Smart Contracts and Petri Dishes

Creating a Shared Technical Infrastructure Roadmap for DeSci

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Co-Founder, Molecule & VitaDAO

Agenda.

1. Problems Definitions and Goals
2. What have we accomplished and learned
3. Where are we today
4. Hopes for the future
5. Workshop session and breakout groups

Problem Definition

“DeSci” has existed for around 1 year.

Problem Definition

crowd survey

DECENTRALIZED SCIENCE LANDSCAPE

Distributed Fundraising • On-chain Publishing • IP-NFTs • Quadradic funding • Retroactive public goods funding

DECENTRALIZED BIOTECH

- Cloud Labs (STRATEOS, EMERALD)
- DeBio
- Fleming Protocol
- Framework Bio
- Innovative Bioresearch
- Molecule
- OpenNMN
- Open Therapeutics
- Perlara PBC
- Phage Directory
- Recerca
- Vibe Bio

DECENTRALIZED FUNDING OF SCIENCE

- Antidote DAO
- Crowd Funded Cures
- DeSci Foundation
- Experiment
- Gitcoin
- Giveth.io
- Gridcoin
- Impact Finance
- Moon Rabbit
- Science Fund
- SCINET

SCIENCE DAOS

- Bio DAO
- Cherubs DAO
- CRISPRDAO
- CureDAO
- DeNature DAO
- Frontier DAO
- GenomesDAO
- HairDAO
- LabDAO
- NeuraDAO
- OpScientia (OPEN SCIENCE DAO)
- PsyDAO
- Research Collective
- Research Hub DAO
- ValleyDAO
- VitaDAO

FOUNDATIONS & INSTITUTES

- Arc Institute
- Arcadia Institute
- Astera Institute
- Convergent Research
- Foresight Institute
- New Science

PROTOCOLS & DATA

- Ocean Protocol
- Protocol Labs

SCIENTIFIC PUBLISHING

- Agora Labs
- Ants Review
- Atoms
- Braid Science
- Flashpub
- Planck
- Seeds of Science
- TalentDAO

SCIENCE NFTS

- Atomic Heart NFT
- DNAVERSE
- Existential Hope
- GENEnft
- PLANT GANG
- SameYou
- SpinalCordNFT
- UltraRare Bio

COMMUNITIES & CHATS

- Blockchain for Science
- DeSci Nerdery Discord
- DeSci World
- Friendzymes
- JustOneGiantLab
- Nucleate Dojo
- Smart Contract Research Forum
- Web3 Women in Science

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Problem Definition

We have an opportunity today to define the roadmap for future builders and create an open collaborative technical infrastructure.

Problem Definition

DeSci will be most successful if enabled as interoperable permissionless lego blocks.

What lego blocks do we need?

For which types of DeSci applications?

Science is full of problems.

Funding

Funding is highly competitive and asymmetrically distributed. Most scientists would change topics and fields if funding was not a concern. We spend too much time applying for it.

Replication

Much of science is not reproducible. We work in silos and often fail to report negative results. Much of science is built on invalid data. Incentives are perverse.

Competition

Science has become hyper-competitive, creating perverse incentives. The life of a young academic is incredibly stressful, publish or perish, and less than 2% of NIH funding to under 35 y/o's.

Comms

Science is inaccessible. Much of the important scientific literature lives behind paywalls, out of the reach of the population. Dissemination, peer-review, and access are broken.

Some problems stem from centralizing authorities.

Funding

Funding is largely centralized by governments with tax-dollar funding, yet the public is largely excluded from the decision-making process around what is funded.

Replication

Centralized scientific communities, which use similar methods and involve shared authors who contribute to many articles, propagate less replicable claims than decentralized communities

