ACKNOWLEDGMENTS

We are pleased to present the Hedera Hashgraph Transparency Report 2020, the first major empirical research study focused on one of the rapidly growing third generation of distributed ledgers.

Hedera Hashgraph is designed to minimize price volatility and enable fast and low-fee payments with its underlying digital asset, HBAR. Hedera is also a network inherently stable with no forks allowed along with a unique governance model, which provides various service offerings such as file management and storage, and DApp development.

The findings in this report are based on the analysis of new data set collected from Hedera Hashgraph, LLC and 26 decentralized applications. The total number of active projects migrating to Hedera makes it one of the most promising platforms. The study utilized both public and previously non-public empirical data to present new insights on an innovative and rapidly evolving sector of the cryptoassets ecosystem. The research would not have been possible without the support of the dozens of project teams that contributed data and feedback. We are thankful for the trust placed in Mosaic.io by study participants.
● 26 projects analyzed, operating various industries such as Media, Entertainment, Commercial Real Estate, Financial Services, etc

● 50% are live (13 projects)

● 54% don't rely on an underlying token

● On average, teams are composed of 17 members.

● The majority of those teams (57%) are based in the US, while other projects are mainly based in the UK (19%)

The rest of these projects have their main offices (5%, respectively) in one of the following countries: Singapore, Colombia, Russia, and China

● 52% of the founders are not working full-time and usually run other businesses in parallel

● 81% of the founding teams in each project have at least one member with a technical background

● 86% of these projects have had a certain amount of years of direct experience in the related industry
SUMMARY

● 43% of the teams outsource the code

● On average they have raised $7.3 million and combined over $100 million in mainly a seed round or a token sale - in rare occasion through an acquisition. These projects on average have 2 investors listed on their boards.

● The majority of these companies will mainly use the funds (over 45%) to develop technology and grow their teams. Additionally, plans to double down on business development and marketing efforts were also listed as high priorities.

● While all the projects are for-profit companies, 52% are incorporated in the US, followed by the 19% in the UK, while others registered in Bermuda, China, Cayman Islands or Russia represented 5%.

● 43% of these companies are planning to raise more funds and on average about $3.8 million, while combined for a total of $22.9 million.

Large enterprises in various sectors such as supply chain, advertising and security — are either currently building or planning to build on Hedera and for privacy reasons, all of them preferred to remain anonymous.
HEDERA SERVICES

- Consensus Service
- Smart Contract
- Cryptocurrency (HBAR)
- File Service
The Hedera Consensus Service, also known as the Hedera Consensus Service API, matches the order of messages for distributed systems without relying on a centralized clock to provide validity, order of events, and transparency into the history of events without providing a continuous history of previous transactions.

The 6 core features of the Consensus Service API:

1) **Topic management** where topics organize transactions where each application only receives the necessary messages
2) **Consensus order** where messages are given a timestamp by the network through cryptographic proof to ensure trust
3) **Audit logs** through a running hash and a tamper-proof history log
4) **Scalable transactions** through external message processing and storage outside of the Hedera network
5) **Low fees**
6) **Historical data**
**Hedera Services**

**HBAR (ℏ)** is the native cryptocurrency of the Hedera network that powers the Hedera Cryptocurrency API through low latency peer-to-peer transactions that cost a fraction of a cent.

HBAR acts as fuel on the network to power users, developers of DApps, and micro payments in business models while protecting the network from malicious actors.

Hedera uses a Proof of Stake (PoS) consensus mechanism on the public network where HBARs are staked to network nodes and weigh in on transactions in order to reach consensus.

**HBAR and Hedera Network Highlights:**
- 10,000 HBARS per second for transactions not requiring a transaction record, but can receive a transaction receipt.
- Transaction fees of less than $0.0001 USD per HBAR transaction
- Record timing in finality of roughly 2 seconds (As of September 30, 2019)
Smart contracts on Hedera are written in Solidity and are accessed through the Hedera Smart Contract API - Existing Solidity code can be ported over to the network. Smart contracts on Hedera are processed in parallel using realms – a defined portion of the network, isolated to execute smart contracts - which are run in the order they are received enabling fair ordering. As Hedera uses Solidity for smart contracts on the platform, Hedera supports ERC-20 and ERC-721 tokens from Ethereum.

