WHITE PAPER

SourceCubes™ to map land, sea, and atmospheric data into a blockchain matrix architecture with a unique nomenclature to enable the rapid analysis, development, and tokenization of micro-data cubes

Submitted on
September 1, 2022

PI: Dr. Jay Bose
Co-PI: Dr. Oliver Jones
SourceEnergy Global
700 Tech Center Dr., Suite 303
Newport News, VA

Part 1: Table of Contents

Part 2: Identification and Significance of the Opportunity

We intend to build a blockchain based decentralized platform to map land, sea, and atmospheric data into 3 square meter cubes using a 3-dimensional matrix, with nomenclature that uniquely identifies SourceCubes™. We create identification tags to allow tokenization, and each cube can be structured into Smart contracts. The inter-cube interaction between SourceCubes™ occurs through a data exchange layer with a temporal dimension, allowing for data to be tagged to specific timestamps and compared against benchmarked historical data and future trends.

The micro-mapping of environmental data (and other 3rd party data) to land assets owned by specific underserved communities and tribal territories, often located in extreme remote locations, is essential to providing measurable results for clean air programs, drinking and agricultural water management, off-grid energy solutions, local waste water management, land-use mapping for agriculture and nutritional needs, mapping of mineral deposits, and the creation of crypto wallets for community members, providing a decentralized digital financial platform to maximize participation in economic development within economic opportunity zones.

SourceCubes™ are the building blocks within this distributed matrix. We leverage the “what3words”, API that identifies precise locations on the planet, given a unique combination of three English words. Our architecture enhances the 2D structure into a 3D matrix and will utilize real-time and non-real time NASA data and 3rd party data sets. It is anticipated that integrated data platform will operate in a High-Performance Computing (HPC) environment, providing remote access to over 100 HBCU’s to perform analysis, create programs and proposals, win future grants, and demonstrate the effective use of NASA data to measurably improve quality of life in underserved communities.

This blockchain based platform constructing a metaverse-like 3-dimensional earth matrix built from an integrated set of temporal land, sea, and atmospheric data can serve as a new foundation where many solutions can be built upon to address persistent climate related problems and more.

The ability to precisely allocate, track, and analyze tokenizable 3 square meter cubes (SourceCubes™) from this matrix, cube clusters can be analyzed, correlated, aggregated, and narrated at cube level up to anything that exists on

or in the land, sea, or atmosphere to drive more informed decisions and outcomes.

The market opportunity includes the ability to present a precise, rich, quantifiable, and relatable earth model to support new use cases in recording, measuring, reporting, and predicting wildfires, sea level, land corrosion, air quality, weather patterns, water management, off-grid energy, agricultural yield optimization, mineral deposits, oil & gas, and other areas of interest.

Part 3: Technical Objectives

Phase 1 Deliveries:

1) Developing initial use cases and design UX targeting the lithium mining sector and scope out the SOW with our development partner, pixelplex.io.

2) Working with Pixelplex, vetting, and selecting AI, ML, and blockchain technologies and tools.

3) Acquiring, hosting, configurating, and optimization of the NASA HPC data servers.

4) Assessing, optimizing, and mapping NASA land, sea, and atmospheric datasets to initial targeted use cases.

5) MVP application

6) Define Phase II scope

7) Serving as an incubator platform, engage one initial HBCU to extend NASA and Source Energy's assets, technologies, methodologies and coaching to researchers and entrepreneurs, enabling them to research, prototype, and elevate their ability to submit and win additional grants as genesis foundations of their fledging enterprises.

