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The Data Economics Company (DECO)
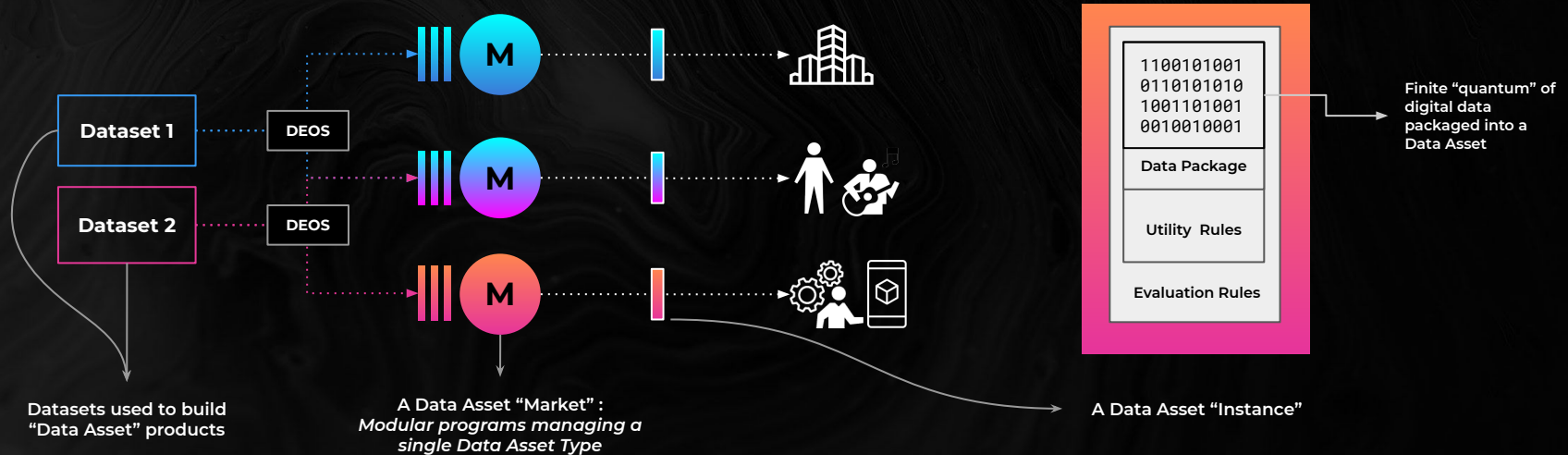
Executive Summary - H1 2021

What has become **The Data Economics Company** *began in 2018 as a collaborative research alliance called Lydion Research. This collective brought together economists, mathematicians, computer scientists, philosophers, and artists to explore how digital data could be used as building blocks for new types of economic interactions.*

In particular, we wanted to explore economic interactions where data that was generated and sourced by the economy's participants acted as the markers expressing, communicating, and transacting both utility and value within the interactions.

In other words, we were exploring economies that allowed participants to transact using products built out of digital data that they were able to generate by completing work in the real world.

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Data Economics is an emerging scientific discipline that treats digital data as raw materials for manufacturing, or minting, products that have *their own utility and value*

These digital data—based products, or **Data Assets,** are created by a software platform called a **Data Economic Operating System (or DEOS)**

Datasets used to build "Data Asset" products

A Data Asset "Market" :
Modular programs managing a single Data Asset Type

Finite "quantum" of digital data packaged into a Data Asset

A Data Asset "Instance"

3 Types of Data Assets with different utility, value and target markets "minted" from the same underlying datasets using a "Data Economic Operating System" (DEOS)

Over the three years spanning 2018 - 2020, the Lydion Research Alliance has developed:

Fundamental Data Economic Theory

Rigorous analysis and explanation of fundamental concepts using established economic and computer science principles

Development of foundational mathematical framework, ripe for further research, formalization, and publication

Applications identified in varied use cases across sectors and presentations at industry and academic conferences

Lydion Data Economic Operating System (DEOS)

Technology suite to implement fundamental Data Economic concepts and apply them to real-world challenges and opportunities
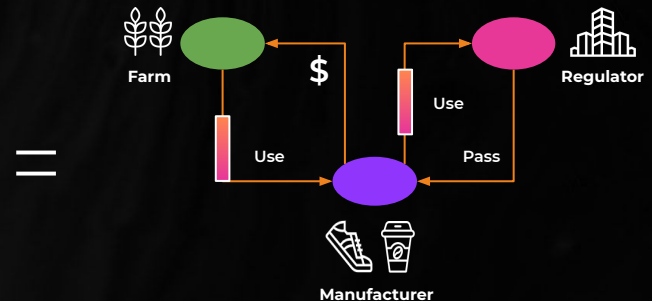
The "Lydion Solutions Toolkit" composed of the Lydion DEOS and related software & services to enable implementation of Data Economics Solutions

Lydion Data Economic Solutions

Software platforms to address high-impact opportunities and challenges in several sectors, built using Data Economic Theory and Lydion DEOS

Each "Solution" is being developed for and alongside one or more major industry/academic partners, targeting large existing and potential markets

Development and implementations with existing partners / customers have created a pipeline for 5+ years (2021 – 2026 and beyond)

Dataset 1

Dataset 2

Lydion Data Economic Operating System
(DEOS)

