	Security a “must have” part of value proposition
Key to all blockchains	**Flexible**	• Can it run complex business logic, such as smart assets, chain programs and conditional transfers?	Must meet expectations for use cases (similar across all blockchain applications)
Specific for ESG blockchain	**Transparent**	• How accessible is it? • Can new parties join and participate fully or is it centrally controlled?	Access for all contributors to verify claims; ability of parties to join and prove claims or view others’ claims
Specific for ESG blockchain	**Affordable & Traceable**	• Can it verifiably track digital assets in detail at a price commensurate to the value created by doing so?	Ability to track individual asset vs. balance • E.g., 3 quarters, 2 dimes and 1 nickel vs. $1 balance
Specific for ESG blockchain	**Lightweight & Scalable**	• Can the blockchain be run only by powerful computer nodes or can it be run on a smartphone? • How many transactions per second (tps) can it process?	Ability to use on lightweight device critical to proving claims at provenance (e.g., in field, at plant, at mine)
Specific for ESG blockchain	**Energy Efficient**	• What is energy requirement of blockchain?	Ensure it does not counter positive ESG efforts (e.g. energy intensive proof of work consensus mechanisms)

Well-known commercial blockchains suboptimal for ESG claims

	Description	Why not ideal for ESG claims?
ethereum	General-purpose platform • permissionless, public, PoW consensus, account-based ledger, smart contract programing language	High transaction fees impractical for tracing lower value asset classes &/or high transaction volumes, excluding some sectors & limiting end-to-end transparency
HYPERLEDGER	Designed for close consortiums or internal company applications; allows select parties to share private information and applications • permissioned, private, BFT consensus	Private, permissioned nature limits parties who can write to or read from BC, allowing only a select few to write the history or read from it, limiting participation & transparency of claims
celo	Enables cryptocurrency transactions using mobile phone • permissionless, pBFT consensus, Ethereum smart contract capabilities, account-based ledger	Lacks capability to represent diverse range of asset classes, limiting ability to support traceability solutions in different supply chains
Stellar	Facilitates exchange of digital representation of all money forms, ideal for currency trade applications • permissioned, public, account-based ledger, limited smart contract	Permissioned nature limits parties who can write & approve transactions, excluding smaller parties (i.e., farmers) while allowing only a select few to write the blockchain's history
vechain	Traces movement & goods across supply chain using IoT devices • permissioned, public, hybrid system (centralized-decentralized), proof of authority (PoA) consensus	PoA consensus protocol selects "authority" to approve & commit data to blockchain, which favors network centralization & expose the system to biases & conflict of interest

Lack of purpose built blockchain for ESG claims hindering market adoption

Appendix: Consensus mechanisms or protocols explained in more detail

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Topl blockchain designed to perform exceedingly well across all major requirements of a sustainability focused blockchain

Key to all blockchains

Specific for ESG blockchain

Secure	• Rigorously tested PoS consensus and enterprise-grade virtual machine offers leading security to its users by ensuring network protected against single source of failure and misuse by a bad actor
Flexible	• Topl blockchain can run complex business logic, such as smart assets, chain programs and conditional transfers
Transparent	• Permissionless nature provides independent public ledger, not merely an internal database • Widely visible proof increases transparency and trust to claims
Affordable & Traceable	• Higher granularity possibly by connecting real-world asset with digital twin in simplest way possible by tracking assets (e.g. specific product) directly instead of simply recording account balances (e.g. SKU level) as an affordable transaction fee
Lightweight & Scalable	• UTXO model results in blockchains lightweight enough to run on mobile phones by allowing users to verify and store only the data that is relevant to them • Currently ~100 tps with upgrade path to 1000, Topl delivers transaction confirmation in seconds vs minutes
Energy Efficient	• Consumes 1000x less energy by using PoS consensus mechanism rather than earlier protocols such as PoW that rely on energy intensive mining

