

# ITU Standards for Blockchain and Distributed Ledger Technology

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*April 2019*



# Context: Blockchain and DLT – More than just a cryptocurrency infrastructure

- ITU definitions (work in progress):
  - **Distributed ledger:** *“A type of ledger, that is shared, replicated, and synchronized in a distributed manner.”*
  - **Block:** *“Individual data unit of a blockchain, composed of a collection of transactions and a block header.”*
  - **Blockchain:** *“A type of distributed ledger which is comprised of digitally recorded data, which may be continuously growing chain of blocks, and where each of block is cryptographically linked hardened against tampering and revision.”*
- Use cases outside the finance sector
  - Vertical sectors:
    - Telecoms (e.g., number portability, settlement of roaming, wholesale voice and data)
    - Public sector (e.g., voting, transparency)
    - Healthcare (e.g., access to health records)
    - Energy (e.g., micro grids)
    - etc.
  - Horizontal:
    - Identity management
    - Security management
    - Data provenance



# Blockchain and DLT – ITU Portfolio

## ITU-T Focus Groups

### Pre-standardization

- **Application of DLT (FG DLT)** - identifies use cases, works on terminology, a high-level architecture, an assessment framework, and regulatory aspects
- **Digital Fiat Currency (FG DFC)** - explores blockchain as enabler for CBDC
- **Data Processing and Management to support IoT and Smart Cities & Communities (FG DPM)** - studies use of blockchain in this context

Open to non-members

## ITU-T Study Groups

### Formal standardization

- **SG13** - Cloud computing requirements for blockchain as a service (BaaS); blockchain in NGNe (2 work items)
- **SG16** - DLT and e-services (Question 22/16) (4 work items)
- **SG17** - Security aspects for DLT (Question 14/17: 10 work items)
- **SG20** - “Blockchain of things” (4 work items)

ITU members only



# Focus Group on Application of DLT (FG DLT) – Overview

## Leaders

**Wei Kai**  
(CAICT, China)

**Suzana Maranhão Moreno**  
(BNDES, Brazil)

## Structure

**WG1:** Terms, Definitions, Concepts

**WG2:** Applications & Services

**WG3:** Technology Ref. Framework

**WG4:** Policy Framework

**WG5:** Standardization Roadmap

## Timeline

**Lifetime** from Oct 2017 to Sept 2019

1. **Geneva, 17-19 October 2017 (ITU)**
2. **Bern, 5-7 February 2018 (Swisscom)**
3. **Geneva, 28-30 May 2018 (ITU)**
4. **Beijing, 9-12 Oct 2018 (CAICT)**
5. **Rio de Janeiro, 14-17 Jan 2019 (BNDES)**
6. **Madrid, 1-4 April 2019 (Alastria)**
7. **Geneva: 29 July-2 August 2019 (ITU)**



# Focus Group on Application of DLT (FG DLT) – Status of Deliverables

Deliverables (Number, title)	Description	Completion %	Completion by meeting	Possible Study Group output / comments	
D1.1	Terms and definitions	Harmonization with related terminology from ITU-T SG17, ISO/TC 307, NIST, and others.	70	April 2019	Recommendation
D2.1	DLT use cases	More than 50 use cases reviewed, including from finance, healthcare, utilities, telecoms sectors, as well as cross-cutting DLT applications (e.g., identity management, data provenance).	50	Jul/Aug 2019	Technical Paper
D3.1	DLT reference architecture	Includes hierarchical relationships, specific functions and modules.	70	April 2019	Recommendation
D3.2	Overview of existing platforms and mapping to DLT reference architecture	Covers most popular DLT platforms.	40	Jul/Aug 2019	Technical Paper
D3.3	Assessment criteria for DLT platforms	Introduction of 17 DLT platform assessment criteria.	70	April 2019	Recommendation
D4.1	Regulatory framework	Discussion of key DLT features and associated regulatory challenges. Examples of approaches for users, regulators and solution providers to address these challenges.	50	Jul/Aug 2019	Technical Paper
Dx.y	Outlook on future DLT	Introduction of emerging concepts related to DLT.	70	April 2019	Technical Paper



