Connected Smart Cities Conference

"Global Standards for IoT and Smart Cities & Communities“

11 January 2018, Brussels

ITU-T activities related to Smart Cities - focus on SG20 and FG-DPM

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ITU activities on IoT and Smart Cities

ITU-T Study Group 20:
Development and implementation of international standards

U4SSC:
UN global platform for knowledge sharing

ITU-T FG-DPM:
Research & pre-standardization work on data processing & management

Resolution 98
Enhancing the standardization of IoT and Smart Cities and Communities for global development

IoT4SDGs: *Considers the importance of IoT to contribute to achieving the 2030 Agenda for Sustainable Development*

ITU-T Study Group 20: Internet of things (IoT) and smart cities & communities (SC&C)

Lead Study Group on

- Internet of things and its applications
- Smart Cities and Communities, incl. its e-services and smart services
- IoT identification

Responsible for studies relating to IoT and its applications, and SC&C

Including studies related to Big data aspects of IoT and SC&C, e-services and smart services for SC&C

Established in June 2015 to consolidate the various ITU-T activities on IoT

Last SG20 meeting on 4-15 Sept 2017, Geneva

Next SG20 (WP1) Rapporteurs Group meeting on 15-24 Jan 2018, Geneva

Next SG20 meeting on 30 Apr-11 May 2018, Geneva – TBC

SG20 Home page: http://www.itu.int/en/ITU-T/studygroups/2017-2020/20/Pages/default.aspx

ITU-T published Recs on IoT and SC&C aspects

[10 Jan 2018 status, incl. pre-SG20 achievements]

ITU-T Y.4000 series	Recommendation category	Number of published Recs
Y.4000-Y.4049	General	3
Y.4050-Y.4099	Definitions and terminologies	1
Y.4100-Y.4249	Requirements and use cases	18
Y.4250-Y.4399	Infrastructure, connectivity and networks	3 (+ 2 in AAP)
Y.4400-Y.4549	Frameworks, architectures and protocols	20 (+ 1 in AAP)
Y.4550-Y.4699	Services, applications, computation and data processing	3
Y.4700-Y.4799	Management, control and performance	3
Y.4800-Y.4899	Identification and security	6
Y.4900-Y.4999	Evaluation and assessment	4
Y.4000-Y.4999	**Informative docs (Suppl., Tech. Report**)	20

All approved and ongoing ITU-T IoT and SC&C specifications are collected in the "IoT and SC&C Standards Roadmap" [cross-SDO roadmap] maintained by JCA-IoT and SC&C

SG20 structure [structure update at March 2017 SG20 meeting]

WP1/20	
Q1/20	End to end connectivity, networks, interoperability, infrastructures and Big Data aspects related to IoT and SC&C
Q2/20	Requirements, capabilities and use cases across verticals
Q3/20	Architectures, management, protocols and Quality of Service
Q4/20	e/Smart services, applications and supporting platforms
WP2/20	
Q5/20	Research and emerging technologies, terminology and definitions
Q6/20	Security, privacy, trust and identification
Q7/20	Evaluation and assessment of Smart Sustainable Cities and Communities
Regional groups	
SG20RG-LATAM	ITU-T SG20 Regional Group for the Latin American Region
SG20RG-EECAT	ITU-T SG20 Regional Group for Eastern Europe, Central Asia and Transcaucasia
SG20RG-ARB	ITU-T SG20 Regional Group for the Arab Region
SG20RG-AFR	ITU-T SG20 Regional Group for the Africa Region
Other groups under SG20	
JCA-IoT and SC&C	Joint Coordination Activity on IoT and SC&C [maintains IoT and SC&C standards roadmap]
FG-DPM	FG on Data Processing and Management to support IoT and SC&C

SG20 specifications focused on smart cities and communities 1/2

Approved Recommendations

- ITU-T Y.4805 **"Identifier service requirements for the interoperability of smart city applications"**
- **Key Performance Indicators for Smart Cities:** Y.4900/L.1600, Y.4901/L.1601, Y.4902/L.1602, Y.4903/L.1603