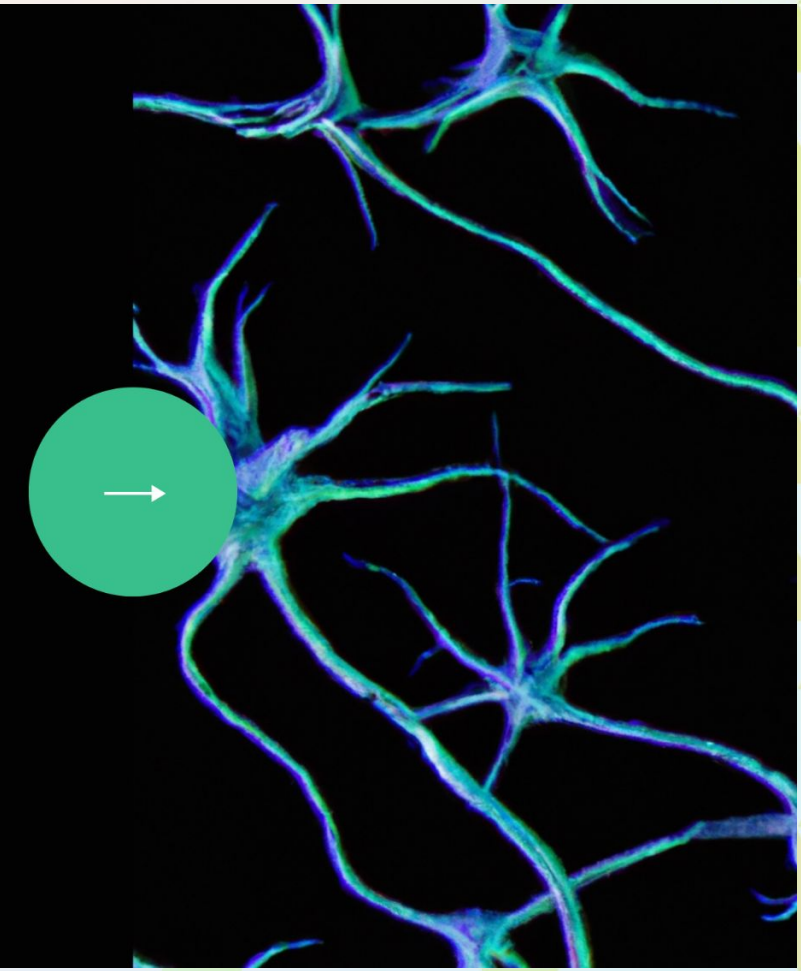
Competition

Competition for publishing, tenure track positions, and unilateral career movement is predicated on engagement with a few centralized and powerful agencies and universities.

Comms

Centralized authorities control access to information and determine the rules of how we communicate science and who reads them. These authorities have asymmetrical power.

What if science is decentralized?



Why is decentralization important?

Centralized institutions have played an important role in the facilitation of science, but can sometimes fall short.

Users participate in a trustless system

Lowers risk of systemic failure

Censorship resistance fosters an open culture.

Enables global collaboration

Why, what, and how DeSci?

01

Why

To build on the open science movement, make science more collaborative, and make science accessible to everyone.

02

What

A global, open alternative to the current scientific system that anyone can participate in.

03

How

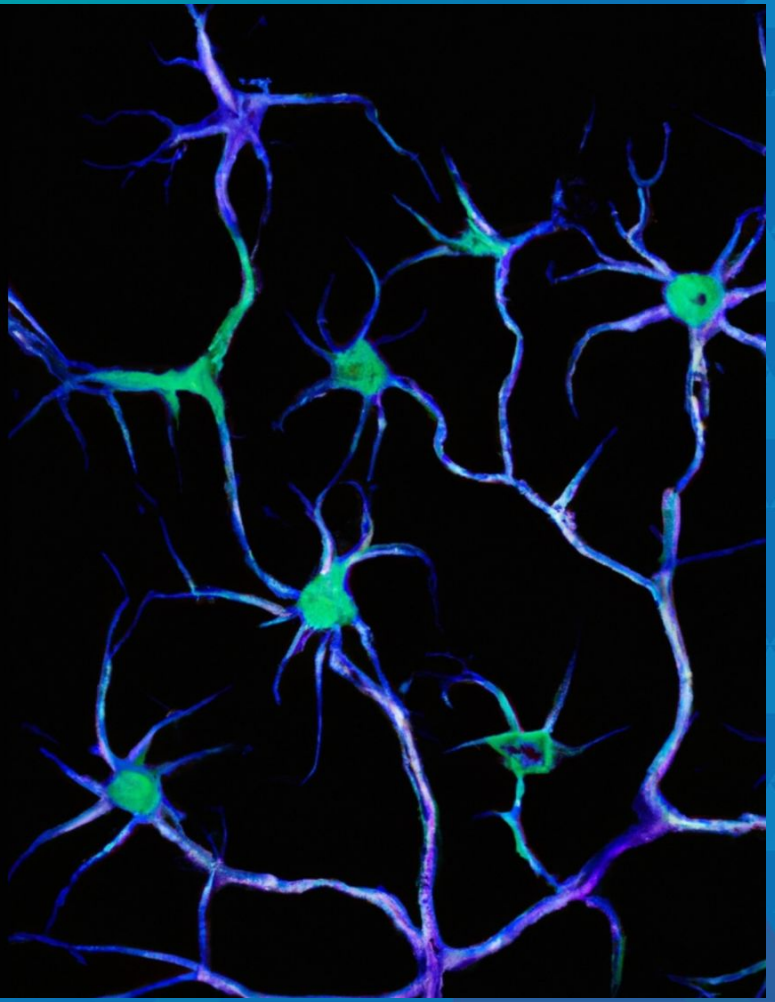
Technology that enables scientists to raise funding, run experiments, share data, distribute insights, and more, openly.

DeSci Verticals

Areas that DeSci is currently targeting and attempting to disrupt.

01 Funding of Data, IP and Impact	Faster, more democratic funding mechanisms that enable communities to form and govern impact and IP.
02 Publishing	Transparent, open access publishing with aligned incentives. Peer review is incentivized.
03 DAOs & Research Governance	DAOs present new ways of organising researcher or patient involvement and clinical trials.
04 Identity and Reputation	Individuals to prove their experience and credentials linked to their Ethereum address for example.

Of these verticals, funding and IP are seeing the most progress.

