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A Collaborative Data Network for the Asia Oceania Region Enabled by Emerging Technologies to Foster Innovation in a Secure and Open Environment.

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A discoverable inventory of items of value and importance to a community, country or region has many benefits. These benefits can be for reporting (state of the environment, achievement of Sustainable Development Goals, conservation objectives), for research (exploration of international phylogenetics, development of new pharmaceuticals), or for economic reasons (tracking the status of fish stocks, timber trade and other food products). As clear from the principles of Open Science, confidence in the value of data is best achieved if the information used to underpin statements and conclusions is open to scrutiny.

Active participation in conserving data in a temporal and spatially relevant manner is desirable. This can result in better knowledge mobilisation and dissemination, and increased community benefits through the capacity building of community partners and their greater involvement in knowledge production and mobilisation activities. Making resources available for the community means ensuring that data (and related materials) are findable and accessible on the Web, and that they comply with adopted international standards making them interoperable and reusable by others (David et al., 2020).

This presentation presents the 'Collaborative Regional Data Access Network' (CREDAN) for the Asia-Oceania region, using the progress made by the Pacific Environment Data Portal (pacific-data.sprep.org) as an exemplar. CREDAN blends the attributes of centralised and decentralised networked databases for the management and discovery of data to comply with (a) FAIR principles, uses criteria to ensure (b) CARE principles are followed, while (c) proposing that the information is held in repositories that follow the TRUST principles. Using Local Context (localcontexts.org/) labels, data owners determine the sovereignty and sharing permissions for their data. To ensure ownership is always clear, and subsequent use of data is tracked, we propose harnessing blockchain technology alongside smart contracts and Decentralised Identifiers (DIDs) to allow for secure discovery and sharing. The use of blockchain, with its features of immutability, security and transparency (data anchoring), will ensure the information about each dataset (metadata, provenance and access rights) is immutably connected to each dataset. Using DIDs, each party in a transformation or movement of data can be recorded on the distributed blockchain ledger. This creates an auditable trail of data provenance that is transparent and tamper-proof, allowing for easy tracing of data back to its origin. The use of smart contracts can further automate and enforce the establishment of common standards for data types, metadata requirements, and vocabulary descriptions, promoting consistency, transparency, and ease of discovery in data management. Smart contracts can be used to enable access permissions to a person or entity, record a data request, and communicate transactions to the primary data owner.

To ensure security of the data gathered by the community CREDAN employs a combination of on-chain and off-chain components: (i) the management of the original data and metadata (off-chain), (ii) data management including establishment of the DIDs and smart contracts (on-chain), and (iii) user access and verification (bridging).

We recommend a strong governance structure to ensure best practices are aligned with international criteria and those set by the component communities. Management of the eventual large volume of data should be anticipated, and partnerships may need to be considered. We propose a seven-step pathway to creation of such a network. A seven-step implementation pathway is suggested, beginning with establishing a common intent, through data collection, and using blockchain technology and unique DiDs to enable secure labelling and tracking of the data.

We consider this work to be of wide interest to data engineers, repository managers, those involved in

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