Lydion DEOS Core

Lydion Data Economic Modules

Lydion Studio Development Platform

```
1100101001
0110101010
1001101001
```

Data Package

Utility Rules

Evaluation Rules

A Data Asset
"Instance"
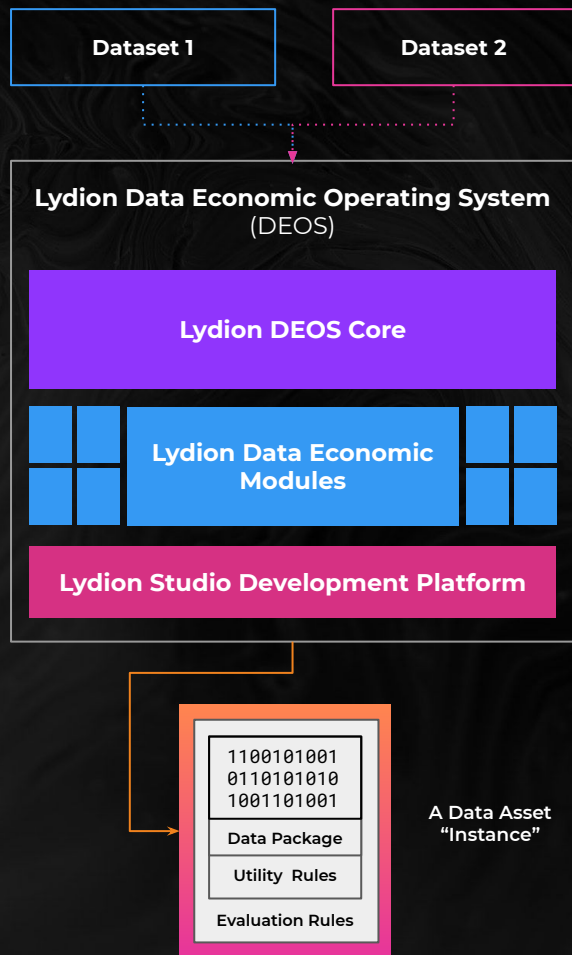
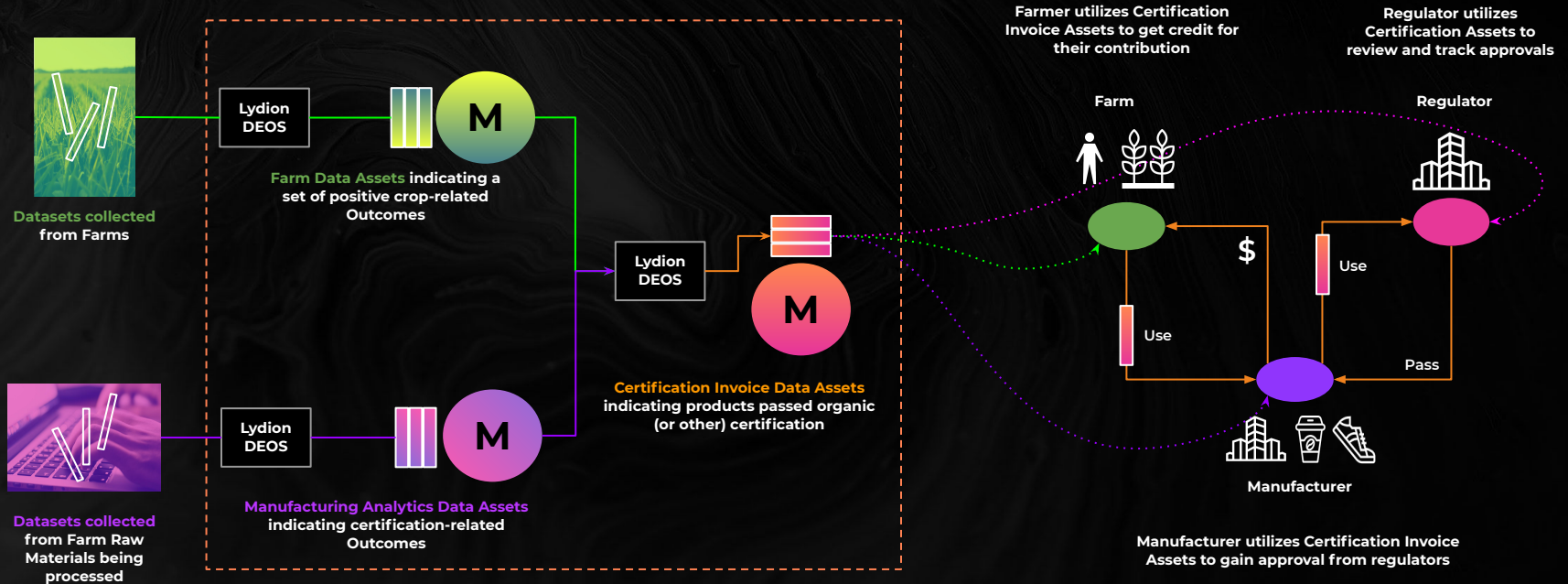**The Lydion DEOS (Data Economic Operating System)**

1) **Manufactures Data Asset products from** *any combination* **of datasets and data streams** generated and owned by Participants - people and organizations - in the economy,

and

2) **Enables Participants to utilize these Data Asset products** to a) pay for things, b) get paid, and c) access other Data Assets of interest and value

The process of turning a digital data package (or quantum) into a utilizable Data Asset is called **"Assetization"**

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The Lydion DEOS is used to build Data Economic Solutions distributed (decentralized) software platforms that can generate and track shared answers from disconnected datasets, with proof, and without relying on a central authority

In many cases, the source datasets are private and cannot be shared with other Participants in the **Data Economic Network**

Datasets collected **from Farms**

Lydion DEOS

Farm Data Assets indicating a set of positive crop-related Outcomes

Datasets collected **from Farm Raw Materials being processed**

Lydion DEOS

Manufacturing Analytics Data Assets indicating certification-related Outcomes

Lydion DEOS

Certification Invoice Data Assets indicating products passed organic (or other) certification

Farmer utilizes Certification Invoice Assets to get credit for their contribution

Regulator utilizes Certification Assets to review and track approvals

Farm

Regulator

Use

Use

$

Pass

Manufacturer

Manufacturer utilizes Certification Invoice Assets to gain approval from regulators

Example of a Lydion DEOS—powered *Lydion Data Economic Solution* enabling a distributed (decentralized) self-certification process for crops and manufactured goods

A *Lydion Data Economic Network (DENET)* is the physical representation of the Data Economy and its Participants

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Each Lydion Data Economic Solution is a standalone software platform built on Lydion DEOS being developed with (or for) one or more industry and academic partners, addressing a total market of $350B+
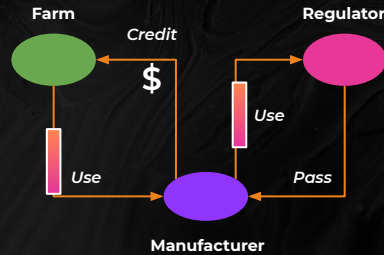