Currently, there is a strong preference towards decentralized applications built on the Hedera network powered by the networks smart contracts aiming to engage in the tokenization of physical and digital assets. Examples of this can be found through ecosystem partners such as REDSWAN, a platform working towards tokenizing real estate assets on Hedera to bring liquidity to an illiquid asset.
File service on Hedera acts as an anchor to external data such as a hash to a document or database to the transparent public ledger. Through file service, credentials are managed and data is verified with adequate timestamps.

The features of the file service API are transparent transactions that allow parties to collaborate and share data, defined ownership of access controls, revoked access, controlled mutability, point off-ledger for documentation created off-ledger for files containing a hash, and globally distributed throughout the entire Hedera network.

Trust to file documentation is created through a 3-part process:
1) Files are added containing a hash of a credential available to the public
2) Keys are assigned to the documentation allowing for any changes or even for the document to be deleted
3) Finally, files go through a revocation check where owners of the trusted files can provide file details to other parties – including proof of documentation and/or any changes made to files
% of hbars released to the market by end of each year until 2025

Network Launch
September 16, 2019

Maximum
Coin Supply:
50,000,000,000
HBAR (ℏ)

% Total Coin Released:

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<tr>
<th>Year</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
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<tr>
<td>%</td>
<td>4%</td>
<td>13%</td>
<td>18%</td>
<td>22%</td>
<td>25%</td>
<td>29%</td>
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</table>

Estimated % of hbars released by first week of open access
Hedera has allocated HBAR coins to its founders and certain employees, advisors, strategic partners, and early developers and users of the network. These coins have a cost basis of zero dollars. Approximately 55.5% of all hbars remain unallocated.
CRYPTOECONOMICS

HBARs serve two purposes: Secure the network against attacks through a coin weighted proof-of-stake consensus mechanism and to act as a fuel to incentivize and pay for computing resources necessary.

**NETWORK “FUEL”**

- Coins are used to pay for network services
- Coins are used to reward nodes for providing services to the network
- Coins enable micropayments

**NETWORK PROTECTION**

- Any distributed ledger can be attacked if a malicious actor controls >1/3 of voting power (50 billions HBAR)
- Hedera’s proof-of-stake system uses coins to weight the votes. Consensus on a transaction is reached once the transaction is validated by nodes representing more than two-thirds of the total supply of coins.
Purpose of Nodes on Hashgraph:

1) To maintain a shared ledger of the balances in each network user's account.

2) Verify and execute new transactions while placing transactions in chronological order so user account balances are updated in real-time.

Nodes are repaid in HBARs from the treasury every 24 hours, along with users engaging in proxy-staking as payment. Proxy-Staking enables owners of HBARs to participate in consensus without actually running a node and split the payment 50-50 with the node owner.
Transaction Fees:

Economics of an HBAR transaction on Hedera:

Transaction fees: paid by end users (single users or third-party applications) in a transaction account. Fees range in size dependent on the action, degree, and duration of network resources needed.

Each transaction fee is a combination of 3 distinct fees - a node, network, and a service fee. Additionally, ecosystem developers hosting applications on the network may charge users an application fee in addition to the 3 distinct fees.
Hedera Hashgraph, LLC

Milestones Since Inception

Phase I
(2017-2018)
- Fundraising: Accredited investors and crowdsale via SAFT
- Governing Council Member Recruitment
- Token Generation Event: 50 Billion Hedera Tokens

Phase II
(2018-2019)
- Legal Agreement Kick-off with Governing Member Teams
- Hedera APIs (Cryptocurrency, Smart Contract and File Storage) - Delivered to Developers
- Hedera Hackathon & Conference: Learn how to build DApps
- Release of the Mobile Wallet on iOS and Android
- Hedera Mainnet Early Access

Phase III
(2019-2020)
- Token Program for Community Testing
- Hedera Annual Assembly 2019
- Announcement of Initial Governing Council Members
- Governing Council Nodes
- Open Access
- Third Party Integration
Hedera Hashgraph, LLC

Milestones Since Inception

Phase IV (2019-2020)
- Demo App Scaffolding (OPEN SOURCE)
- Developer Tools
- Demo Applications
- Third Party Integrations (Wallets and Tools)

Phase V (2020)
- Improved Testnet Onboarding
- Hedera Consensus Service
- Hardware Wallet Integrations
- State Proof On Entities
- Mirror Node Beta
- Open Review And Open Source
Hedera Hashgraph, LLC

Financing History

The company has raised a total of $124 million from 894 investors - 850 of which are high-net worth individual investors and to a lesser extent, institutional investors (~44) such as BlockTower Capital, Digital Currency Group, and Multicoin Capital, etc.