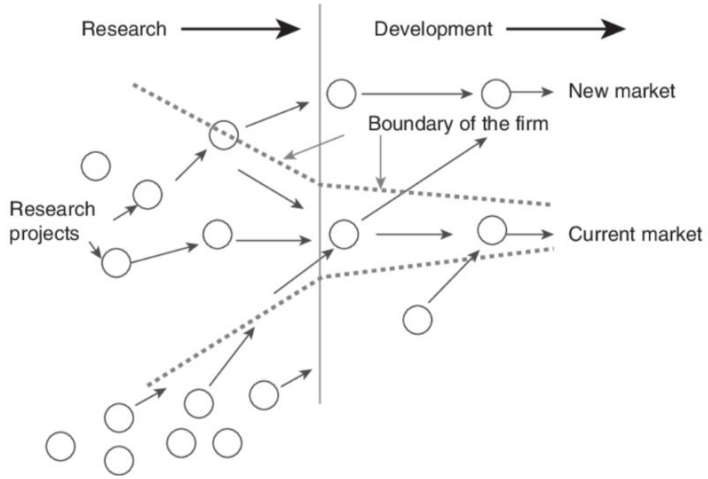


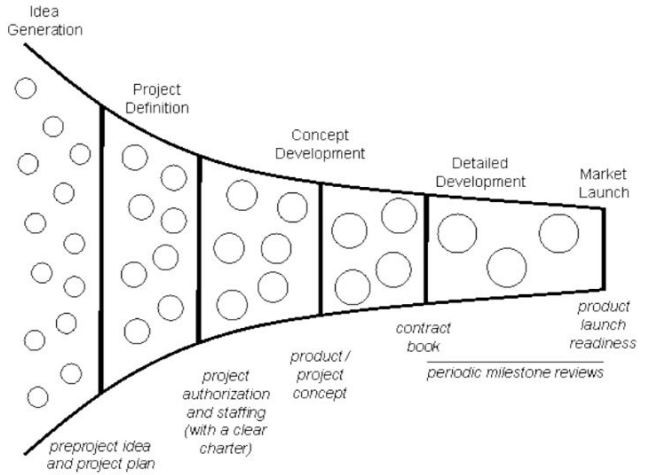
Funding + IP

The current standard model for funding science is that individuals or groups of scientists make written applications to a funding agency, or form a company to raise VC.

01 Retroactive Public Goods Funding	Projects receive funding for achieving certain goals, created by the public.
02 Quadratic Funding	A fairer, more democratic and balanced way to allocate funding to projects
03 DAOs/Tokenized Incentive Structures	Communities vote to decide how funding is allocated. They govern over projects.
04 IP-NFTs	Ownership in research related IP as an incentive for funding and collaboration.