Recommendations currently in AAP

- ITU-T Y.4200 (ex-Y.SCP) **"Requirements for interoperability of smart city platforms"**
- ITU-T Y.4201 (ex-Y.frame-SCC) **"High-level requirements and reference framework of smart city platform"**

New work items launched at the Sept 2017 meeting

Question	Working title	Title
Q2/20	ITU-T Y.SCC-Reqts	Common requirements and capabilities of smart cities and communities from IoT and ICT perspectives
Q4/20	Y.disaster_notification	Framework of the disaster notification of the population in Smart Cities and Communities
Q5/20	Y.MEDT	Methodology for Building Sustainable Capabilities during Enterprises' Digital Transformation
Q6/20	Y.API4IOT	API for IoT Open Data in Smart Cities
Q6/20	Y.FW-IC-MDSC	Framework of identification and connectivity of Moving Devices in Smart City
Q7/20	Y.SSC-IA	Smart Sustainable City Impact Assessment
Q7/20	Y.SSC-MM	Smart Sustainable City Maturity Model
Q7/20	Y.AFDTS	Assessment Framework for Digital Transformation of Sectors in Smart Cities

SG20 specifications focused on smart cities and communities 2/2

Approved Supplements

- ITU-T Y.Supp.34 to ITU-T Y.4000 series **"Smart Sustainable Cities (SSC) - Setting stage for stakeholders' engagement"**
- ITU-T Y.Supp.33 to ITU-T Y.4000 series **"SSC - Master plan"**
- ITU-T Y.Supp.32 to ITU-T Y.4000 series **"SSC - a guide for city leaders"**
- ITU-T Y Supp.45 to ITU-T Y.4000-series **"An overview of smart cities and communities and the role of ICT"**
- ITU-T Y.Supp.37 to ITU-T Y.4050 series **"Definition for SSC"**
- ITU-T Y.Supp.38 to ITU-T Y.4050 series **"SSC - An analysis of definitions"**
- ITU-T Y.Supp.29 to ITU-T Y.4250 series **"Multi-service infrastructure for SSC in new-development areas"**
- ITU-T Y.Supp.30 to ITU-T Y.4250 series **"Overview of SSC infrastructure"**
- ITU-T Y.Supp.27 to ITU-T Y.4400 series **"Setting the framework for an ICT architecture of SSC"**
- ITU-T Y.Supp.31 to ITU-T Y.4550 series **"SSC - Intelligent sustainable buildings"**
- ITU-T Y.Supp.28 to ITU-T Y.4550 series **"Integrated management for SSC"**
- ITU-T Y.Supp.36 to ITU-T Y.4550 series **"Smart water management in cities"**
- ITU-T Y.Supp.39 to ITU-T Y.4900 series **"Key performance indicators definitions for SSC"**

Smart cities and communities studies in progress in SG20: summary view of the ongoing topics

