# DeSilo

A Blockchain Solution for Open Science

Introduction

DeSilo is a scientific publishing platform hosted on the blockchain that promotes open science through the use of tokenomics and a robust reputation system. Our mission is to mitigate the replication crisis currently experienced in the soft sciences, where the lack of incentive to cross-replicate studies combined with opaque data processing pipelines led to many published results being unreproducible. We believe that these issues can be addressed through careful mechanism design on the blockchain.

Implementation

For this hackathon, we are building an MVP that implements two core features of DeSilo: pre-registration and social credit.

Pre-registration, as coined by Nosek in 2019, is a proposed framework to separate hypothesis-generation from hypothesis-testing. Practically, this means providing a platform in which researchers can first submit their methods and proposed analyses for peer review, and be accepted for publication by journals (known as 'in-principle acceptance'), before moving forward to data collection and analysis. Researchers can therefore expect the fruit of their labor to be published regardless of results, without the pressure to arrive at sensational results or to validate their hypotheses. This takes away the incentive to commit statistical malpractice such as p-hacking, as well as help reduce publication bias.
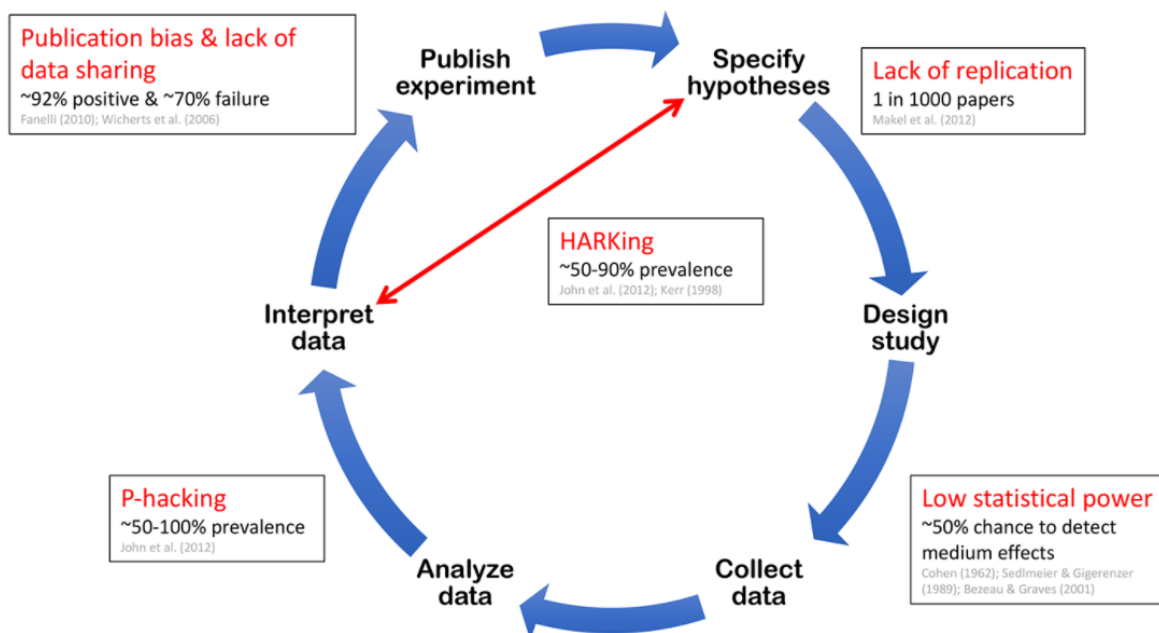
Blockchain is a natural choice of medium for storing and publicizing pre-registered reports, as it provides researchers proof of their intellectual rights over the research, track peer reviews, keep an immutable history of supplementary materials such as scripts or datasets, as well as hold accountable journals that offer in-principle acceptance. Additionally, since the process of publication involves multiple steps (outlined in the diagram below), blockchain provides a publicly accessible record of all progress and amendments of a research project, helping to safeguard its credibility over the course of development. We foresee researchers taking advantage of our platform to increase visibility for their ideas in the early stages, and acquire public attestation for their results in the later stages.

Social credit is our proposed mechanism to increase engagement and replication of studies on our platform. Crucially, it serves to track reputation through the actions of each user, aggregating their contributions in replicating studies, challenging data pipelines, and auditing the integrity of datasets. Their claimed contributions are open to scrutiny by any other user, and can be verified or nullified through a simple collateralized voting mechanism.

We introduce a simple file upload mechanism that allows researchers to attach supplementary materials such as scripts and datasets along with their manuscripts and have it be posted on the IPFS. Each uploaded file becomes an interactive non-fungible asset, which other users can challenge or verify. In order to take either action, users must stake their social credit to substantiate their claims, which they risk losing in case of negative response from the author or community. Note that social credit is non-transferrable, and can only be earned through engagement. When the author or community responds positively to their challenge/verification within a fixed timeframe, then staked social credit will be returned to the contributor with an added amount.

Since domain expertise is an important indicator in assessing the validity of claims in research, we also track the social credit earned within each field (specified by author), which will be visible next to their claims. It does not directly affect the collateralized voting mechanism, but provides heuristics for other users in deciding their response towards claims.

Tech Stack
Ceramic, web3.Storage, Polygon, The Graph (possibly)