Example: Innovation & Biotech Research Today

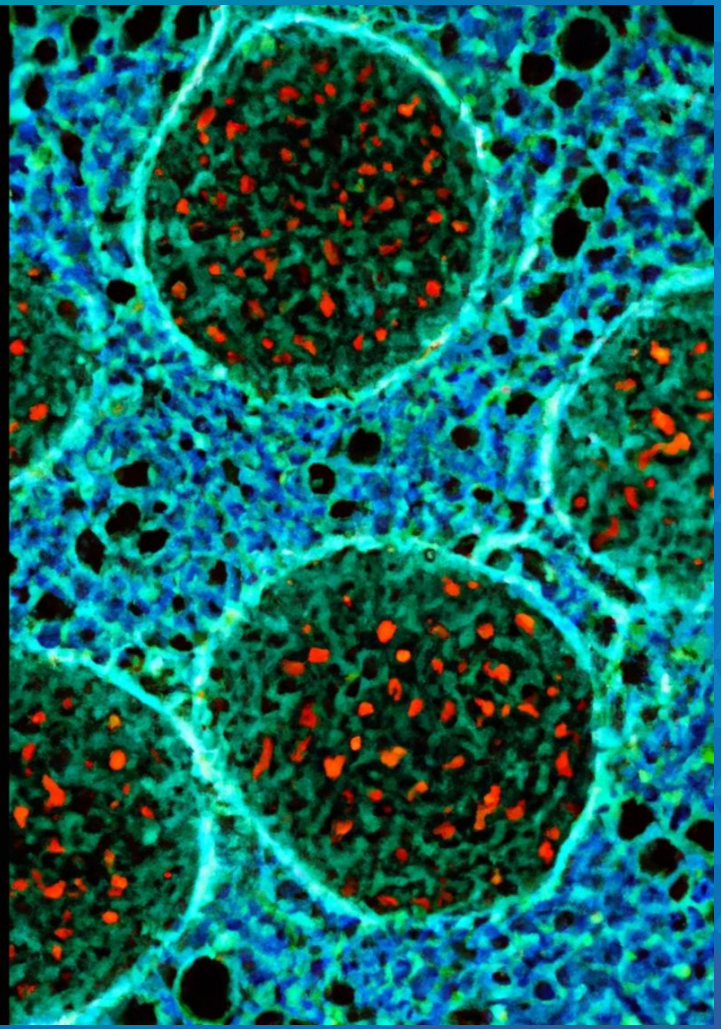




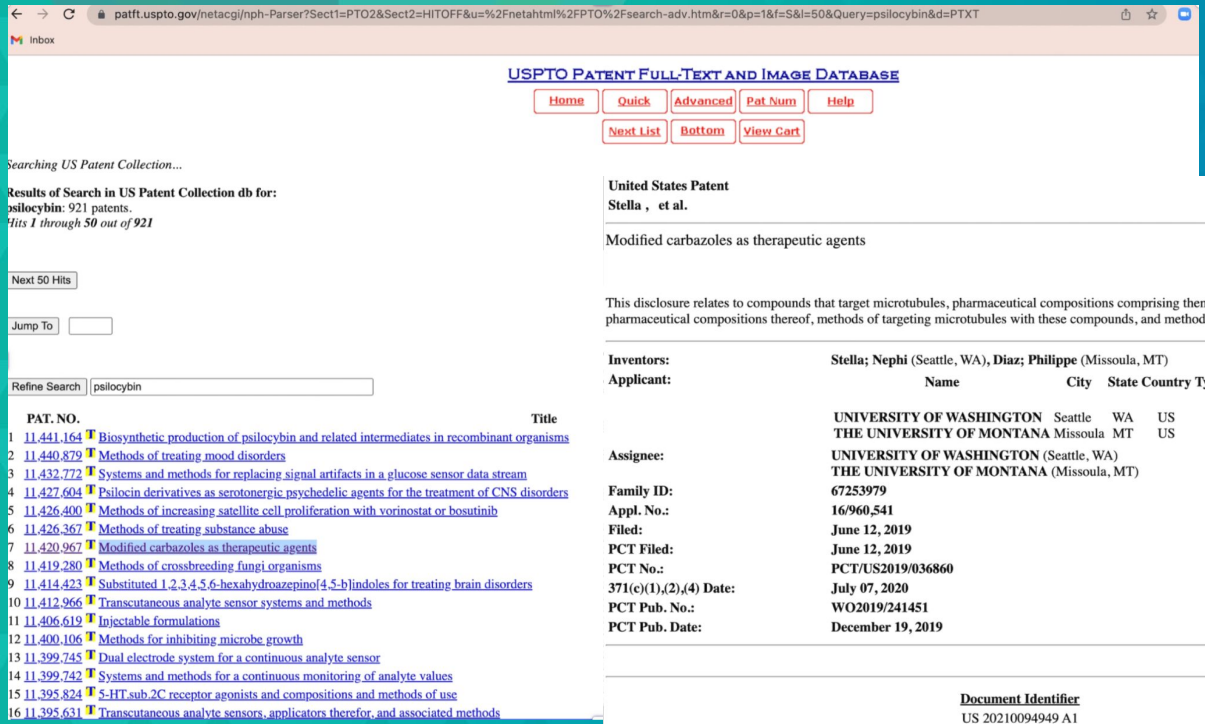
IP and Patents are Legacy Legal Physical Assets.

1. Bureaucratic and outdated IP systems make IP hard to transact
2. Often too expensive to structure and negotiate early stage IP
3. Fuels the Valley of Death as IP gets shelved due to inefficiency

Data and Software is Virtual.



Example: USPTO Patent Search



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Inbox

USPTO PATENT FULL-TEXT AND IMAGE DATABASE

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Searching US Patent Collection...

Results of Search in US Patent Collection db for:
psilocybin: 921 patents.
*Hits **1** through **50** out of **921***

Next 50 Hits

Jump To

Refine Search psilocybin

	PAT. NO.	Title
1	11,441,164	Biosynthetic production of psilocybin and related intermediates in recombinant organisms
2	11,440,879	Methods of treating mood disorders
3	11,432,772	Systems and methods for replacing signal artifacts in a glucose sensor data stream
4	11,427,604	Psilocin derivatives as serotonergic psychedelic agents for the treatment of CNS disorders
5	11,426,400	Methods of increasing satellite cell proliferation with vorinostat or bosutinib
6	11,426,367	Methods of treating substance abuse
7	11,420,967	Modified carbazoles as therapeutic agents
8	11,419,280	Methods of crossbreeding fungi organisms
9	11,414,423	Substituted 1,2,3,4,5,6-hexahydroazepino[4,5-b]indoles for treating brain disorders
10	11,412,966	Transcutaneous analyte sensor systems and methods
11	11,406,619	Injectable formulations
12	11,400,106	Methods for inhibiting microbe growth
13	11,399,745	Dual electrode system for a continuous analyte sensor
14	11,399,742	Systems and methods for a continuous monitoring of analyte values
15	11,395,824	5-HT.sub.2C receptor agonists and compositions and methods of use
16	11,395,631	Transcutaneous analyte sensors, applicators therefor, and associated methods

United States Patent
Stella , et al.

Modified carbazoles as therapeutic agents

Abstract

This disclosure relates to compounds that target microtubules, pharmaceutical compositions comprising them, and methods of using the compounds and compositions for treating diseases. More particularly, this disclosure rel
pharmaceutical compositions thereof, methods of targeting microtubules with these compounds, and methods of treating diseases affected by microtubule disruption.