Building our own blockchain frees us from constraints faced by others

ESG Constraint	Architecture choice	Consequence in ESG	Technology
1 Transparent	Only certain parties can view committed data, rendering transactions unverifiable by anyone outside of the consortium (e.g. private)	For claim to be widely trusted, it needs to be widely verified, which private blockchains do not allow	HYPERLEDGER
	Only authorized parties can write and confirm data to blockchain (i.e., permissioned)	• Consortium owners can act as gatekeepers to what claims can me put on the blockchain • Limiting “free speech” lessens ability of those whose ESG claims are strongest (e.g. at source) to make them	Stellar HYPERLEDGER vechain
2 Affordable & Traceable	Native coin used to both price transactions and reward network. Publicly traded nature of native coin means transaction price increases with appreciation of its token	• Transaction fees can exceed the value of the asset being transacted (i.e., coffee, cocoa) • Limits ability to track all the way to end user	Stellar celo ethereum
3 Energy efficient & Lightweight	Consensus mechanism is a ‘race’ by network nodes to solve mathematical puzzle (e.g. PoW)	• Requires high energy input to maintain, diminishing or offsetting ESG efforts	ethereum

Additional architectural choices allows Topl community (users & partners) to shape the future above & beyond our initial offering

Impact Credits

Topl's Impact Credit will change the way sustainability is supported / monetized by converting verified sustainable practices into additional revenue streams for those creating the impact

Impact Credits: tokens to align created impact to any of 17 UN SDGs or ESG claims, traced by Topl
- Once earned, can be sold to governments, private sector or individuals pursuing verifiable results in focus area
- Exchange and use can create more visibility and transparency into broader ESG reporting

Access to credit

Digital production history can be leveraged to build credit worthiness, unlocking barriers to access financing and insurance for underserved and rural communities worldwide
- E.g. by recording their production, farmers can leverage their digital production history to build credit worthiness via the ability to prove verifiable history of sustained income generation

Topl's Blockchain-as-a-Service allows companies enhanced ESG claim verification capabilities across our full-stack offering

Two product offerings

BaaS

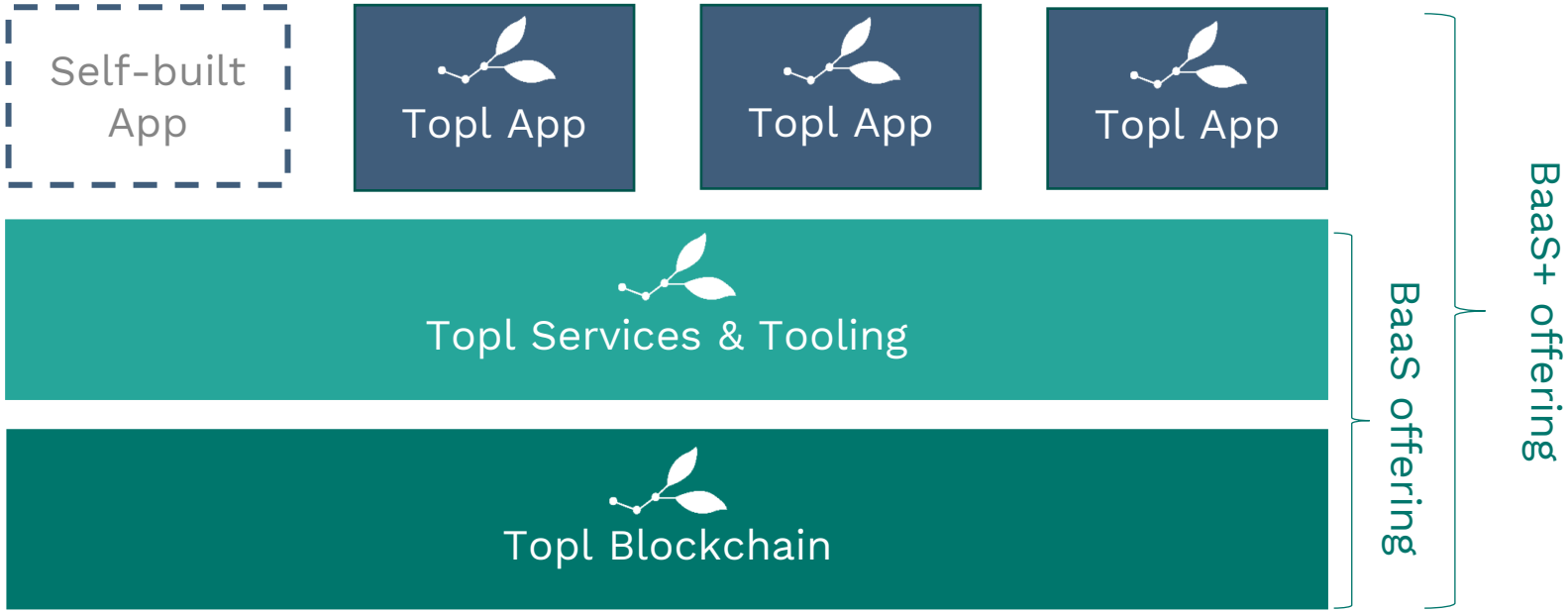
Seamless connection to Topl Blockchain through suite of hosted tools and services