Agricultural Self-Certification & Smallholder Farmer Solution Platforms

Crop traceability and transparency enabling self-certification for organic and regenerative farming practices and data-backed incentives and services for smallholder farmers
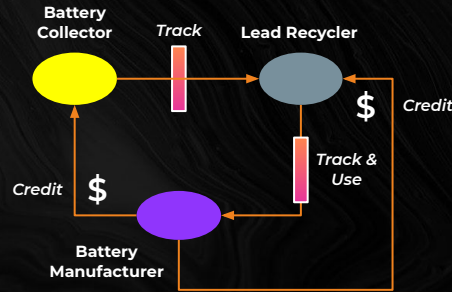
Industrial Material Traceability Solution Platform

End-to-end traceability and compliance for any primary industrial material's value chain, starting with lead and other metals
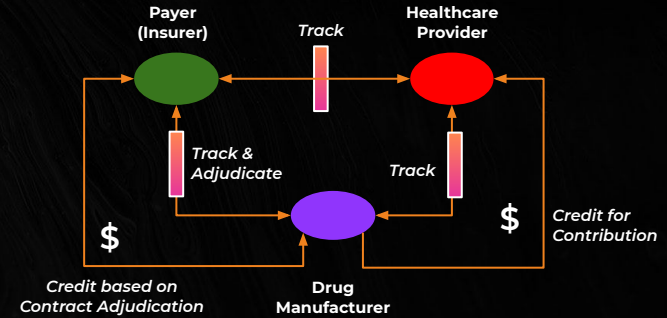
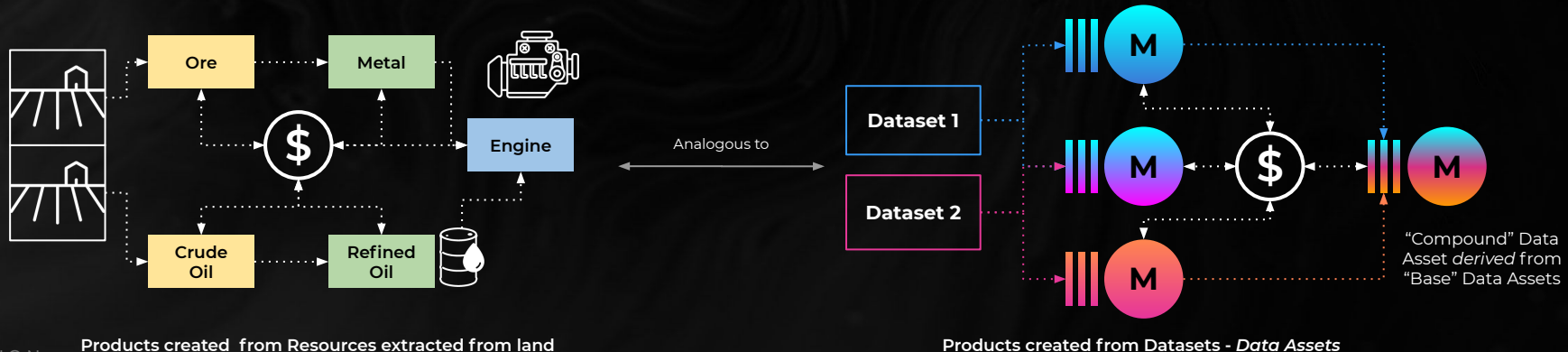**Health Outcomes and Contracting Solution Platform**

Frameworks for translating clinical & non-clinical outcomes into value, including tools for efficiently building and adjudicating fully decentralized outcomes-based contracts

Examples of Lydion Data Economic Solution Platforms Currently in Development

Traditional methods of utilizing datasets and streams by selling or licensing are analogous to parcels of land being sold or rented out

sell

rent

Land Owned by an Entity

Analogous to

Dataset 1

sell

Dataset 2

license

Datasets owned by an Entity

Data Economic methods of utilizing datasets and streams are analogous to each parcel of land being used to extract resources they contain to build products that have their own uses, or utilities

Ore

Metal

Engine

Crude Oil

Refined Oil

Analogous to

Dataset 1

Dataset 2

M

M

M

M

"Compound" Data Asset *derived* from "Base" Data Assets

Products created from Resources extracted from land

**Products created from Datasets -** *Data Assets*

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Assetizing a data package by turning it into a Lydion Data Asset using the Lydion DEOS enables a set of standard features leading to powerful functionality

Generation Context

```
1100101001
0110010010
1001101001
0010010001
```

Utility Context

```
0110100110
1001010001
1100100100
```

Context (Creation) Rules

Utility Rules

Evaluation Rules

1. **Define rules for generating the Data Asset and for interpreting its meaning (or "Context")**

2. **Define rules for exactly how the Data Asset can be used (or utilized)** - why, by whom, and under what conditions

3. **Define rules for measuring the "value" of the Data Asset**

4. **Define rules for credit received for each utilization of the Data Asset**

5. **Track, audit, and recall each access and utilization of the Data Asset**

6. **Track, audit, and enforce rules independently**, without relying on a central authority

7. **Original datasets or streams not modified nor leave their location of generation or storage**

Data Assets

Company B Node

Company A Node

Company C Node

Data Economic Network within which the Data Asset is generated and circulates

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A *Lydion Data Asset*, created by the Lydion DEOS, enables a combination of 3 powerful scenarios for its manufacturer (or owner) based on rules embedded in its *Data Asset Market* via the Lydion API
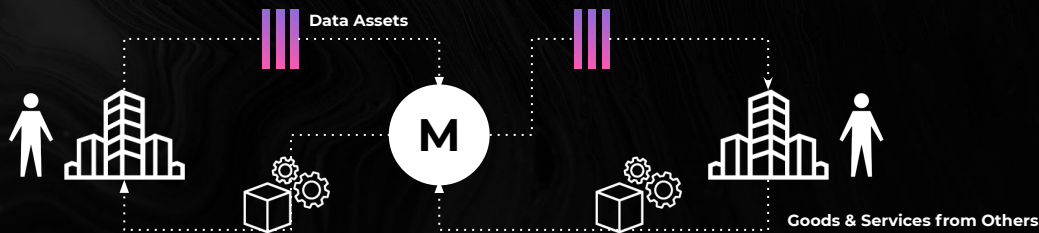
Scenario 1