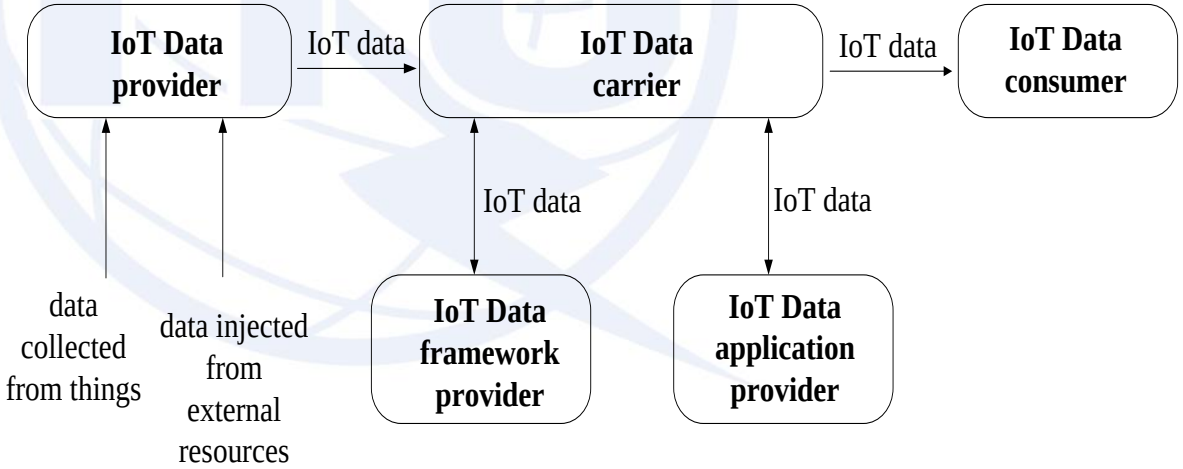
- SC&C related ecosystem, applications and services
  - studies directly related to SC&C include: smart grids, water, mobility, logistic, waste, healthcare, e-government, education, transport, utilities
- Requirements and capabilities from IoT and ICT perspectives
  - including ICT requirements and related comm. technologies to be taken into account when designing SC&C services
- General reference models of SC&C
  - including spatio-temporal modelling for SC&C
- Frameworks
  - impact assessment, maturity model, assessment framework for digital transformation of sectors in SC&C
  - Identification of architectural and service compositions, and views on SC&C
- Entities, functions and reference points required to support SC&C applications
- Efficient service analysis, strategic planning, deployment and implementation of SC&C
  - taking into account different needs of developed and developing countries
- ICT use for SC&C physical infrastructure
- Open Data in SC&C
  - incl. framework, open indicators, APIs

A basis for further ITU-T work concerning Data Management in IoT: Y.4114 "Specific requirements and capabilities of the IoT for Big Data"

Y.4114 complements the common requirements and functional framework of the IoT [ITU-T Y.2066] [ITU-T Y.2068] in terms of the specific requirements and capabilities that the IoT is expected to support in order to address the challenges related to Big Data

It is expected to constitute a basis for further ITU-T standardization work on Data Management in the IoT (e.g. functional entities, APIs and protocols), **incl. for FG-DPM**

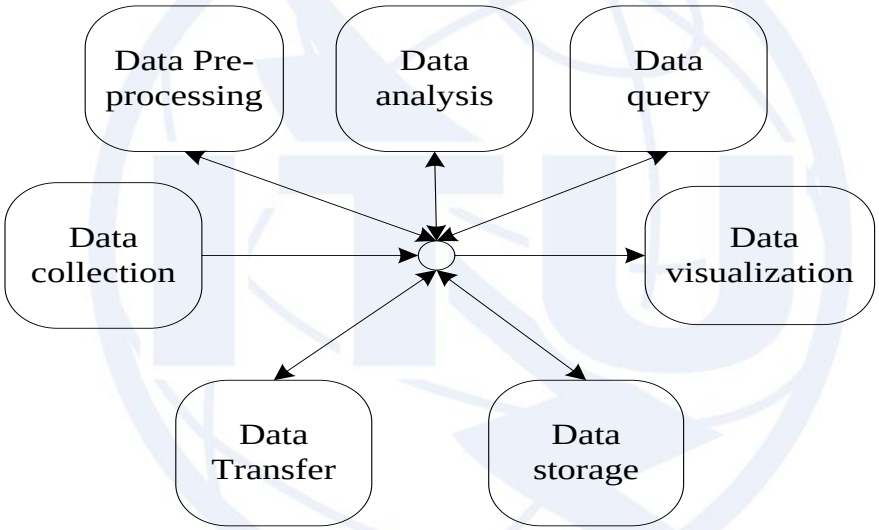
The IoT data roles identified in Y.4114 [intended as the key roles which are relevant in an IoT deployment from a data operation perspective]



IoT data operations in Y.4114

Abstract representation of the various IoT data operations and related data flows (considering that the diverse set of concrete IoT deployments do not imply a unique logical sequencing of the various IoT data operations)

IoT data operations



The sequencing of IoT data operations in IoT highly depends on the service and deployment scenarios (e.g. data analysis with respect to scenarios implementing cloud computing vs edge computing)

Y.4114 Appendixes also describe relationships between IoT data roles and IoT data operations, as well as between IoT data operations and IoT components