Inventors: **Stella; Nephi** (Seattle, WA), **Diaz; Philippe** (Missoula, MT)

Applicant:

Name	City	State	Country	Type
UNIVERSITY OF WASHINGTON	Seattle	WA	US	
THE UNIVERSITY OF MONTANA	Missoula	MT	US	

Assignee: **UNIVERSITY OF WASHINGTON** (Seattle, WA)
THE UNIVERSITY OF MONTANA (Missoula, MT)

Family ID: **67253979**
Appl. No.: **16/960,541**
Filed: **June 12, 2019**
PCT Filed: **June 12, 2019**
PCT No.: **PCT/US2019/036860**
371(c)(1),(2),(4) Date: **July 07, 2020**
PCT Pub. No.: **WO2019/241451**
PCT Pub. Date: **December 19, 2019**

Prior Publication Data

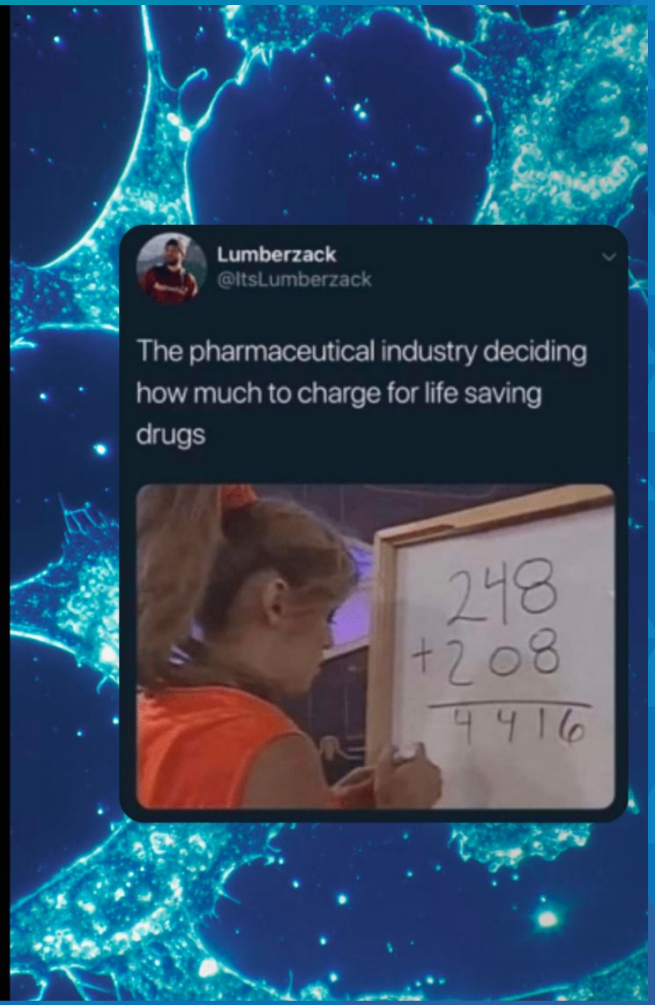
Document Identifier	Publication Date
US 20210094949 A1	Apr 1, 2021

Related U.S. Patent Documents

Application Number	Filing Date	Patent Number
62683953	Jun 12, 2018	
62714436	Aug 3, 2018	

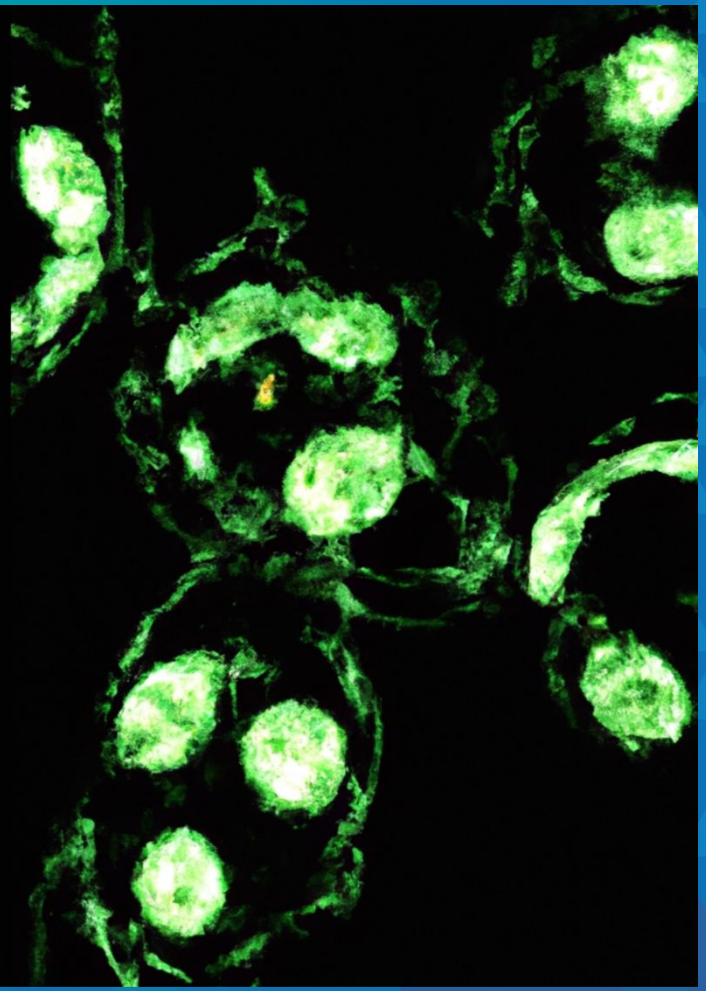
IP monopolies kill innovation – and lead to high drug prices

- Restricts scientific collaboration and "discoverability of IP" as organisations work in siloes.
- Limits open science, creates reproducibility crisis as negative data is buried.
- Rather than the best science, revenue-drivers dominate medicine.



