**OGC Project Document 18-068**

**TITLE:** Blockchain and Distributed Ledger Technologies Domain Working Group Charter

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**CATEGORY: Domain Working Group**

# Introduction

Trust is a key requirement of the modern-day digital economy. In most current applications, trust is delegated out to a third-party who acts as a type of Trust Authority. This provides a degree of assurance to participating applications because they can verify information through the Trust Authority. Dependency on a centralized trust authority however carries some risk, should the centralized trust authority become compromised and suddenly become unavailable. To address this risk, a new trust paradigm based on Distributed Ledgers has recently emerged.

Distributed Ledgers are collections of replicated, shared and synchronized digital records that are stored across multiple sites that are geographically spread. The technologies used to implement such ledgers are referred to as Distributed Ledger Technologies (DLT). An example of a DLT is Blockchain, which is a digital ledger of records arranged into linked chunks of data called blocks. The blocks are linked together through a hashing function that provides cryptographic validation on those records.

This document presents the charter of the Blockchain and DLT (BDLT) Domain Working Group (DWG). This charter defines the role of the DWG within the OGC, Blockchain and Distributed Ledger Technologies communities and allows for an open forum for the discussion and presentation of interoperability requirements, use cases, pilots, and implementations of OGC standards in this domain. This charter is to be presented to the OGC’s Technical and Planning committees for consideration.

## Working Group

Operation of OGC Domain Working Group follows the policies and procedures of the [Technical Committee](http://portal.opengeospatial.org/files/?artifact_id=23325) . The following definitions from the Technical Policies and Procedures apply to this DWG Charter template.

Definition of a Domain Working Group: A group (organizationally, a subgroup of the TC) of individuals composed of members of the TC and invited guests, with the specific intent of solving some particular interoperability problem or problems in a particular technology domain for recommendation to the Technical Committee.

Functions of a Domain Working Group:

* Provide a forum for discussion and documentation of interoperability requirements for a given information or user community;
* Provide a forum to discuss and recommend document actions related to Interoperability Program Reports.
* Develop Change Requests Proposals (CRPs) for existing OGC Standards.
* Develop engineering reports with the intent of seeking approval by the TC for release of these documents as OGC White Papers, [Discussion Papers](#_gjdgxs) or [Best Practices Papers](#_30j0zll).

Informational presentations and discussions about the market use of adopted OGC Standards.

* Have a formal approved charter that defines the DWGs Scope of Work and estimated timeline for completion of the work.

Have all-member voting policies (unless otherwise stated).

Have missions and goals defined by the TC.

A DWG Does Not work on RFC submissions, candidate standards, or revisions to existing OGC Standards. However, a DWG can develop change requests as document interoperability requirements that can then be submitted as work items to a SWG.

A DWG may determine that they wish to have public collaboration, such as in teleconference, email discussions, or a public twiki. In this case, the DWG shall make a motion to the TC to approve public participation in the DWG. Voting in DWGs is by simple majority of OGC Members present at the WG meeting, not just Voting TC Members, with the caveat that no OGC Member organization may cast more than one vote in a WG vote

# Purpose of Working Group

The purpose of the BDLT DWG and its overall mission in relation to OGC processes and OGC’s business plan is to building understanding of blockchain and distributed ledger technologies, as well as the potential requirements for geospatial standardization within those technologies. Another purpose of the BDLT DWG is to identify gaps and issues that should be addressed to improve geospatial standardization in Blockchain and DLT.

# Problem Statement

At present, there are several DLT services and networks available. There is however no standard for how those DLT should encode geospatial information such as locations, coordinates and coordinate reference systems. The various DLT have therefore implemented ad-hoc geo encoding approaches. This situation is likely to lead to a problem of limited interoperability between information held in different DLT networks. Limited interoperability typically has the effect of higher costs for users because of limited options for data exchange. Furthermore, the risk of information loss increases when there is limited interoperability between systems.

By far, the most widely cited application of blockchain technology is in the finance sector where it can be used as a cryptocurrency as shown by Bitcoin and Ethereum. However, other application areas are gaining popularity too, demonstrating the utility of blockchain in non-financial sectors. Blockchain has been used in a variety of applications, for example cryptocurrencies, land registration, and justice. In each of these application areas, location can play a key role. For example, the location of transactions can determine what taxes apply, the location of the boundary of a property forms the basis of its registration, and the location where evidence is discovered in a crime scene can have an impact on judicial proceedings.

Recognizing the role that location can play in applications of blockchain, the OGC initiated a review of DLT and blockchain. The review was initiated within the OGC Technology Trends activity, which has been set up to continuously provide analysis of technology trends and advise on their potential impact of current and future OGC standards. A discussion paper (OGC 18-041r1) with the purpose of improving the OGC's understanding of blockchain and distributed ledger technologies was approved at the June 2018 TC meeting in Fort Collins [1].

The discussion paper has identified case studies of blockchain implementation in the following geospatial-related areas:

* Land Registration
* Space
* City Services
* Pan-Government Registries

The discussion paper also identified related standardization initiatives by the following organizations:

* International Organization for Standardization (ISO)
* International Federation of Surveyors (FIG)
* The World Bank
* Telecommunications sector of the International Telecommunication Union (ITU-T)
* Potential Standards from FOAM

Amongst other recommendations, the discussion paper recommended the establishment of a DWG to help define future requirements for geospatial standardization of DLT (including blockchain) and maintain liaison with other standards-development organizations such as ISO/TC 307 and industry associations such as FIG.