# Focus Group on Application of DLT (FG DLT) – Terminology

- Currently 37 DLT-related terms defined
- Work takes into consideration ongoing discussion in ISO/TC 307, NIST, DIN, ITU-T, and elsewhere
- Moving forward, it will provide a useful reference for DLT work in ITU Study Groups and beyond



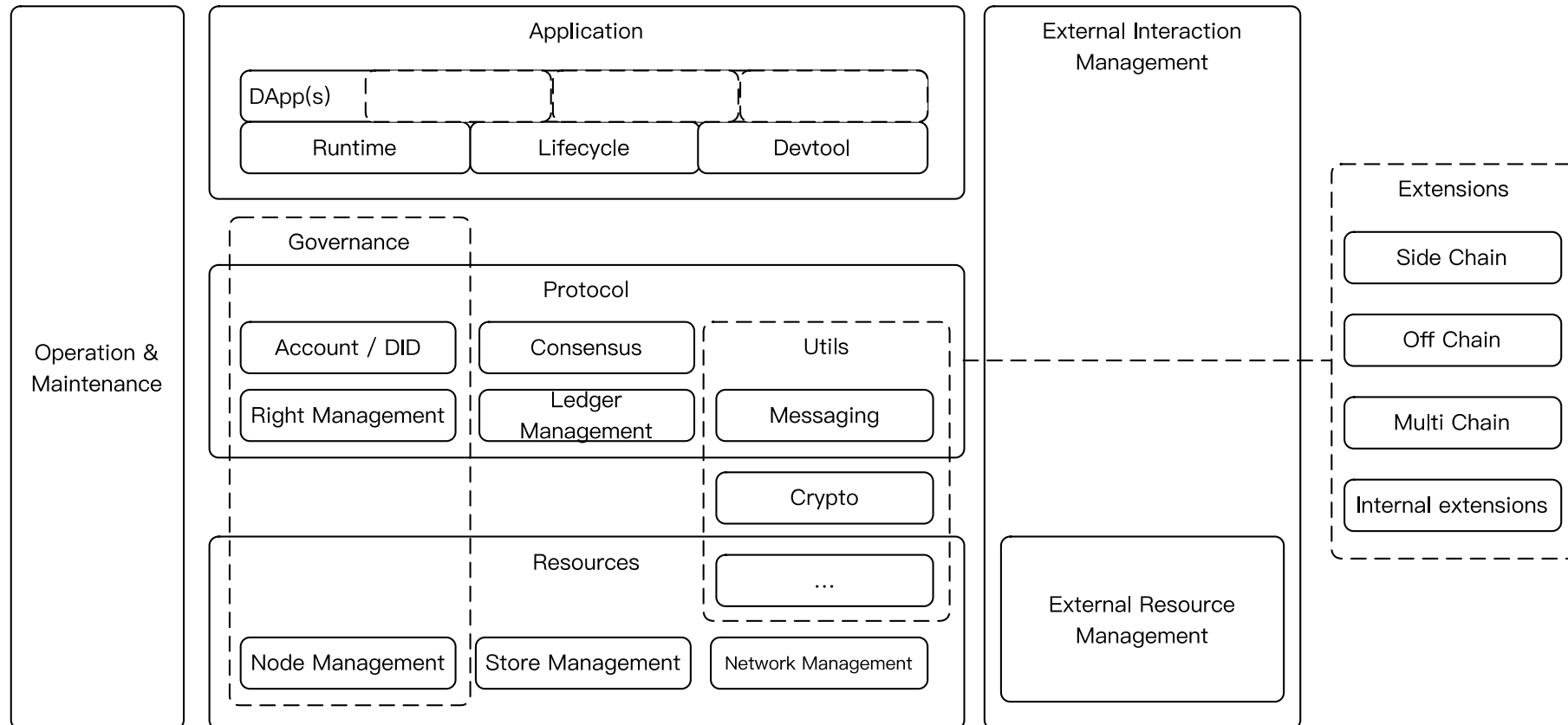
# Focus Group on Application of DLT (FG DLT) – Use cases