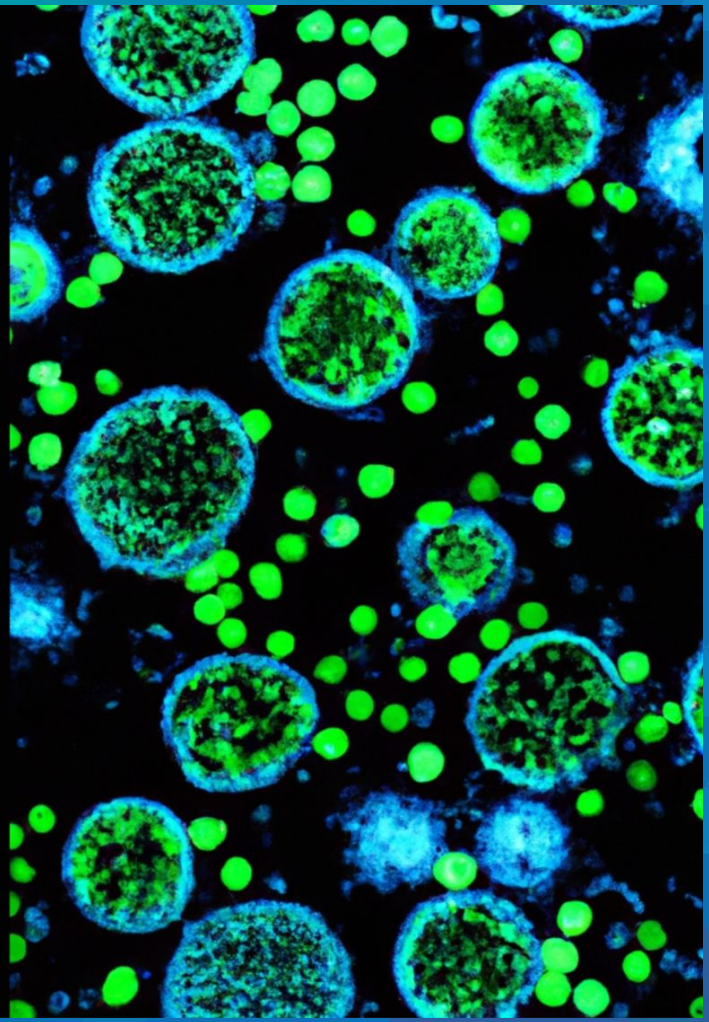
What could a different system look like?

Towards an open market for IP



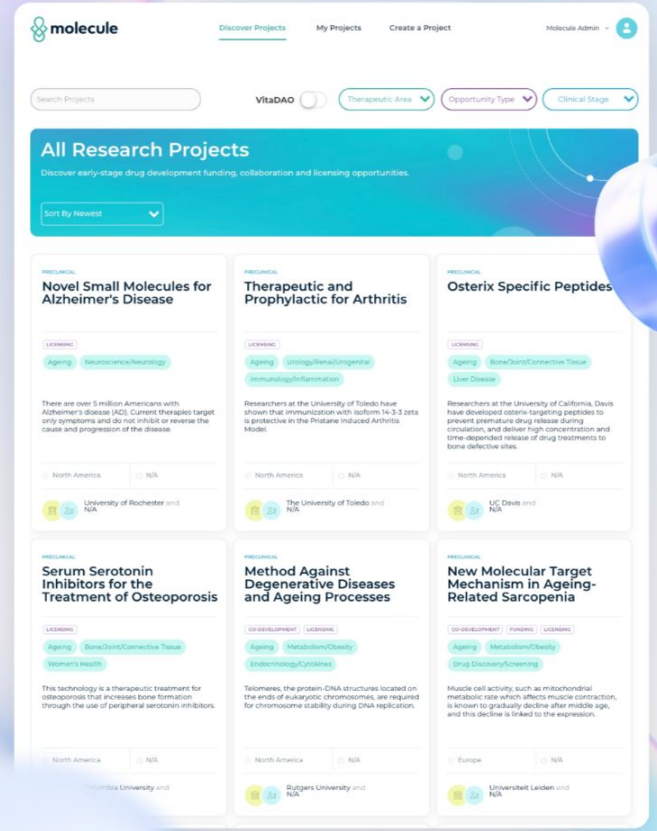
Most of the world's potential scientific talent remains untapped.

Let's enable a Creator Economy for Scientists...