Additional application areas that the charter members identified include:

* Digital Twin representations of any entity within the Blockchain
* The use of immutable observations in the Internet of Things (IoT) to resolve potential disputes
* Blockchain-supported asset management

# Charter

The Blockchain and DLT DWG is being established to address the gap in the OGC baseline with regards to geospatial data in DLT and to ensure knowledge is exchanged effectively between the relevant standards organizations, the OGC membership and the broader geospatial community. Although this group will not be the platform for creating new standards, it will be the platform to discuss and understand any issues, concerns, or barriers to interoperability to ensure that geospatial data and other forms of location-referenced information can be used effectively within the wider Blockchain and DLT communities.

## Charter Members.

The initial membership of the Blockchain and DLT DWG will be open to OGC members. It is being chartered by the following members and individuals with extensive education and experience in blockchain, distributed ledger technologies and OGC web services security issues, namely:

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| --- | --- |
| **NAME** | **AFFILIATION** |
| Kristoffer Josefsson | FOAM |
| Colin George | Real Factors |
| Andreas Matheus | Secure Dimensions |
| David Williams | David Williams |
| Perry Peterson | PYXIS DigitalEarth Solutions |
| Steve Liang | SensorUp |
| Matthew Purss | Geoscience Australia |
| Peter Vretanos | CubeWerx |

## Membership will be open to those with an interest in blockchain and wider DLT. Active membership is defined by regular member contributions of material or participation in DWG meetings and discussions.

## Key Activities.

This DWG is being established to address geospatial interoperability challenges within the blockchain and wider DLT communities. The group will facilitate discussion of the requirements that define different exchange methods, encodings in blockchain records and architectures to ensure that location-referenced information that is based on open standards can also be used within blockchain and other DLT. Initial activities will include:

1. Identify and define use cases
2. Discuss case studies for Blockchain and OGC Service Architecture interoperability
3. Discuss encryption and security implications of Blockchain and other DLT
4. Explore issues of Trust and Proof-of-Location
5. Explore Smart Contracts technology
6. Define any areas for standardization and create necessary Standards Working Groups to address the gaps in the OGC standards baseline.
7. Explore the potential for an interoperability pilots and testbeds that help define geospatial architectures that benefit from Blockchain and other DLT.

## Business Case

Some of the issues that need to be addressed by the DWG include the encoding of geospatial information and metadata in DLT. Without improvements to standardization in this area of DLT, the problem of limited interoperability will become an obstacle for growth.

Another issue that needs to be addressed by the DWG is that of communication and outreach to the wider DLT community. Without user education activities that reach the wider DLT community, there is a risk of slow uptake of geospatial standards within that community.

The potential benefits of geospatial standardization in DLT are:

* Greater interoperability between different DLT implementations
* Efficient integration of different DLT implementations that hold location-referenced information
* Better integrity of provenance records that contain geospatial information
* Greater level of detail in location-references

The potential benefits of DLT to geospatial architecture are:

* Improved efficiency in trust determination by disintermediation of 3rd party trust service providers (i.e. trust from distributed nature)
* Improved transparency through sharing of immutable records

# Organizational Approach and Scope of Work

## Blockchain and DLT DWG Business Goals

The Blockchain and DLT DWG has the following goals.

1. Understand implementation barriers for the broader use of geospatial data in distributed ledger technologies and document them in a way that can guide future project work.
2. Identify interfaces and information encodings that complement the existing OGC standards, but are tailored to the requirements of the DLT community.
3. Promote the development of OGC best practices and standards to meet the needs and objectives of the DLT community.
4. Identify use cases where efforts to streamline data transfer and exchange requirements result in a net gain for the community by broadening the usefulness of geospatial data in Blockchain and other DLT.
5. Monitor the practices of domains and DWGs with similar objectives and problem sets, and recognize potential for sharing and collaboration between domains and DWGs.
6. Define the supporting infrastructure for the community to achieve these goals.

## Blockchain and DLT DWG Mission and Role

The Blockchain and DLT DWG will concern itself with technology issues related to blockchain and other DLT so that geospatial data and services can be more effectively represented in DLT, and the means by which those issues are appropriately factored into the OGC standards development process.

1. The **mission** of the Blockchain and Distributed Ledger Technologies Domain Working Group is to enable the OGC as a community to improve its understanding of distributed ledger technologies, their use cases, applications and opportunities for geospatial standardization; review and assess the impact of distributed ledger technologies on the OGC standards baseline.
2. The **role** of the Blockchain and Distributed Ledger Technologies Domain Working Group is to serve as a forum within OGC for distributed ledger technologies issues; to present, refine and focus interoperability-related issues to the Technical Committee; and to serve where appropriate as a liaison to other relevant industry, government, independent, research, and standards development organizations active within the distributed ledger technologies domain.

## Activities planned for the Blockchain and DLT DWG

The activities that the BDLT DWG shall undertake include:

* Regular presentations and discussions during OGC Technical Committee meetings
* Informing and providing alternatives to the DLT community for use of geospatial standards
* Outreach and education of the DLT community
* Organization of summits and workshops
* Advising the OGC Innovation Program (IP) on ideas for future IP activities (e.g. testbeds)
* Initiate services or prototypes that demonstrate convergence of geospatial technologies and Blockchain, as well as with other DLT
* Liaison with other OGC working groups (e.g. the Security DWG, Smart Cities DWG).
* Engagement with other standards-developing organizations (e.g. ISO)

# References

1. Hobona, G., De Lathouwer, B.: Geospatial Standardization of Distributed Ledger Technologies, OGC 18-041r1, Open Geospatial Consortium (2018)