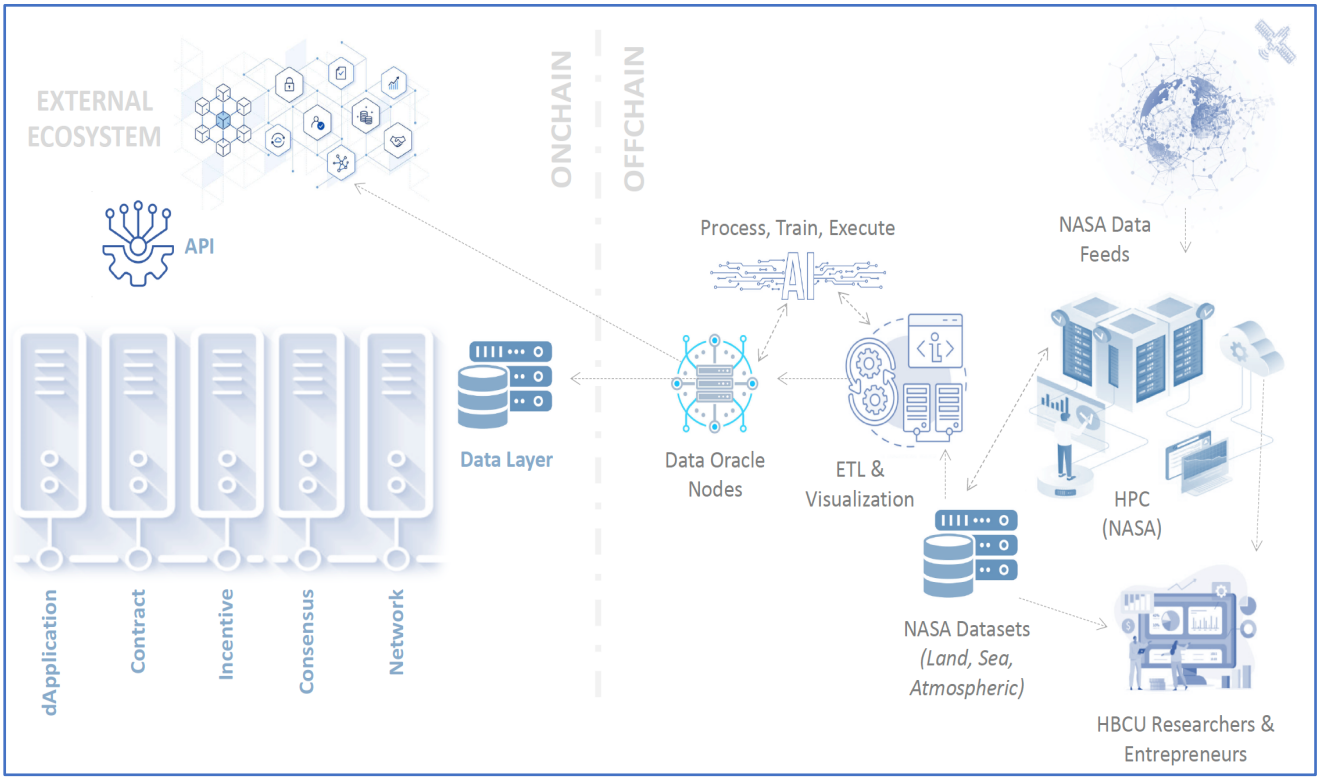

Diagram 1. Overall Architecture

Part 4: Work Plan

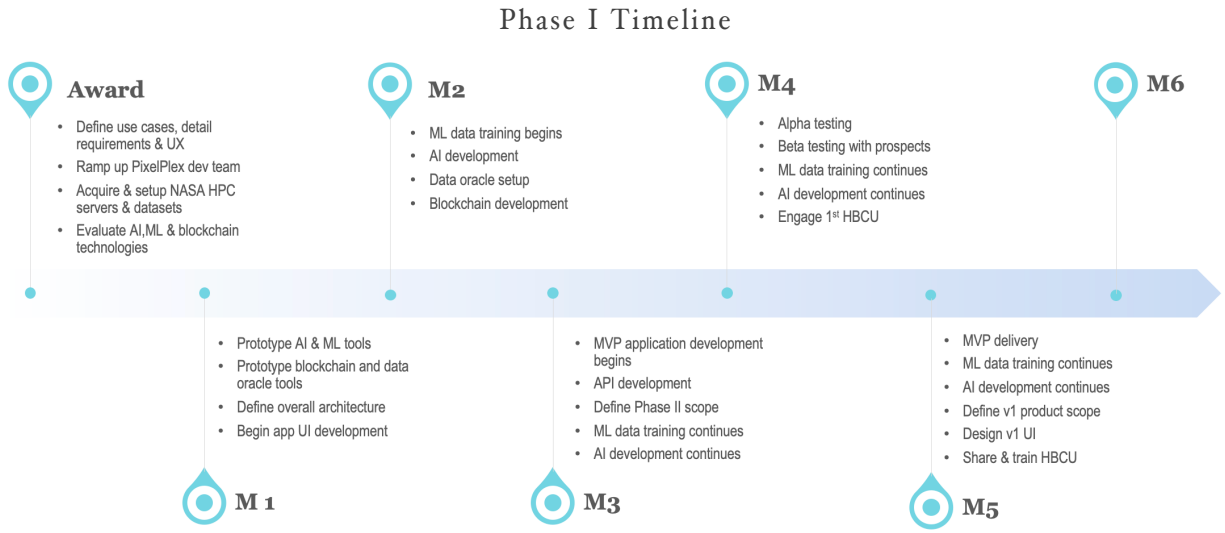

Diagram 2: Milestones and Deliverables

The workplan has been broadly categorized into 4 components:

Technical Development: This segment of the workplan calls for the prototype blockchain development within an Oracle database structure. The overall data schemas are defined, the UI interfaces developed and the framework for AI and ML integration established. This section also begins the API integration phase.