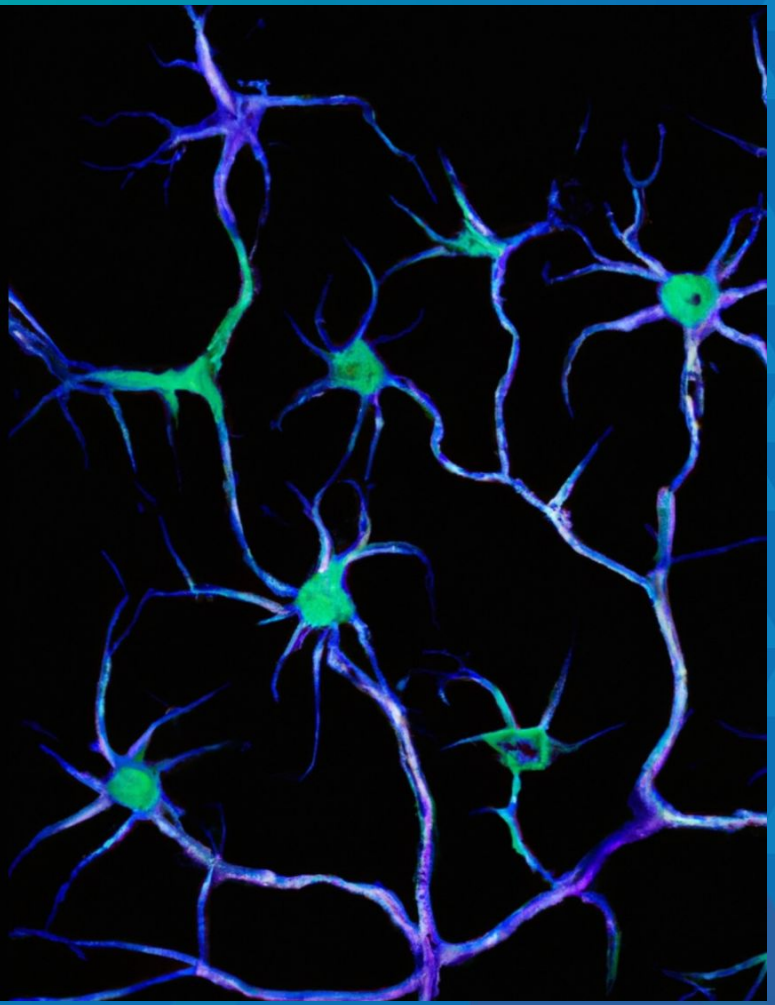
Molecule's Mission: Realigning Incentives via Decentralised Biotech

Towards an open transparent market for research funding



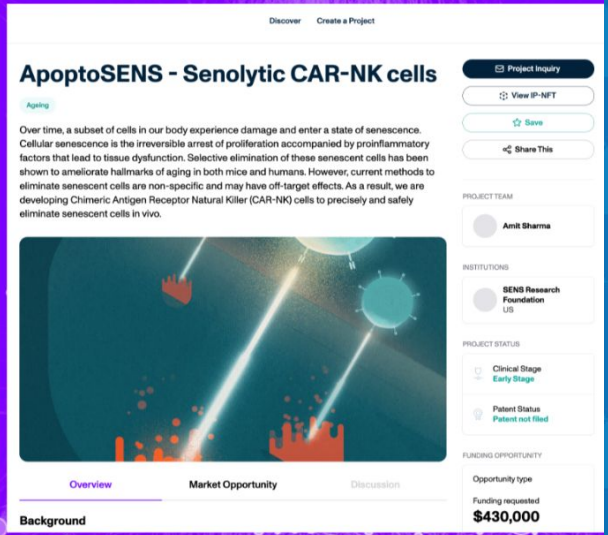
How do we bring legal IP and Data into Web3?

A DeSci Lego Block: IP-NFTs



Anatomy of IP-NFTs

1. **Legal** - legal contracts & license tied to real-world research or data
2. **Storage** - decentralised permanent data storage, public and private data repos
3. **Transactability** - seamless transfer of IP
4. **Discoverability** - via public metadata
5. **Programmability of IP**
   a. **Governance**
   b. **Fractionalisation (FRENS framework)**
   c. **Programmatic royalties**
   d. **Pay-for-success models**