- **March 13th, 2018**
  - $18 million raised through a private sale

- **August 1st, 2018**
  - $100 million raised through a single round of funding using a simple agreement for future tokens (SAFT) framework

- **August 15th, 2018**
  - The company conducted an accredited investor crowdsale from August 1st to August 15th, 2018, raising the remaining $6 million.
Hedera Hashgraph, LLC

Breakdown of Investors

<table>
<thead>
<tr>
<th>Retail Accredited Investors</th>
<th>850</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutional Investors</td>
<td>44</td>
</tr>
</tbody>
</table>

Institutional Investors

- Blockchange Ventures
- Struck Capital
- BlockTower Capital
- Fenbushi Digital
- Eterna Capital
- Mind Fund Group
- Digital Currency Group
- CMCC Global
- Danhua Capital
- DNA.Fund
- Multicoin Capital

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Hedera Hashgraph, LLC

Company’s Chart

Hedera has hired a total of 65 employees as of March 2020 - most of them are based out of Texas, USA.

CEO
Mance Harmon

Chief Scientist
Dr. Leemon Baird

CMO
Christian Hasker

CPO
Lionel Chocron
Hedera Hashgraph, LLC

Business Model Canvas

.Value Proposition:
Hedera is a public ledger built on the hashgraph consensus algorithm. Each node independently builds the picture of the hashgraph (gossip about gossip), and able to calculate what all nodes would vote, if they were to cast their vote over the network.

.Key Strengths of the Platform:
Hedera Consensus Service, Speed, Fairness, Security, Native Multi-Sig, Controlled Mutability, large ecosystem of developers

.User Adoption:
Developers looking to build decentralized applications on the Hedera public network.

Products and services provided on the Hedera Network: Cryptocurrency (HBAR) as a network resource, Smart Contracts, and File and Consensus services.
Business Model Canvas

**Key Activities:**
The Council will engage in the business of creating and maintaining the Hedera Network and various activities related to that business. The Council may also engage in any and all other lawful business, purpose or activity related thereto in which a limited liability company may be engaged under Applicable Law (including, without limitation, the Act).

**Direction of Codebase**
Members of the Hedera Governing Council share an equal vote in the direction of software for thousands of public nodes, and the Hedera platform’s codebase.

**Initial Network Nodes**
At scale, we anticipate thousands of public nodes joining to support the network’s decentralized consensus and growth. Council members will set up and maintain the initial set of nodes on the Hedera public network, after testing has completed.

**Critical Decisions**
The most critical decisions for the Hedera platform and public network require unanimous council support. Decisions made by the council include, but are not limited to:
- Direction of platform and public network node codebase features and functions
- Treasury management to ensure overall network safety
- Controlled mutability to address legal and data compliance
- Legal network requirements to serve global markets

**Key Partners:**
- Boeing
- Deutsch Telekom
- DLA Piper
- FIS
- Google
- IBM
- Magazine Luiza
- Nomura
- Swirlds
- Swisscom Blockchain
- Tata Communications
- Wipro
Business Model Canvas

Partners of Hedera sitting on the governance council help contribute the technical resources required to run the network and in return, are positioned to help provide governance decisions on the direction of the technical roadmap of the platform. It is important to note that they are owners and governors of Hedera such as Boeing, Deutsch Telekom, and DLA Piper.
Business Model Canvas

Key Customer Segmentation:

Entrepreneurs, most specifically, developers looking to build decentralized applications on the Hedera public network.

Or enterprises looking to add decentralized trust to existing applications, including consortia that have built networks using Hyperledger Fabric and Corda.

Relationships:

Relationships of developers are maintained through Developer Advocates in Discord and through council members such as Google, Wipro and IBM.

A word from the Hedera team: “We have a very active developer community in Discord with 7,500+ developers in total and 350+ online at any one time. We also have our Developer Advocates that provides ongoing support, answering technical questions and advising developers / companies as appropriate.”
Governed by Rules:
As of May 2020, Hedera has 13 governing council members, composed of highly diversified leading organizations and enterprises - including London’s leading multidisciplinary university, UCL, as the most recent member. Each member is given one vote on all submitted issues such as the direction of the Hedera platform’s codebase. The Hedera Governing Council will consist of up to 39 members. The initial thirty-eight (38) governing members are determined and appointed by the Original Member, Swirlds, the creator of the hashgraph algorithm.

Terms:
Members will serve for terms of not less than three years. Each of them has up to two consecutive terms, except for Swirlds, which benefits from a permanent seat.