Get paid money by Others (people and companies) for units of digital data packaged up as *data-based utilizable products - Data Assets*
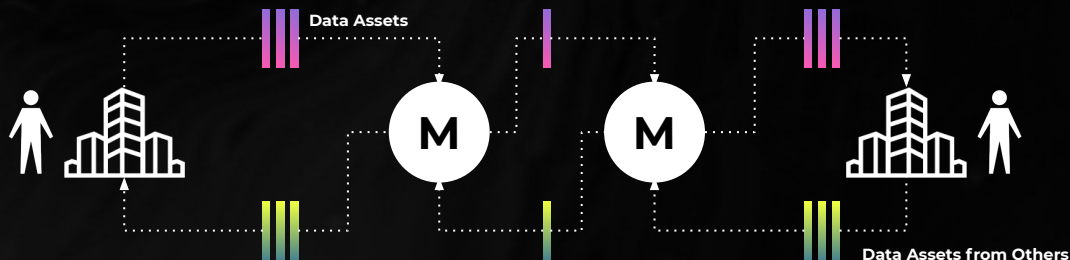
Data Assets

Data Asset Market

Data Owner / Asset Manufacturer

Other People / Companies
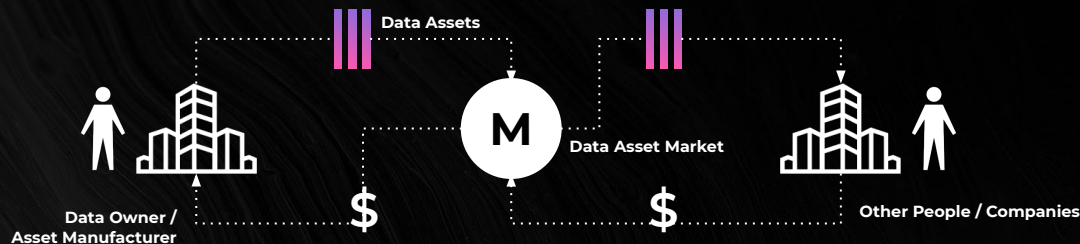
Scenario 2

Pay Others for Goods and Services provided with units of digital data packaged up as Data Assets

Data Assets

Goods & Services from Others

Scenario 3

Pay Others for their Data Assets using units of digital data packaged up as Data Assets
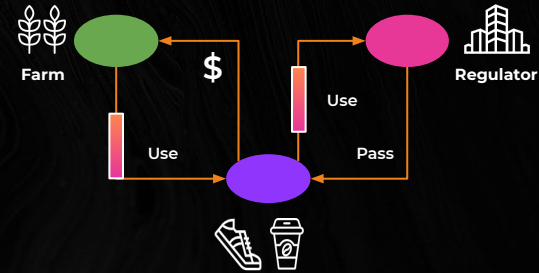
Data Assets

Data Assets from Others

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A *Lydion Data Economic Solution* enables companies and individuals to address complex problems related to using, sharing, tracking digital data using different types of *Lydion Data Assets* transacted over *Data Economic Networks* (DENETs) — without relying on any central authority

1. **Creating multiple products and associated revenue streams from the same digital data**, without losing control of the underlying datasets
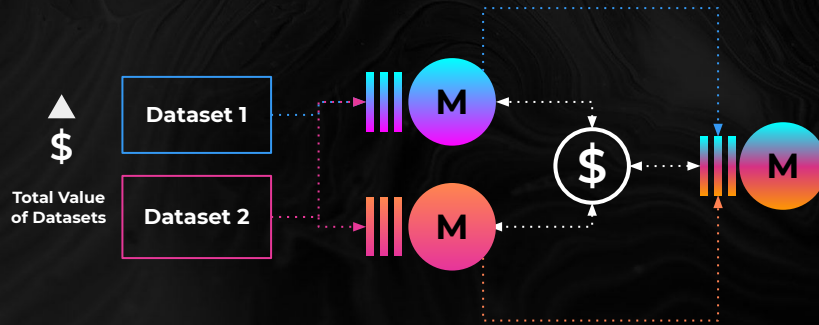
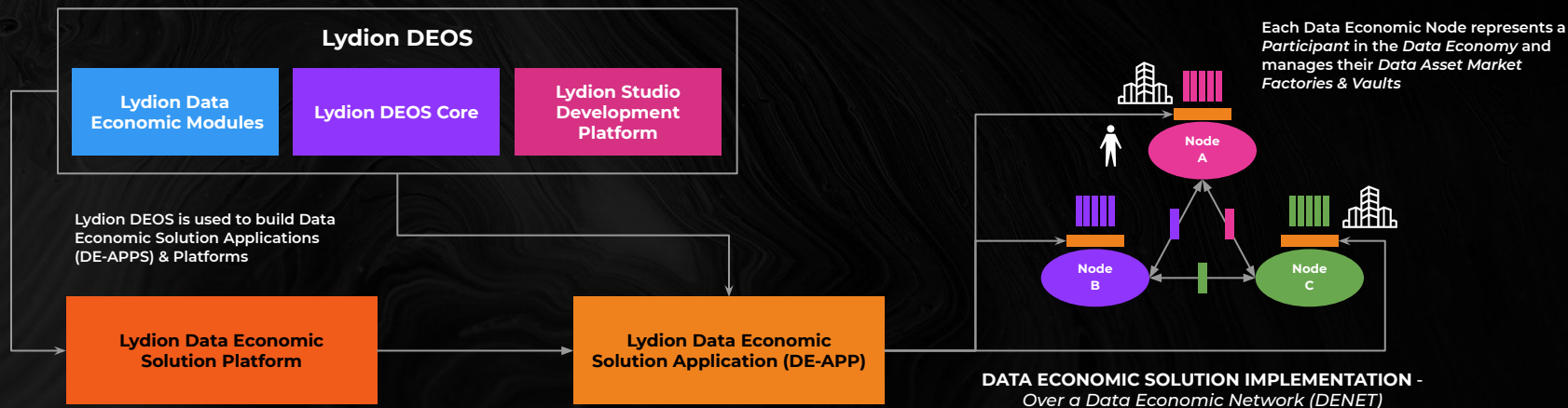**2.** **Tracking usage of each piece of digital data and transfer of credit** for each such utilization