- Perfect for those with existing digital traceability platforms or tracking devices

BaaS+

Custom built, all-inclusive, user-friendly integration provides complete solution towards achieving digital traceability goals

- Perfect for those requiring end-to-end software development support or custom-made blockchain solutions



Blockchain

BaaS and BaaS+ allow access to connect and store proof of data on the Topl Blockchain

Services & Tooling

BaaS and BaaS+ include tools to make its use as simple as any API accessible service

Application

BaaS+ offers exclusive access to Topl app development and architecture.

BaaS: tiered pricing to meet specific customer needs

Startup

From

$0/month

Small scale initiatives and startups with potential for growth

- Free access to testing network
- Single-user access control
- Community support
- 20,000 daily API call limit
- Pre-purchase Transactions

Professional

From

$50/month

Mid-market challengers and clients with existing platforms

- Free access to testing network
- Multi-user access control
- Direct customer support
- 100,000 daily API call limit
- Pre-purchase Transactions

Enterprise

From

$500/month

Market leaders and enterprise clients with existing platforms

- Free access to testing network
- Advanced multi-user access
- 24-hour response time on direct customer support
- 1,000,000 daily API call limit
- Pre-purchase and 15% discount on Transactions

Transactions

- After subscribing to Topl's Blockchain-as-a-Service, **transactions** are needed to use the blockchain
- Each time an asset is created, transferred, or updated, a $0.15 fee is applied
- Like cloud storage credits, you can pre-pay fees through the purchase of bundled transactions

Strong commercial traction across several key use cases

FDA Regulated

Track food/healthcare products from source

OHC OSANG HEALTHCARE

Media Sourcery

BaaS Offering

- Offers workflow automation and authorization services
- Cold chain product traces temperature-controlled assets like COVID-19 test kits and vaccines for Osang Healthcare

Media Sourcery cold chain platform enabled by Topl Blockchain to provide transparency, traceability, & assurance of vital HC supplies

Energy

Enable measurement of carbon abatement

eog resources

BaaS Offering

- American energy company engaged in hydrocarbon exploration
- Focus on low costs, high returns, and lowest emissions possible to transform long-term future of energy

Uses Topl blockchain to track water used in fracking to verify its origin from sustainable source

Logistics

Support data & asset management

TrackX

BaaS+ Offering

- SaaS-based enterprise asset management and supply chain solution provider
- TrackX's Global Asset Management for Enterprises (GAME) platform enables the Industrial Internet of Things (IIoT)

Integrates Topl blockchain with core GAME platform so customers can confidently and securely share verified event data to lower costs and increase transparency

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Working with Topl BaaS: journey from today to transparency

1-2 weeks

Register

Register on Topl's website & subscribe to tier of preference to implement blockchain powered solution

Phase milestones

- Know how to interact with Topl blockchain
- Access documentation, tutorials and community support
- Interact with test network to design desired use cases

3-6 weeks

Integrate

Use internal development cycles to develop platform or integrate an existing solution

Phase milestones

- Develop or integrate application on top of Topl's blockchain
- Move solution to deployment network
- Access tiered-based support and API calls

1 week

Maintain

Maintain active subscription for continued network access and support

Phase milestones

- Continue to receive blockchain support and network access
- Purchase required Transactions
- Follow subsequent development cycles to add new features to your solution

Ideal for those with in-house development capabilities or traceability solution ready to integrate to Topl