Infrastructure Development: This segment of the workplan is characterized by the customization of the PixelPlex blockchain framework, notably the creation of SourceCubesTM within the construct of the blockchain framework. This meta data and application infrastructure is expected to be interfaced into the NASA atmospheric and environmental data, residing on Hadoop computing clusters within the High-Performance Computing HPC facility, jointly operated with Hampton University.

Testing and Documentation: Alpha testing procedures and scripts will be developed, the entire framework documented and patents stemming from the work will be filed. In addition, beta testing methodologies and prospects will be identified with selection criteria for the MVP test.

Use Case (Alpha): Detailed requirements for a narrow use-case to establish the interconnectedness of all system level components as well as UI for that specific use-case will be executed most likely with Hampton University as the first HBCU.

Part 5: Related R/R&D

One of the more important works entitled "*Earth system data cubes unravel global multivariate dynamics*", to understand Earth system dynamics and considering ongoing human intervention and dependency was published on 25 February 2020 and undertaken by some of the leading minds at the following institutes (who shared the contributions equally):

[1]Max Planck Institute for Biogeochemistry, Jena, Germany; [2]German Centre for Integrative Biodiversity Research (iDiv), Deutscher Platz 5e, Leipzig, Germany; [3]Michael Stifel Center Jena for Data-Driven and Simulation Science, Jena, Germany [4]Brockmann Consult GmbH, Hamburg, Germany; [5]Department of Mathematical Sciences, University of Copenhagen, Copenhagen, Denmark [6]Stockholm Resilience Center, Stockholm University, Stockholm, Sweden [7]Image Processing Lab, Universitat de València, Paterna, Spain; [8]Computer Vision Group, Friedrich Schiller University Jena, Jena, Germany; [9]Earth System Analysis, Potsdam Institute for Climate Impact Research, PIK, Potsdam, Germany [10]Department of Geodesy and Geo-Information, TU Wien, Vienna, Austria [11]Department of Geography and Urban Studies, Temple University, Philadelphia, PA, USA [12]Department of Geography, Friedrich Schiller University Jena, Jena, Germany [13]Alexander von Humboldt Biological Resources Research Institute, Bogotá, Colombia [14]Hydro-Climate Extremes Lab (H-CEL), Ghent, Belgium [15]TUM School of Life Sciences Weihenstephan, Technical University of Munich, Freising, Germany

In summary, the unprecedented availability of data streams describing different facets of the Earth now offers fundamentally new avenues, and several practical hurdles, especially the lack of data analysis, interoperability, and integration into 3rd party data sources. Today, many initiatives within and beyond the Earth system sciences are exploring new approaches to overcome these hurdles and meet the growing interdisciplinary need for data-intensive research -- **using data cubes is one promising avenue**.

The concept of Earth system data cubes and how to operate on them in a formal way is the idea of treating multiple data dimensions, such as spatial, temporal, variable, frequency, and other grids, to allow the effective application of user-defined functions to co-interpret Earth observations and/or model- data integration. An implementation of this concept combines analysis-ready data cubes with a suitable analytic interface on a Blockchain technology (as suggested by SourceEnergy) has never been done before. We have trademarked SourceCubes™ to (1) aggregate ecosystem and climate data into cubes; (2) provide dimensionality analysis on multiple timescales; and (3) model-data integration from 3rd parties. We see many emerging perspectives of this approach for interpreting and applying large-scale data models to commercial applications. The latest developments in artificial intelligence and machine learning can be seamlessly implemented in the SourceCubes™ framework, supporting data-intensive research across disciplinary boundaries.

One such 3rd party data provider to which NASA provided data will be applied is What3Words. What3Words provides libraries available in Java, JavaScript, Swift, Python, Node.js, .NET, PHP and others make it easy to add what3words to navigation systems, and various platforms. SourceEnergy intends to utilize their technical framework to integrate our Blockchain into the W3W APIs.

Part 6: Subcontractors/Consultants

pixelplex, 520 West 28th St. Suite 31, New York, NY 10001

Mr. Hung Vu, Independent Consultant (Acting CTO)

Part 7: Related, Essentially Equivalent, and Duplicate Proposals and Awards

Not applicable. No equivalent or duplicate proposals were submitted.


SourceCubes Coverage
A blockchain based decentralized platform to map land, sea, and atmospheric data into 3 square meter cubes using a 3-dimensional matrix, over Time (4D GPS)
Legend
OZ 1 - Hampton
SourceCube wth Hampton University Doppler
Google Earth
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image IBCAO
Image U.S. Geological Survey
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image IBCAO
Image U.S. Geological Survey
Google Earth
N
View from Space (Altitude: 4107 mi)