3. **Value appreciation of :**

I. **Underlying digital datasets** used to construct different Data Assets

II. **Companies / individuals** who own such Data Assets

4. **Generating shared answers from multiple, disconnected datasets** (ie. "complex invoices") with proof

Generating shared answers from disconnected datasets **whose source data can't be shared**

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The Lydion DEOS is used to build *Lydion Data Economic Applications (DE-APPs)* and *Solution Platforms* that can be used to design and deploy specific *implementations of Lydion Data Economic Solutions* for a sets of Participants

Each Data Economic Node represents a *Participant* in the *Data Economy* and manages their *Data Asset Market Factories & Vaults*

DATA ECONOMIC SOLUTION IMPLEMENTATION - *Over a Data Economic Network (DENET)*

1. Data Economic Solution Platforms

The Lydion DEOS can be used to build **Data Economic Solution Platforms**, which in turn can be used to build customized **Data Economic Applications**
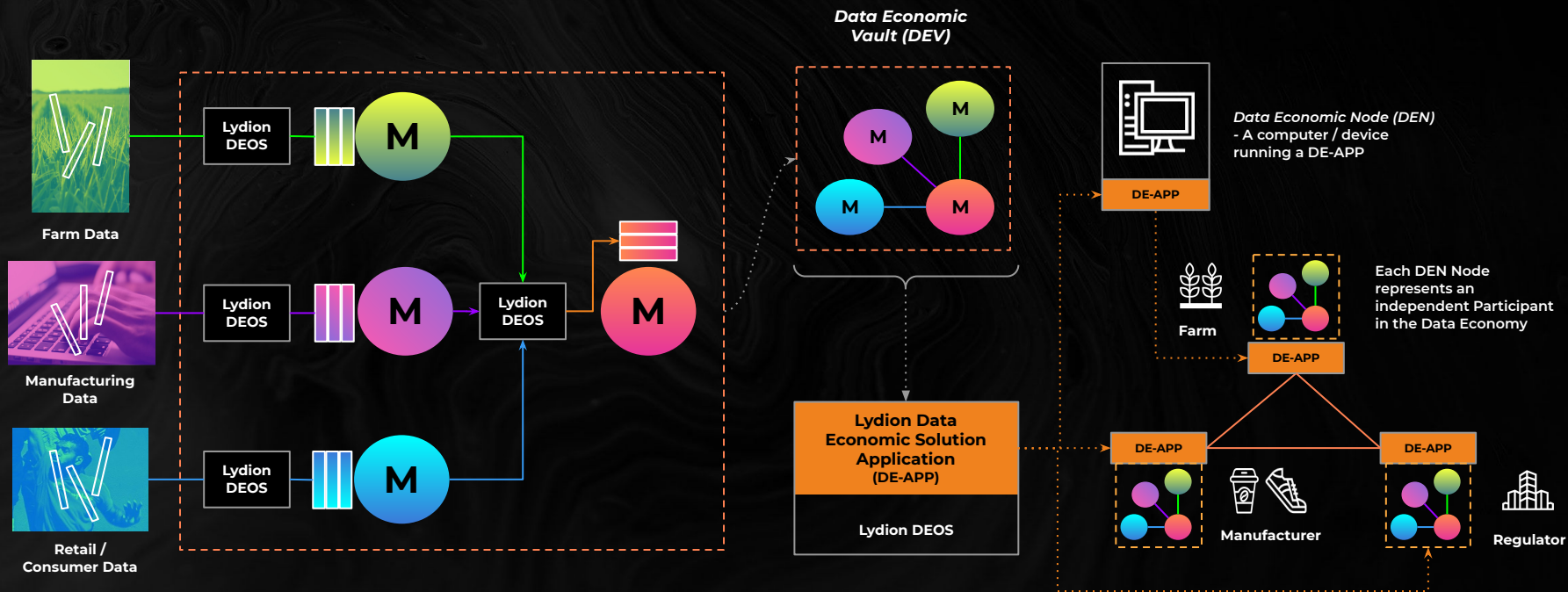
2. Data Economic Applications (DE-APP)

Data Economic Applications (DE-APPs) can be built from Solution Platforms or using the Lydion DEOS directly

3. Data Economic Solution Implementation (over DENET)

Data Economic Applications (DE-APPs) can be used to power one or more implementations of the Data Economic Solution, each implementation creating a **Data Economy** among its Participants and manifesting as a **Data Economic Network (DENET)** comprising **Data Economic Nodes (DENs)** connecting to each other through the DE-APP

A *Lydion Data Economic Solution* is implemented as one or more *Data Economic Networks (DENETs)* formed by *Nodes (DENs)* running copies (instances) of a *Data Economic Application (DE-APP)* and connecting with each other through these DE-APP instances

Farm Data

Manufacturing Data

Retail / Consumer Data

Lydion DEOS

Data Economic Vault (DEV)

Lydion Data Economic Solution Application (DE-APP)

Lydion DEOS

Data Economic Node (DEN) - A computer / device running a DE-APP

DE-APP

Farm

Each DEN Node represents an independent Participant in the Data Economy

Manufacturer

Regulator

A Lydion Data Economy is any number of *Data Asset Markets (DAMs)* working together to create a *Data Economic Solution*

A Data Economic App (DE-APP) implements the all Data Asset Markets (DAMs) in the Solution using Lydion DEOS and maintains a copy of each DAM's Factory and Vault in its *Data Economic Vault (DEV)*