Working with Topl BaaS+: the journey from today to transparency

2 weeks	*3-4 weeks*	*3-6 months*	*1 week*
Scope	**Design**	**Develop**	**Deploy**
Define project goals, timeline and structure	Design project architecture and detailed user stories	Develop & test features on testnet	Deploy solution to live environment
Phase milestones • Define goals, main use cases • Agree on overall project structure and expected milestones • Draft project proposal to begin subsequent phases	**Phase milestones** • Develop user stories • Design solution architecture • Agree on proposed solution and user stories before development	**Phase milestones** • Develop software platform and blockchain integrations • Iterate using testing environment • Agree on project deployment or required finetuning	**Phase milestones** • Deploy solution to main network • Maintain active subscription for continued network access & support • Purchase required Transactions

Ideal for those that require end-to-end development support or custom-made advanced solutions

Next steps

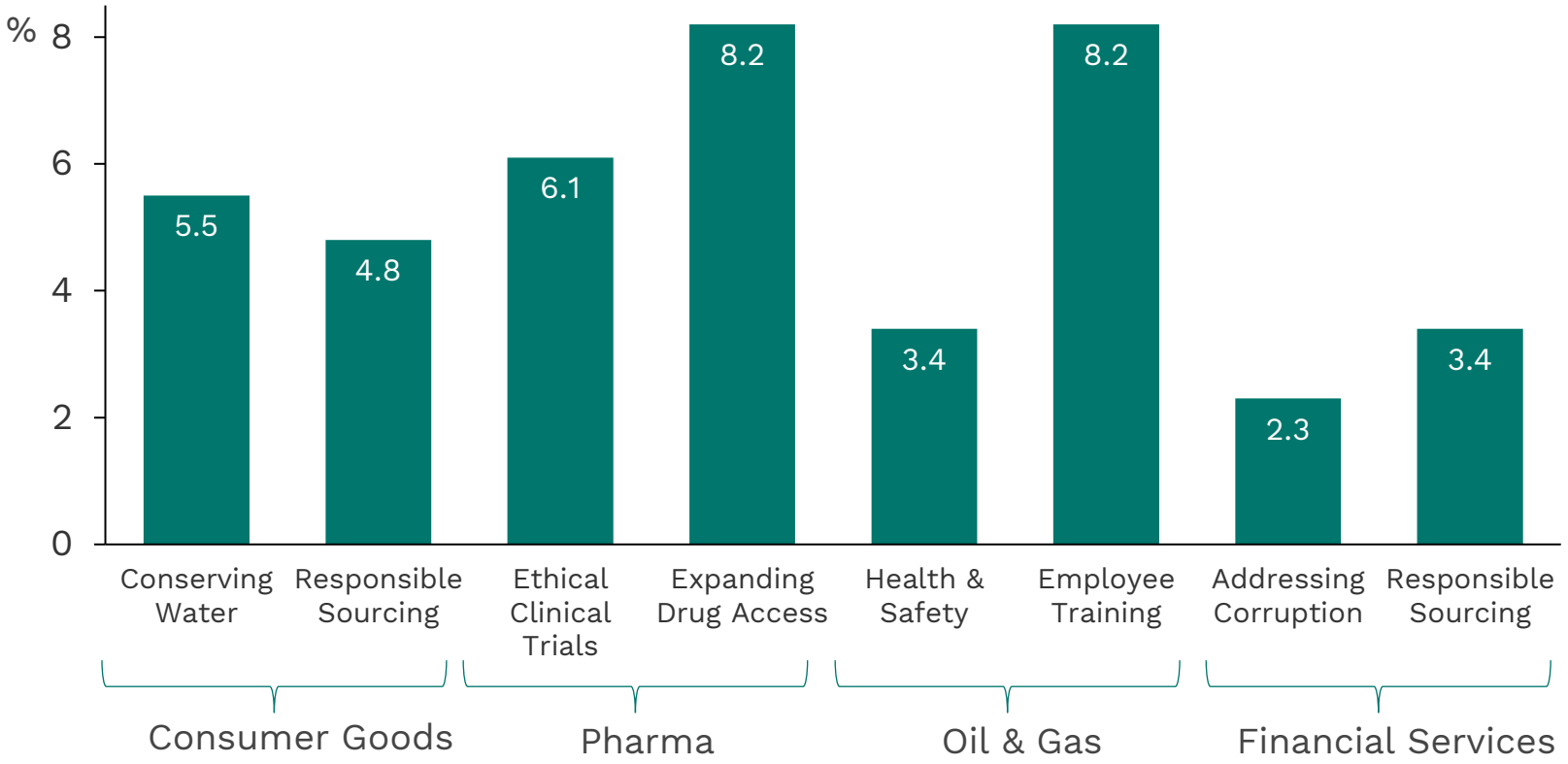
- [x] Incorporate your feedback to clarify any key issues
- [x] Agree on timeline, deliverables and team members to explore further collaboration
- [x] Schedule follow-up meeting / call