Monetary Contributions:
Except as otherwise required by law or pursuant to Sections 3.2 and 3.3

- No Member shall be permitted or required to make any additional Capital Contributions to the Council.

- Each Member shall purchase its interest for an initial capital contribution of US$100.00 (the “Initial Capital Contribution”)

- The Board, subject to the approval of at least eighty percent (80%) of the Members, may also require the Members to make Capital Contributions to the Council on a pro rata basis in accordance with their respective interests as and when necessary to satisfy extraordinary expenses or other similar liabilities of the Council.
projects identified, testing Hedera Hashgraph before open access, 13 of which are live.

It is important to note that Hedera does not track DApps on the network closely, therefore, as of writing the number of projects is undoubtedly greater than 26.
Ecosystem

- Music
  - hearo.fm
- Legal Services
  - rightory
- Supply Chain
  - ARMADA
  - OTRAFY
- Internet
  - Chainlink
- Commercial Real Estate
  - REDSWAN
- Consumer Services
  - ATTTESTIV
- Online Media
  - DIAMOND STANDARD
- Capital Markets
  - EARTHJD
- Marketing and Advertising
  - AdsDaX
- Computer Games
  - ALTO
- Management Consulting
  - BOXRED
- Computer Software
  - HASHING SYSTEMS
- Utilities
  - power transition
- Financial Services
  - CARBON
  - COINSQUAD
- Pharmaceuticals
  - acer
- Consumer Rewards
  - lumeos

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Ecosystem

13 projects (50%) have implemented a cryptographic token

The majority of these projects with an inherent cryptoasset, migrated from Ethereum, followed by EOS and to a lesser extent Stellar, TRON or Quantum.

1.2 M
On average, 1.2 million transactions are recorded per day

52% of the founders are not working full time and usually run over businesses in parallel

12 of these projects have their team based in the US

17 On average, teams are composed of 17 members.
Ecosystem

Average amount of raised per project mostly via seed funding: $7.3 million

Total amount raised: $100 + million

9 of these companies are planning to raise more funds and on average about $3.8 million, while combined for a total of $22.9 million.

81% of the founding teams in each project have at least one member with a technical background. However, 43% of the teams outsource the code.
Ecosystem

Total Funds Raised

- RED SWAN: $1M
- DIAMOND STANDARD: $25M
- Lumeos: $100K
- AdsDaX: $350K
- ALONG: $1.2M
- CARBON: $2M
- ALTO: $38.7M
- hearo.fm: $612K
- ZEUX: $750K
- HASHING SYSTEMS: $100K

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Ecosystem

Pros and Cons of building on Hedera according to the surveyed projects

Pros:
1) Security
2) Speed of transactions,
3) Scalability,
4) Enterprise-grade platform,
5) Stability of the ecosystem,
6) Price stability,
7) Clear communication and friendly community
8) Regulatory-compliant platform
9) Ease of adoption with integrations that make it possible to add HCS with no code change to an application

Cons:
1) Nascent development platform,
2) Developer tools on Hedera are not as developed as other alternatives as in the Ethereum Ecosystem.
## Competition

<table>
<thead>
<tr>
<th></th>
<th>Bitcoin</th>
<th>Ethereum</th>
<th>NEM</th>
<th>IOTA</th>
<th>EOS</th>
<th>Hedera Hashgraph</th>
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<tbody>
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<td><strong>LAUNCH DATE</strong></td>
<td>January 2009</td>
<td>July 2015</td>
<td>March 2015</td>
<td>June 2017</td>
<td>January 2018</td>
<td>August 2018</td>
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<tr>
<td><strong>VALUE PROPOSITION</strong></td>
<td>Peer-to-peer electronic cash</td>
<td>A global decentralized platform for money and applications with smart contract functionality</td>
<td>Peer-to-peer cryptocurrency</td>
<td>Permissionless distributed ledger for a new economy</td>
<td>Blockchain platform for the development of decentralized applications</td>
<td>Public distributed ledger</td>
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<tr>
<td><strong>Maximum Coin Supply</strong></td>
<td>₿ 21,000,000</td>
<td>Undefined</td>
<td>XEM 8,999,999,999</td>
<td>MIOTA 2,779,530,283</td>
<td>EOS 1,031,457,117</td>
<td>HBAR 50,000,000,000</td>
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<td><strong>Sybil-Control Algorithm</strong></td>
<td>Proof of Work</td>
<td>Proof of Work</td>
<td>Proof of Importance</td>
<td>Directed Acyclic Graph (Tangle)</td>
<td>Delegated Proof of Stake</td>
<td>Proof of Stake</td>
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<tr>
<td>Miners compete against each other to complete transactions on the network and get rewarded.</td>
<td>Miners compete against each other to complete transactions on the network and get rewarded.</td>
<td>Considers account stakes in the network and rewards active supporters based on their activity.</td>
<td>All new transactions approve two previous transactions.</td>
<td>A consensus algorithm maintaining irrefutable agreement on the truth across the network, validating transactions and acting as a form of digital democracy.</td>
<td>Proxy staking where stakeholders can influence consensus by proxying their stake to a node through Hedera's proxy weighting model</td>
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# Competition