Data Economic Nodes (DENs) connect with each other through the DE-APP to form a *Data Economic Network* (DENET) connecting the Participants of the DAMs and their copies of the *Data Economic Vault (DEV)*
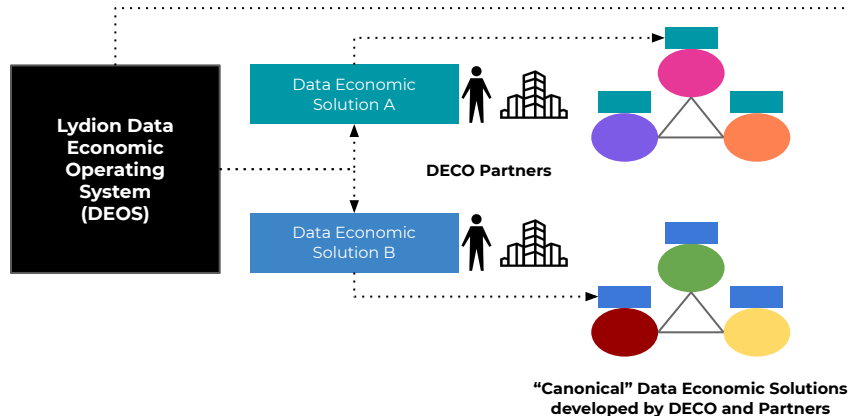
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Lydion DEOS and Solutions—Development & Propagation Model

The Solution (product) Development Model for Lydion DEOS is the early development and propagation model for popular enterprise Operating Systems such as Windows and Android
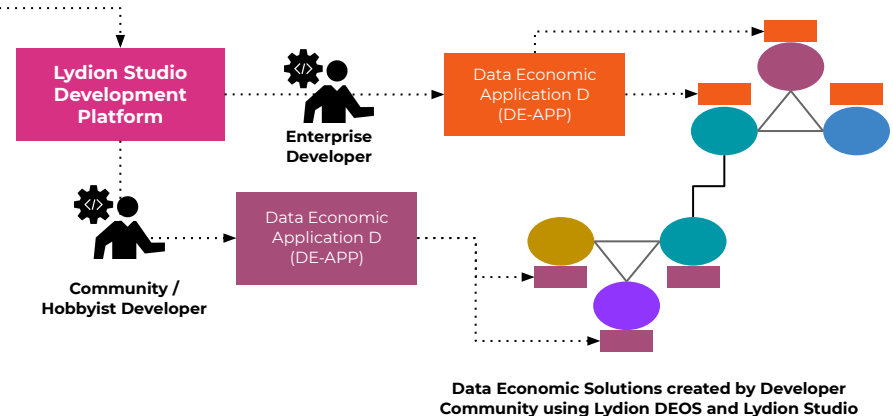
1. Partnership-based Propagation Model

DECO builds Lydion DEOS and helps seed the "canonical" Data Economic Application and related Solution ecosystem across major sectors through targeted partnerships with enterprise, government, and other organizations as **direct** or **middleware** implementations

2. Broad Propagation Model

Build passionate developer community, both enterprise and hobbyist / solo developers, who build Data Economic Apps and DENETs using Lydion DEOS independently of the direct support of the DECO Team via the Lydion Studio Development Platform

Lydion Data Economic Operating System (DEOS)

Data Economic Solution A

Data Economic Solution B

DECO Partners

"Canonical" Data Economic Solutions developed by DECO and Partners

Lydion Studio Development Platform

Enterprise Developer

Community / Hobbyist Developer

Data Economic Application D (DE-APP)

Data Economic Application D (DE-APP)

Data Economic Solutions created by Developer Community using Lydion DEOS and Lydion Studio

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DECO has two models for developing Lydion DEOS-based Solution products with partners
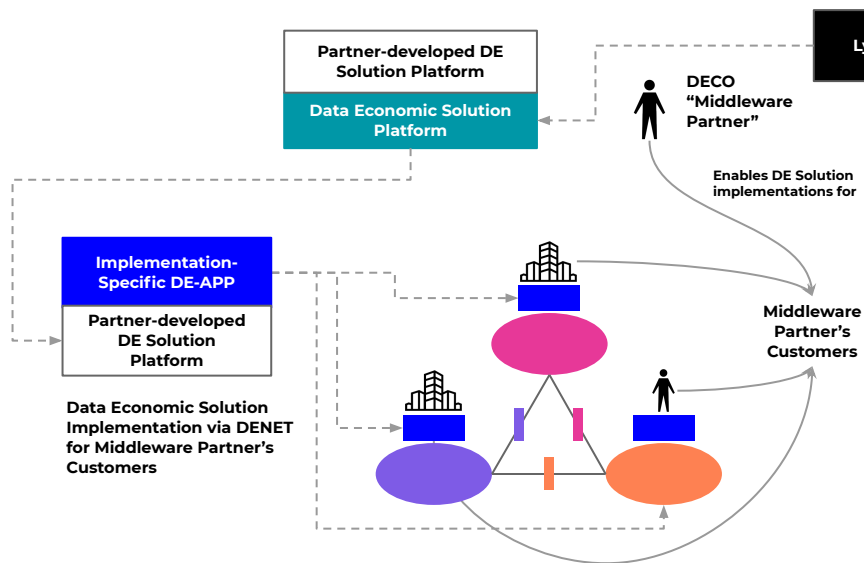
1. Middleware Partnerships

Middleware Implementations involve the development of Data Economic Solution Platforms for Partners who in turn use them to enable Data Economic Solutions and DENETs for their customers

Lydion DEOS in this case is used as middleware in Solution products that are built for DECO's Partners and sold by them to their customers
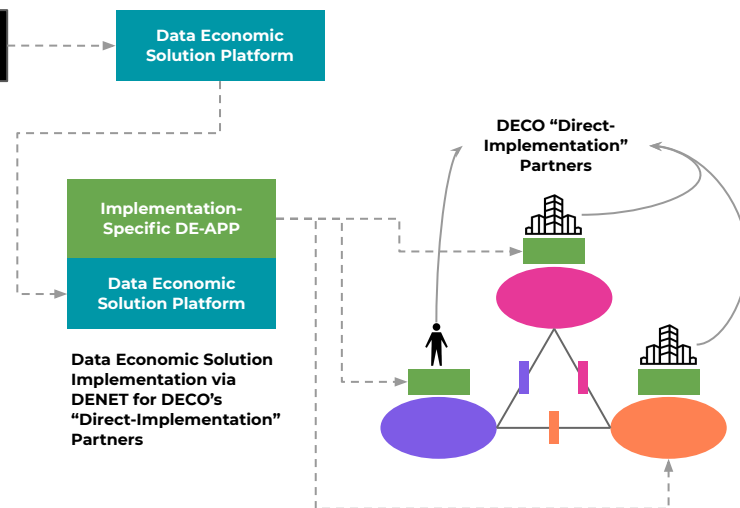
2. Direct Implementation Partnerships