Appendix

ESG not just about doing good...it's good for business

Studies confirm strong link between ESG and company performance

Margin Premiums for Strong ESG Performance in Select Industries



ESG Funds outperforming overall market at 1-, 3- and 5-year horizons (2019)

BCG, "Insights on Total Societal Impact from Five Industries"; Beyond Bunny Hugging: ESG, Investor Expectations and Reporting Trends, Foley & Lardner LLP (2020); https://www.morningstar.com/articles/973590/us-esg-funds-outperformed-conventional-funds-in-2019

Companies large and small reaping rewards from ESG focus

Bottom line improvement through revenue growth and cost savings

Revenue Generation & Growth

Unilever	Water saving products outpacing category growth ~20%
Nike	Zero-waste FlyKnit shoe >$1B sales & higher margin profile
patagonia	4x growth in ten years while increasing Certified B Corp. rating >40%
allbirds	Sells shoes made from sustainable materials; recently raised $100M, at >$1.6B valuation
LuDaim	U.S.-based diamond broker using blockchain to certify ethical sourcing, commanding 20% price premium

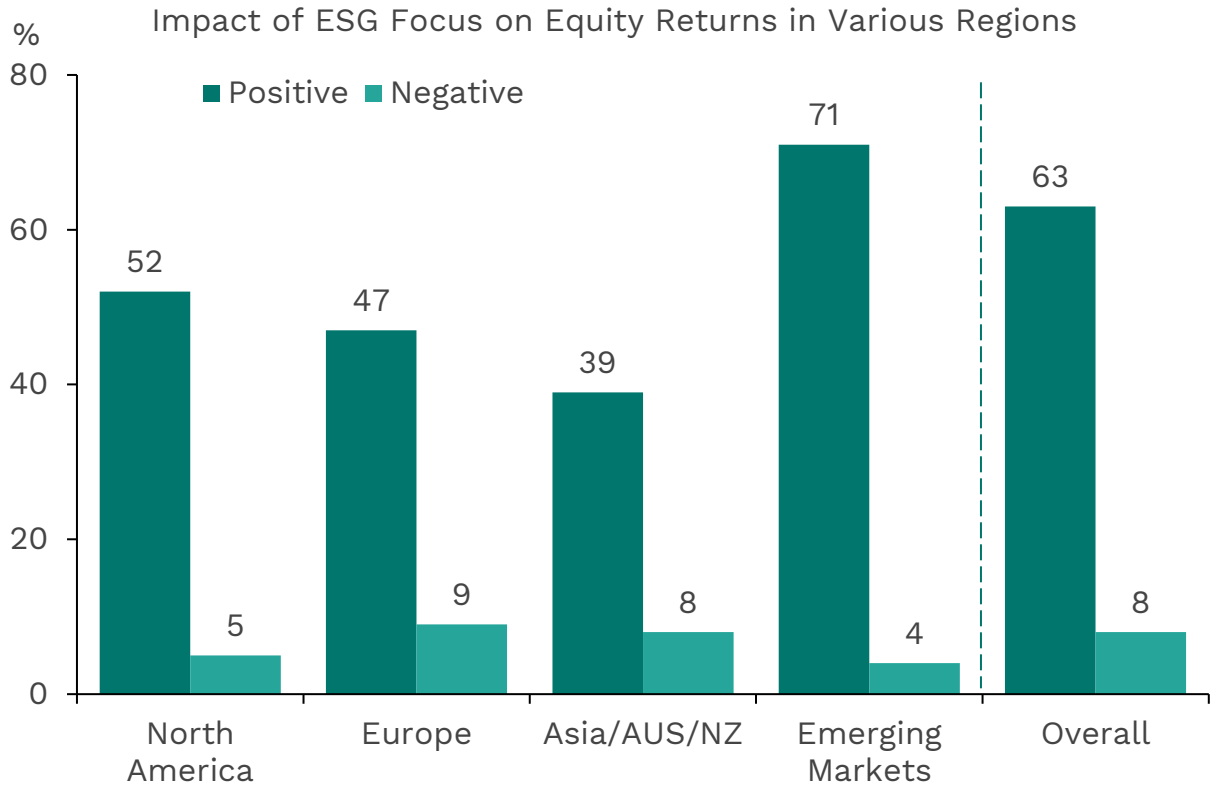
Cost Savings

Walmart	Improved efficiency of truck fleet, reducing CO2 >87K metric tons & fuel cost >$1B over 15 years
DOW	Invested ~$2B in resource efficiency, achieving ~$10B in savings (2004-2016)
HEINEKEN	Reduced water usage per liter of beer from 5.3 to 3.7 liters, saving ~$18M
Fibria	Launched program to support poor farmers & encourage biodiversity, saving $30M (2016)
EVERLANE	Sustainable sourcing lowered materials cost, allowing price cuts that drove 3x sales of cashmere sweaters

McKinsey, "Five ways that ESG creates value"; HBR, "The Comprehensive Business Case for Sustainability"; GreenBiz, "10 questions for Walmart's sustainable fleet leader"

Strong link ESG/financial performance confirmed across numerous meta studies

ESG/financial performance across >2000 studies



Select additional meta-analyses

Oxford University

~90% found improved operational performance
~80% of studies showed better stock price performance

Wharton Business School

High ESG performance highly correlated with lower incidence of material adverse events

Fidelity International

High ESG rated companies outperform lower rated companies in both bull and bear markets

Gunnar Friede et al., "ESG and financial Performance: Aggregated evidence from more than 2000 empirical studies"; Fidelity International, "Why sustainable investing does not mean lower returns"

Topl's Blockchain-as-a-Service helps expand or launch ESG claim verification with user experience powered by "deep tech" offering