- Collecting and analyzing real world DLT use cases using a standardized reporting template
  - Description of the value added by the use of DLT in use case vs. non-DLT
  - Highlights significance of DLT in the attainment of the UN Sustainable Development Goals
  - Discusses any implication or requirements for future standards work

Use Case Summary			
Use Case ID:		Use Case Type:	
Submission Date:		Is Use Case supporting SDGs:	
Use Case Title:		Domain:	
Status of Case:		Sub-Domain:	
Contact information of person submitting/managing the use-case:			
Proposing Organization:			
Short Description:			
Long description:			
SDG in Focus (when applicable):			
Value Transfer:	No.	Number of Users:	
Types of Users:			
Stakeholders:			
Data:			
Identification:			
Predicted Outcomes:			
Overview of the Business Problem or Opportunity			
-			
Why Distributed Ledger Technology?			



# Focus Group on Application of DLT (FG DLT) – Reference architecture



Goal: Abstract hierarchical architecture of distributed ledger technologies. Cover (almost) all DLTs, including public blockchains represented by Ethereum and Bitcoin, private blockchains represented by Hyperledger Fabric, and non-blockchain DLT systems, such as IOTA Tangle or R3 CORDA.





# Focus Group on Application of DLT (FG DLT) – Platform mapping

- Describing existing DLT platforms and how they related to reference architecture
- Platforms currently considered include: Ontology, Ontology 2B, Stellar, Sawtooth, Fabric, EOS, Ethereum, Alastria, Corda, Quorum, IOTA, Disledger, Hashgraph, Ardor ... *input from other platforms welcome*

Mapping template:

Summary	Governance & Compliance		Smart Contract	AAA Mgt	Consensus	Ledger Mgt	Node Mgt
	Governance	Trust Endorsement Policy					

Data Storage	Network Mgt	Message	Crypto Lib	Operation & Maintenance		External Resource Mgt	Extensions
				Node Mgt	Chain Network		



# Focus Group on Application of DLT (FG DLT) – Platform assessment

Core Technology	Effectiveness of the Consensus Algorithms	Proper Private Key Management		
	Transaction Confirmation Time	Smart Contract	Traceability	
	Basic Function	Compliance of cryptography		Throughput
Application	Memory expansion	Authentication and Authorization	Platform Stability	Data Privacy
	Application Stability		Business Separation	Components Support
Operations	Node Management	Failure Recovery		
	Auditability	Data Migration		

Goal: Describe DLT platform assessment criteria and methods.



# Focus Group on Application of DLT (FG DLT) – Regulatory framework

DLT key features	Regulatory aspects include	Recommendations
<b>Distributed</b>	<ul style="list-style-type: none"> <li>• Applicable law if nodes are established in multiple jurisdictions</li> <li>• Who is the legal subject</li> </ul>	<p>(For users and implementers)</p> <p>For policy makers and regulators</p> <p>(For industry)</p>
<b>Tamper-evident and -resistant</b>	<ul style="list-style-type: none"> <li>• Immutable shared ledgers, error corrections mechanisms</li> <li>• Right to be forgotten</li> <li>• Smart contracts</li> </ul>	
<b>Shared</b>	<ul style="list-style-type: none"> <li>• Privacy &amp; data protection</li> </ul>	
<b>Incentive- and asset-based</b>	<ul style="list-style-type: none"> <li>• Meaning of token/coin</li> <li>• Legal aspects of ICOs</li> <li>• Future of crypto-economy</li> </ul>	
<b>Open and transparent</b>	<ul style="list-style-type: none"> <li>• How to deal with abuse</li> </ul>	
<b>Anonymous</b>	<ul style="list-style-type: none"> <li>• Considerations of anonymity vs identification (AML/KYC)</li> </ul>	
<b>Autonomous</b>	<ul style="list-style-type: none"> <li>• Implications of autonomous smart contract execution</li> <li>• Automation of governance rules</li> </ul>	

Goal: Provide guidance to policy makers, regulators.





Find out more at <https://itu.int/en/ITU-T/focusgroups/dlt/>





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