DECO works with a set of partners to enable custom implementations of Data Economic Solutions for them

A Direct Implementation typically involves the creation of a DE-APP using an existing Solution Platform built on Lydion DEOS that enables the deployment of one or more DENETs for the set of partners

Lydion DEOS
Lydion DEOS Modules
Lydion Studio

Science & Engineering
(Research & Technology)

Solutions
(Partnerships & Commercialization)

Lydion Data Economic Solutions

DE Solution Design & Implementation Services

DECO

DECO is organized into 3 teams, each responsible for developing and managing a set of products and services

Publishing
(Education & Marketing)

The Data Economics Company (DECO)

The Data Economics Company (DECO) was formed in 2020 by consolidating the assets, organizations, and people involved in the Lydion Research Alliance under a single entity — To lead the further development of the science of Data Economics, the Lydion DEOS technology, and the suite of Lydion Solutions and Platforms being developed for and with enterprise and academic partners

Lydion.com ("*The Lydion*")

Lydion Publishing Platform (LPP)

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Current Lydion DEOS-based Data Economic Solutions being developed with partners in several sectors target a combined market of >$350B with projected market growth averaging 21% CAGR

The Data Economics Company

Builds

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| Lydion DEOS | Knowledge Services | Lydion Publishing Platform |

Lydion Data Economic Solutions Toolkit

Used to build Data Economic Solutions and Solution Platforms

Finance

SOLUTION 1
Lydion Data Economic Valuation Platform

SOLUTION 2
Lydion Data Economic Derivatives Platform

Health Sciences

SOLUTION 1
Lydion Outcomes-based Contracting Platform

SOLUTION 2
Lydion Health Outcomes Measurement & Valuation Platform

Core Industrials

SOLUTION 1
Industrial Material Traceability Platform

SOLUTION 2
Industrial Finance Solutions Platform

Climate & Environment

SOLUTION 1
Lydion Climate Data Management Platform

Agriculture

SOLUTION 1
Lydion Agricultural Traceability and Incentives Platform

SOLUTION 2
Smallholder Farmers Data Economic Network Platform

Personal Data & Telecom

SOLUTION 1
Lydion Personal Data Economic Portfolio Platform + Telecom-backed DEs

SOLUTION 2
The Layer Narrative/Gaming Data Economic Platform

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DECO's model for innovation and development is based on 20th century examples such as Bell Labs and Xerox PARC that pioneered technology and applications in diverse sectors based on foundational science and impact theses, updated for the 21st century

DECO is similarly pioneering the foundational science of Data Economics and its impact via real-world Lydion-powered applications based on the following core principles:

1. Data economics isn't elitist or inaccessible

Democracy, equity, and sustainability in the digital data landscape directly translates into democracy, equity, and sustainability from an economic perspective

Reduce risks of Digital Power Concentration, tech governance failure

2. No shortcuts - Building with sustainability and partnership in mind

Instead of "breaking or hacking things", put in the hard work and research to build a rapidly scalable foundation for the core science and tech, with products that are evidence-backed and truly work

No fear in pushing the envelope; in parallel, embrace and evolve the regulatory environment

Make investments in developing IP and building market advantages: No need for empty hype when there are real goods to show
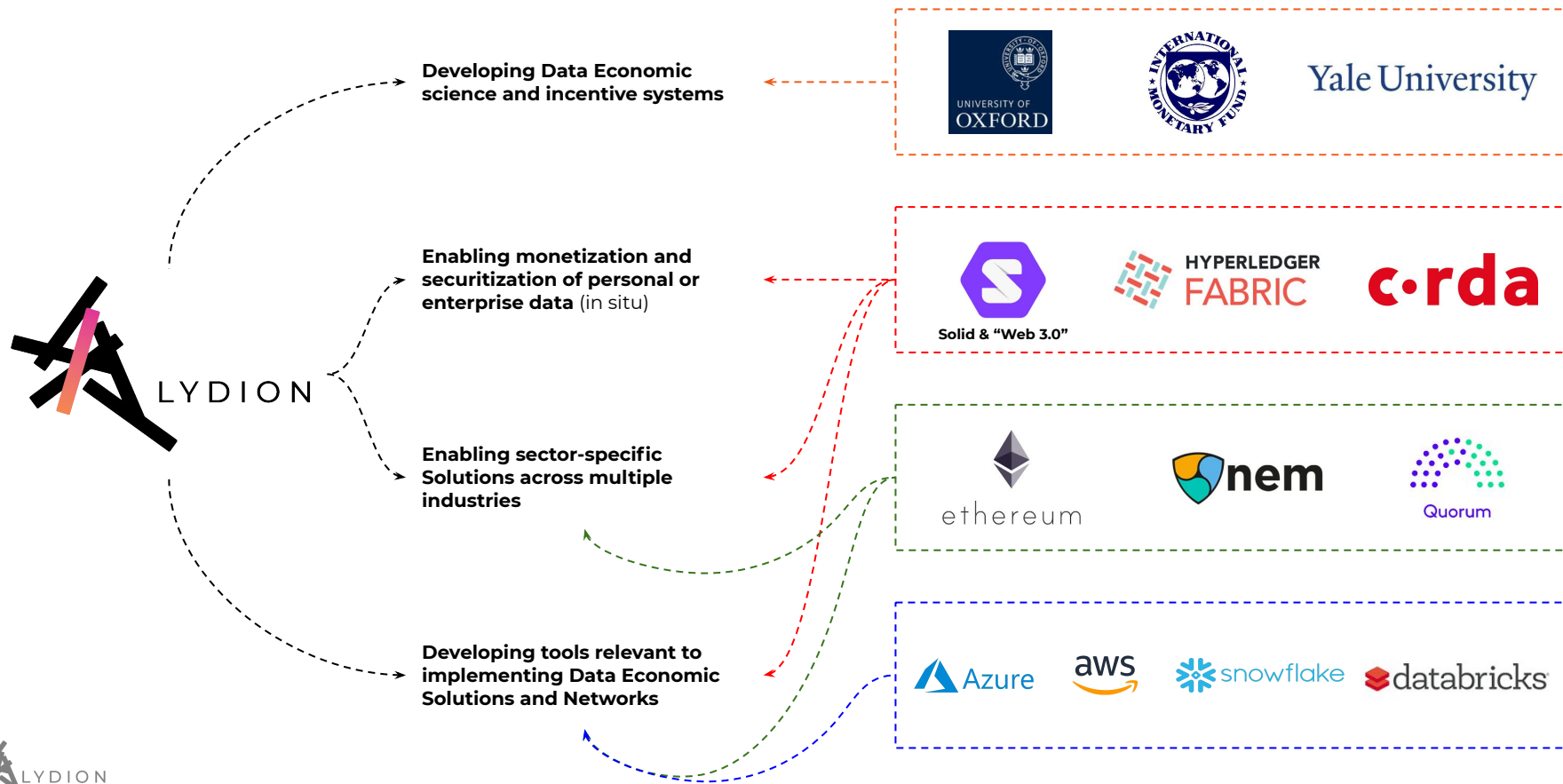
3. Partner with everyone while building a globally-distributed, empowered team of inquisitive, imaginative, and collaborative minds
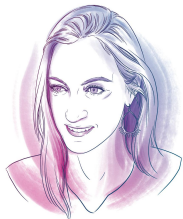
Keep core DECO team relatively small, set very high bar for hiring full-time team members