BaaS

Seamless connection to Topl Blockchain through suite of hosted tools and services
- Perfect for those with existing digital traceability platforms or tracking devices

Our BaaS product includes:
- Access to a testing network, to test offering without any fees
- API Calls, User Access Control and Customer Support
- Discounts on Bundled Transactions

FAIRFOOD

- SaaS platform, Trace, uses Topl to trace products from farm to fork
- Verstegen Spices and Trabocca Coffee, now offer consumers a full story of their spice and coffee, down to geographic origin and farmer

BaaS+

Custom built, all-inclusive, and user-friendly integration with the Topl Blockchain provides complete solution towards achieving digital traceability goals
- Perfect for those requiring end-to-end software development support or custom-made advanced blockchain solutions

BaaS+ offers everything in BaaS suite, plus:
- Personalized customer service and support
- Joint marketing and promotion for decentralized application
- Project design, development, and launch

LuDaim

- Technology-driven diamond broker uses Topl's custom built Precious Gems and Metals App to securely and efficiently capture product's full ethical and sustainable journey, from mine to marriage

- Easily used by any developer
- Easily integrated into existing platforms
- User friendly experience
- Continuous customer support

Every blockchain uses a different consensus mechanism or protocol to validate transactions

Popular Consensus Mechanisms Used

Proof of Stake (used for Topl blockchain)

- Node randomly chosen on weighted average basis of network ownership to create next block
- Little chance of corrupt behavior as nodes financially incentivized to maintain order

Proof of Work

- Computer (node) solves cryptography equation
- Node broadcasts new block to all nodes for validation
- If >50% agree, block is added to ledger

Byzantine Fault Tolerance

- All nodes vote on each individual block to determine new network state
- Network can be compromised by 1/3 of nodes being faulty or malicious vs. 1/2 (PoW / PoS)

PoS Consensus Mechanism Nuances

Nakamoto Style Consensus (Recover & Liquid)

- Used by Topl, Bitcoin, Cardano
- The blockchain can recover easily, having self healing properties
- No need for locking up stake for fixed amount of time, immediate liquidity available

Non Nakamoto Style Consensus (Reset & Illiquid)

- Used by Cosmos and Ethereum 2.0
- Blockchain must be reset or forked to heal/recover
- Stake must be locked up for a fixed amount of time having harsh penalties if lock up time broken