ITU-T Focus Group on "Data Processing and Management to support IoT and Smart Cities & Communities" (FG-DPM)

- Established at March 2017 SG20 meeting, 1st meeting on July 17-19, 2nd meeting on Oct 20-25
- Terms of Reference
  - To study and survey existing technologies, platforms, guidelines and standards for data processing and management incl. data format and meta-data in support of the mandate of SG20
  - To promote establishment of data management frameworks
  - To study security and trust within data management frameworks, to study data protection techniques
  - To facilitate cross-cutting data interoperability
  - To investigate emerging technologies and trends to support data management including blockchain
  - To identify challenges in the standardization activities for data processing and management
- SG20 is the parent ITU-T Study Group
- One Year life time from the first meeting (renewable)
- Management team
  - Chair: Gyu Myoung Lee (KAIST, Korea); 8 Vice Chairs: Argentina, China Telecom, Climate Associates, Etisalat, OASC, Swisscom, Tunisia, UN-Habitat
- WG structure
  - WG1 - Use Cases, Requirements and Applications/Services **(Chair: OASC Chair, Martin Brynskov)**
  - WG2 - DPM Framework, Architectures and Core Components (Co-Chairs: OGC, TelecomSudParis)
  - WG3 - Data sharing, Interoperability and Blockchain (Chair: Huawei)
  - WG4 - Security, Privacy and Trust including Governance (Chair: UN-Habitat)
  - WG5 – Data Economy, commercialization and monetization (Co-Chairs: Smart Dubai, Etisalat)

FG-DPM Home page: https://www.itu.int/en/ITU-T/focusgroups/dpm/Pages/default.aspx

FG-DPM Working Groups and planned Deliverables

Working Groups
WG1 **Use Cases, Requirements and Applications/Services**
WG2 **DPM Framework, Architectures and Core Components**
WG3 **Data sharing, Interoperability and Blockchain**
WG4 **Security, Privacy and Trust including Governance**
WG5 **Data Economy, commercialization, and monetization**

Specific deliverables for each WG were identified at the first FG-DPM meeting [an "extended set of deliverables" at current stage, possible consolidation at later stage]

Some key deliverables (not exhaustive list):

- D1.1: Use Cases Analysis and General Requirements for DPM
- D2.1 DPM Framework for Data-driven IoT and SC&C
- D2.2 DPM Functional Architectures
- D3.1 Framework of Open/Private Data
- D3.2 Technical Enablers for Open Data Platform
- D3.6 Blockchain-based Data Exchange and Sharing Technology
- D4.1 Framework of Security and Privacy in DPM
- D4.5 Data Governance Framework for IoT and SC&C

Some items are common to all WGs: gap analysis, requirements specific to the area under study, terms and definitions, standardization roadmap

FG-DPM has established relationships with a number of external parties, incl. (but not limited to) ETSI ISG CIM, ISO, OGC

Some details on FG-DPM: WG01 status - D1.1

WG01 D1.1: Use Cases Analysis and General Requirements for DPM

Development leader and Editor: Marco Carugi (NEC)

Outcome of 2nd FG-DPM meeting, 20-25 Oct 2017

- First version of unified template for DPM use cases (with other efforts' consideration: SG20, NIST, ISO)
- Collection of the first 3 use cases – they still require adaptation to the template
  - E-health/Assisted Living from Vicinity project
  - Smart Cities from SynchroniCity project
  - Digital Interface to urban processes for registered legal entities from GOLEM IMS GMBH (Austria)
- Draft list of external sources and references for collection and selection of adequate DPM use cases – *see details in backup slide*
- Definition of the DPM use case development process

Outcome of 21 Dec 2017 WG01 D1.1 electronic meeting

- Definition of detailed action plan - inputs to 25 Jan D1.1 e-meeting and/or 3rd FG-DPM meeting, incl.
  - Input on taxonomy (incl. versus use case template) - in progress
  - Inputs on governance and quality evaluation aspects for the use case template
  - Inputs on smart building use cases, smart city use cases and further Vicinity use cases
  - Adaptation of already collected use cases to the template
  - Example requirements based on use cases (to progress discussion on how to express the requirements)
- Additional use cases (cross-domain use cases in priority) are expected based on potential contributors - *see external sources in backup slide*