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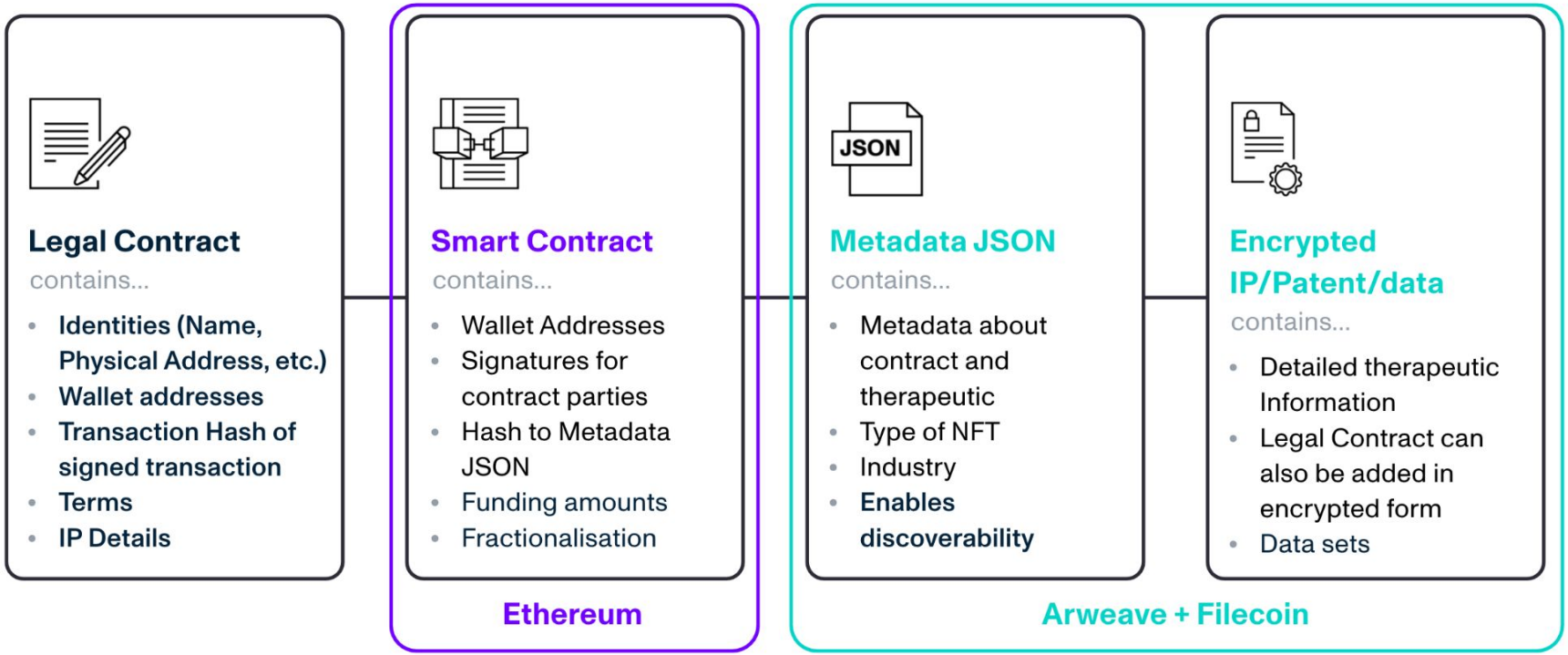


IP-NFTs are composable Web3 building blocks

1. Can be transacted like NFTs and applied in funding
2. DAOs can now build portfolios of research (Bio DAOs)
3. NFTs can be fractionalised and act as DeFi lego blocks
4. Data access can be granted via multi-sigs

Only scratching the surface…

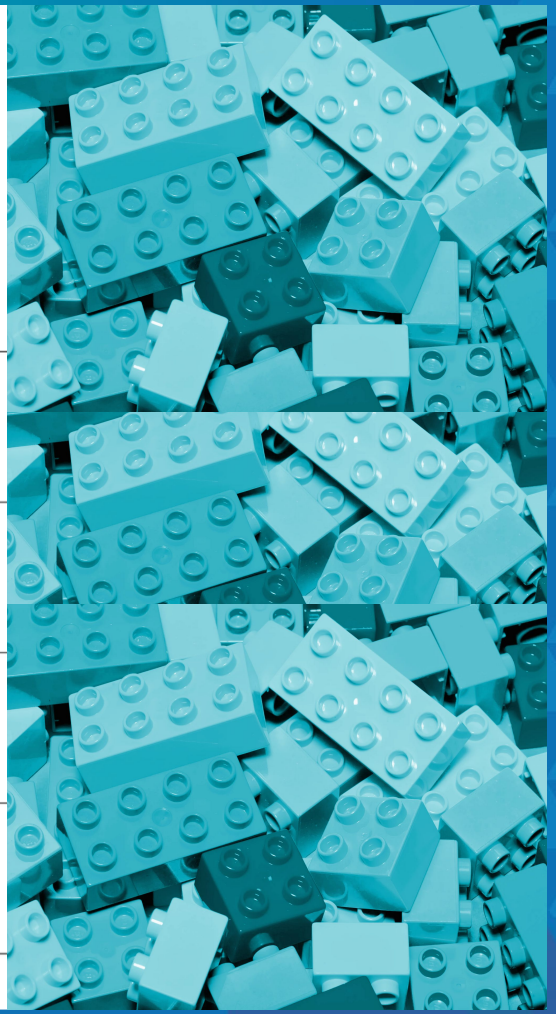
DeSci Web3 Lego Blocks

01 Transaction Layers

02 Data Storage Layers

03 Compute & Execution Layers

04 Identity Layers



Workshop Goals

The goal of this workshop will be **to explore how decentralized science can improve the process of funding, doing, and disseminating science through the use of decentralized systems**. Groups can break into the following verticals to explore the problem space and brainstorm solutions:

1. Funding and IP
2. Data and Reproducibility
3. Publishing
4. Identity and Reputation

Workshop Flow

Setting the Scene (20min)

Breakout 1 (40min)

Breakout Pitches (10min)

Discussion (40min)

Call to Action (10min)

Workshop and Breakouts

DeSci Verticals

Areas that DeSci is currently targeting and attempting to disrupt.

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Thank you!

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