<table>
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<th>Bitcoin</th>
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# Competition

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<th>Multi-party Consensus</th>
<th>Independent Validation</th>
<th>Tamper Evidence</th>
<th>Tamper Resistance</th>
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Source: Cambridge Judge Business School
Three types of cryptoasset references:

**Fully endogenous**
A fully endogenous cryptoasset in a DLT system exclusively enables to pay network fees, generate additional digital assets and align incentives and interests among the network’s actors.

**Hybrid**
A hybrid cryptoasset in a DLT system is exclusively contained within the distributed ledger for functioning purposes, but the digital asset can also serve as a gateway to external systems for various use cases and purposes. 

*HBARs also represent an interest in the company, Hedera Hashgraph, LLC*

**Fully exogenous**
A fully exogenous digital asset is non-tradeable token in a system used for bookkeeping purposes such as tracking events, objects, facts etc.
## Competition

<table>
<thead>
<tr>
<th>GOVERNANCE</th>
<th>Anarchic</th>
<th>Hierarchical</th>
<th>Dictatorship</th>
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</table>
Competition

CODE BASE

Existing Framework

New/From Scratch

OPENNESS

Closed-source

Open-source

Swirlds owns the patents to the hashgraph technology and licenses the hashgraph technology to Hedera for the purposes of running a general-purpose public ledger.
## Competition

<table>
<thead>
<tr>
<th>Transaction Finality</th>
<th>Bitcoin</th>
<th>Ethereum</th>
<th>NEM</th>
<th>IOTA</th>
<th>EOS</th>
<th>Hedera Hashgraph</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Provisional</strong></td>
<td>Probabilistic</td>
<td>Probabilistic</td>
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<tr>
<td></td>
<td>In theory always; practically, a time window determined by network conditions</td>
<td>Probabilistic</td>
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<td>Probabilistic</td>
<td>Probabilistic</td>
<td>Probabilistic</td>
</tr>
<tr>
<td><strong>Explicit</strong></td>
<td>Short time window determined by protocol</td>
<td>Explicit</td>
<td>Explicit</td>
<td>Explicit</td>
<td>Explicit</td>
<td>Explicit</td>
</tr>
<tr>
<td><strong>Finalised</strong></td>
<td>Probabilistic: In theory never; practically, after a certain block depth</td>
<td>Transactions are immediately final once on-chain; however, users must wait for 20-25 confirmations</td>
<td>Finality is achieved in 180 seconds after a transaction is included in a block with nominal working conditions for 21 block producers</td>
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<tr>
<td></td>
<td>Transactions 6 blocks deep, 1 hour in time, to ensure a low likelihood in reverted transactions</td>
<td>Light latency through the network - average transaction times between 1-3 seconds</td>
<td>The hashgraph consensus algorithm reaches transaction finality in seconds on the back of fair order and high-throughput</td>
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Source: Cambridge Judge Business School

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# Competition

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<tr>
<th>Adversarial Events</th>
<th>Bitcoin</th>
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<th>Hedera Hashgraph</th>
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</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>51% Attack</td>
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<td>Bribery</td>
<td>Curl-P-27</td>
<td>Sybil Attack</td>
<td>Bribery</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>A bad actor controlling a majority of network hash rate to revise transaction history</td>
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<td>Fake stake attacks when an attacker uses none or very little stake to crash an affected node.</td>
<td>Short colliding messages - in a chosen-message can forge signatures and multi-signatures of valid spending transactions</td>
<td>Bad actors strong arming network contributors out of being able to process transactions by creating fake identities, and using them to initiate spam and DDoS attacks</td>
<td>Owns 1/3 of the total coin supply</td>
</tr>
<tr>
<td><strong>1-hour Attack Cost ($USD)</strong></td>
<td>$714,500</td>
<td>$90,026</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td><strong>September 2019</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</table>
Should you need any further information, please email

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