INTEGRATION OF DIGITAL EARTH AND IoT FOR WATER QUALITY MONITORING

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Introduction

Water is a vital resource for life on Earth, sustaining ecosystems, biodiversity, and societies. However, the quality of water resources is facing significant deterioration due to both natural and anthropogenic disturbances. Hence, there is an urgent need to continuously monitor quality of Australian inland and coastal water [1].

The rapid increase in accessible and diverse data adhering to open data policies, along with advanced Earth Observation (EO) services, offers opportunities for improved management strategies based on climate and environmental data. Ensuring access to data and metadata that are quality-assured and quality-controlled (QA/QC) is of utmost importance, as the quality of information is a fundamental characteristic of data that determines its applicability and reliability. Additionally, integrating data presents several overarching data management challenges, notably in standardisation, interoperability, and the uncertainty quantification (UQ) [2].

Aims

This research project aims to establish a reliable integration framework for Internet of Things (IoT) data with Digital Earth (DE), using water quality monitoring as a case study. The framework aims to provide access, sharing, and use of quality-assured, quality-controlled, and uncertainty-quantified datasets relevant to water resource management decision-making.

Methods

The location of pilot sites (Fig.1), general methodology (Fig.2), data sources and objectives (Fig.3) and workflow of methodology are illustrated in Fig.4 which consists of four distinct blocks for establishing a quality aware and FAIR (Findable, Accessible, Interoperable, and Reusable) compliant framework for DE and IoT data integration with a case-study of water quality monitoring.

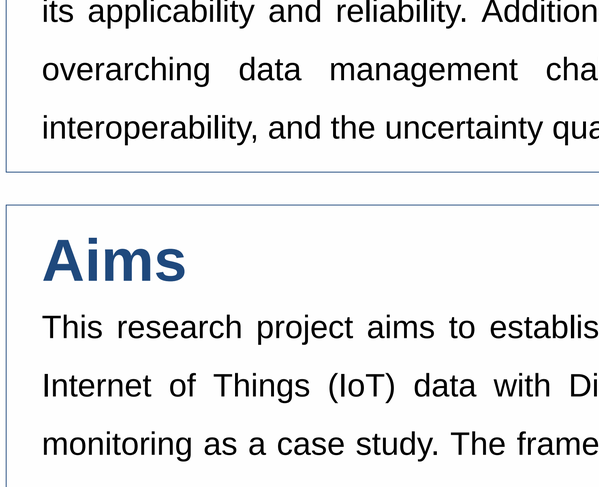

Figure 1. Location of Pilot sites

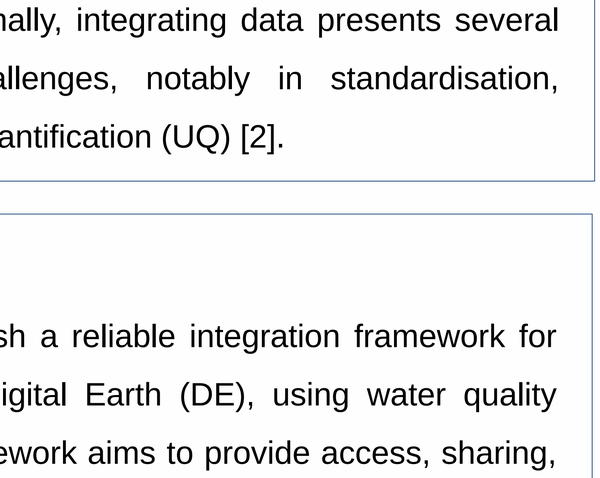

Figure 2. General methodology

- conducting QA/QC throughout data lifecycle.
- uncertainty quantification, documentation, communication to end-users.
- adaptable and standardised interfaces for heterogeneous sources of data to integrate

Figure 3. Data sources and objectives

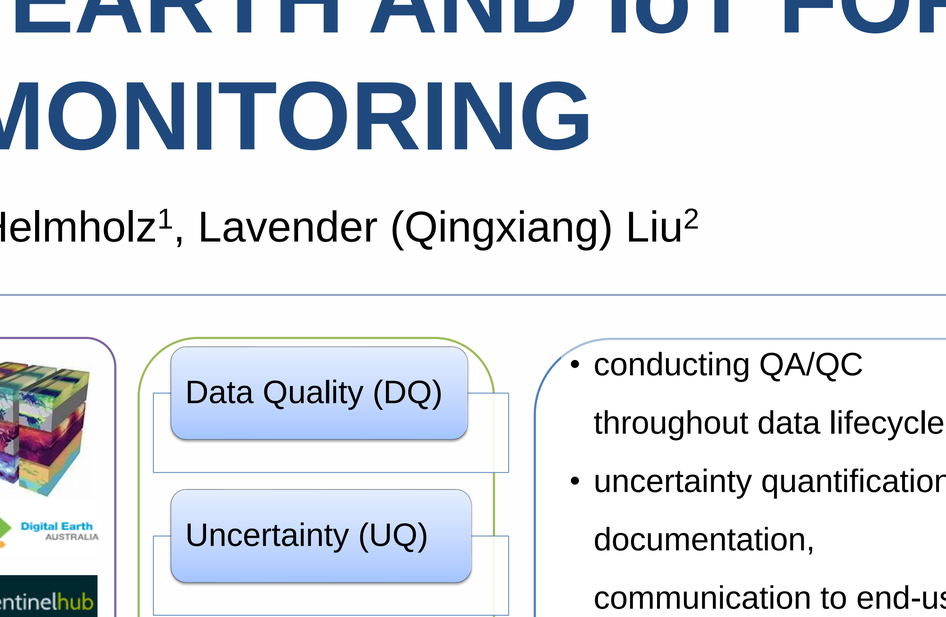

Figure 4. Workflow of methodology

Expected results

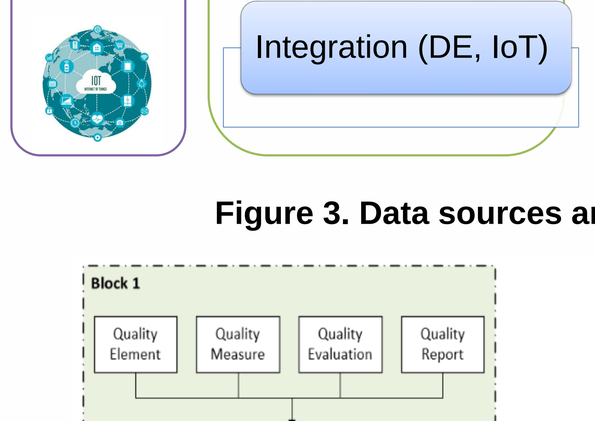

Figure 5. Expected result

- Standardised and accepted QA/QC framework with a full description of the process and transparency.
- Development of a robust domain-specific algorithm that quantifies and documents uncertainty and its propagation
- A prototype system that integrates DE and IoT, ensuring data integrity and interoperability.

References

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