Partner aggressively with top industry and academic experts without having to recruit them into the company

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Developing Data Economic science and incentive systems

UNIVERSITY OF OXFORD — INTERNATIONAL MONETARY FUND — Yale University

Enabling monetization and securitization of personal or enterprise data (in situ)

Solid & "Web 3.0" — HYPERLEDGER FABRIC — c·rda

Enabling sector-specific Solutions across multiple industries

ethereum — nem — Quorum

Developing tools relevant to implementing Data Economic Solutions and Networks

Azure — aws — snowflake — databricks

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Jennifer Hinkel
Partnerships & Evangelism

Previously - Roche, Genentech, NCCN, Oxford, LSE, Georgia Tech

Sirtaj Brar
Product & Operations

Previously - Genentech, Wells Fargo, Deloitte, UC Berkeley

Arka Ray
Science & Engineering

Previously - Microsoft, Sidelines, UC Berkeley

Michele Svengsouk
Creative & Publishing

Previously - Disney, Popularium, Art Center College of Design

Abhinav Goyal
Product & PM

Previously - Computer Sciences Corporation, Pradeep Metals Ltd., Cornell University

A glance at the Principals of DECO

Management and Team Building Strategy

1. **Small, curated team:** Mix of high-impact team members with tech, science, and industry expertise within DECO's target markets

2. **Empower each team member:** With the scope, tools, experience, and education/mentorship to grow their passion, enthusiasm, and knowledge of Data Economics and empower them to potentially drive their own Data Economic Solution

3. **Strong foundational team and hiring pipeline from Lydion Research Alliance**: Built over three years across all disciplines of interest—science/economics, tech/engineering, health sciences, finance, climate, entertainment, etc.

4. **Strong in-house infrastructure for building and supporting partnerships:** Across all target industry, government, and academic sectors

5. **Rapidly grow DECO ecosystem through partnerships and:**

   1. **Executive Advisory Board:** Industry leaders who are working closely with DECO to build new research, solutions, or other major deliverables

   2. **Data Economics Alliance (DECA):** Companies and organizations co-developing or implementing Data Economic Solutions and growing DECO's reach

The Data Economics Company (DECO) is realizing the potential of Data Economics in 3 Phases

2018 — **2021** — **2024**

Phase 1 (2018 - 2020)

1. Formation of the "Lydion Research Alliance" to develop Data Economic science and tech

2. Creation of fundamental Data Economic Theory and *Lydion DEOS v0.1*

3. Data Economic Solutions and their initial designs and implementations in multiple sectors

4. Initial DENET implementations ready for deployment within several high-impact sectors to kick off Phase 2

Phase 2 (2021 - 2023)

1. Formation of The Data Economics Company (DECO) to consolidate assets and team

2. Launch and rollout of details around DECO, the Lydion DEOS technology stack and Data Economics Research

3. Rollouts of live implementations of Data Economic Solution implementations setup in **Phase 1** in *Health Sciences, Finance, Industrials, Climate, Agriculture, Telecom, and Gaming*

4. DENETS forming and connecting within industries

5. Data Economic Solutions identified in Energy, Personal Data, Real Estate and others

Phase 3 (2024 - 2026)

1. Data Economic research and evangelism in academia, industries, and press

2. Public rollout of Lydion Studio enabling wide-scale DENET development

3. Inter-DENET emerges as DENETs from different industries and sectors connect

4. Investments by DECO and industry and government partners to build Data Economic infrastructure, especially in areas and geographies where traditional economics have left a gap

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We have only scratched the surface...

There is much more to explore within the science of Data Economics, the Lydion DEOS and the Lydion Data Economic Solutions being developed by the DECO

1. **For those who want to learn more about DECO's science,, technology, and partnership opportunities** beyond the summary covered in this deck, the **Introduction to Data Economics and Lydion DEOS – For Investor and Partners** deck and the video highlights from the **Virtual Forum on Data Economics (Nov 2020)** on the **Lydion YouTube channel** provide deeper insight into the science of Data Economics, how the Lydion DEOS works, and how it is used to build Solution products comprising Data Economic Networks (DENETs)

   To discuss partnership opportunities with DECO, please contact jennifer@lydion.com

2. **For those interested in investment opportunities in DECO**, the **DECO – Details for Investors** deck and the video highlights from the **Virtual Forum Introducing DECO (Jan 2021)** discusses aspects of The Data Economics Company that would be of interest to investors, including DECO's mission, product development and growth strategy, evangelism strategy, and revenue models and projections

   To learn about investment opportunities in DECO, please contact arka@lydion.com

3. **The above and a wealth of materials related to DECO, Lydion DEOS, and Data Economics research await at _Lydion Insider,_** with previews of upcoming research, solutions and other products published regularly as well as invites to DECO-Hosted Events

   Go to insider.lydion.com/join to get access or drop us a note at contact@lydion.com

Thank You,
The DECO Team

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