Current D1.1 use case template 1/2

Use case Title	Name	
	Domain – Cross domain	
	Version	
	Source	
Objective		
Background	Current practice	
	Rational for use case	
Ecosystem	• Stakeholder roles and responsibilities • Stakeholder relationships	
Scenario	• Contextual illustration • Pre-requisites • Pre-conditions (if any) • Triggers • Scenario • Process flow diagram • Post-conditions • Information exchange	

DPM capabilities considerations	Data characteristics
	• Data input characteristics
	  ○ Data granularity
	  ○ Characteristics of meta data
	• Data output characteristics	

	Data curation
	• Processing capability
	  ○ Data collection
	  ○ Data pre-processing
	  ○ …
	• System capability
	  ○ Performance (5Vs)
	  ○ …
	• Management capability
	  ○ Creating
	  ○ Collecting
	  ○ Access
	  ○ Storage
	  ○ Administration
	  ○ Update
	  ○ Destroying
	  ○ Preservation
	  ○ …	

	Data application	

Guidelines:

each grey box is a use case entry;

each bullet is something the use case contributor may want to consider

Current D1.1 use case template 2/2

Governance considerations	Personal data consideration	
	IPR and Licensing consideration • Open data vs private data	
	Risk management • Cybersecurity • Privacy • Safety	
	Data distribution • Technical management considerations on data distribution	
Lifecycle consideration	Risk management process	
	Incident management process	
	Continuous improvement process	
Requirements consideration	Operational requirements • Security and privacy • Availability • Safety • Trust	
	Specific requirements • Isolation • Security • Interoperability • Flexibility	
	Other requirements	
	Available International Standards (if any)	
	References (related to standards or other useful information)	
	Available International Standards (if any)	
Architecture considerations	• Deployment Considerations • Communication Infrastructure • Performance Criteria • Interface Requirements • User Interface • APIs to be Exposed to the Application from Platform • Data Backup, Archiving and Recovery • Remote device management • Start-up/Shutdown Process	
General remarks		

Guidelines:

each grey box is a use case entry;

each bullet is something the use case contributor may want to consider

WG01 status - D1.2

WG01 D1.2 "IoT and SC&C Applications and Services using DPM"

- Planned for initiation at the 3rd FG-DPM meeting
- Main goal: to develop "guidelines" for applications based on the work done in D1.1

Next ITU-T events relevant for smart cities

- WP1/20 Rapporteurs Group Meeting (Q1, Q2, Q3, Q4), Geneva, 15-24 Jan 2018 (Questions' meetings on 15-23, WP1/20 meeting on 24)
- 1st ITU Workshop on Data Processing and Management for IoT and Smart Cities & Communities, Brussels, 19 Feb 2018 (co-organized with EC and OASC)
- 3rd FG-DPM meeting, Brussels, 20-23 Feb 2018
- SG20 meeting, Geneva, 30 Apr-11 May 2018 – date and location to be confirmed officially

Thanks for your attention

Backup

FG-DPM WG01 D1.1: external sources and references

Draft list of external sources and references for collection and selection of adequate DPM use cases (outcome of 2nd FG-DPM meeting)

- ITU-T SG20 draft Supplement Y.IoT-Use-Cases [accessible at https://www.itu.int/md/T17-SG20-170904-TD-GEN-0484/en]
- ITU-T FG-M2M D1.1 e-health Use Cases [accessible at http://www.itu.int/pub/T-FG-M2M-2014-D1.1]
- ISO/IEC JTC1/SC41 (ex-WG10) (IoT) Use Cases [accessible at https://www.itu.int/md/T17-SG20-170313-TD-GEN-0098]
- ISO/IEC JTC1 WG9 (to become ISO/IEC JTC1 SC42) 20547-2 (and future version of it)
- ISO TC268
- IEC Edge Intelligence Use Cases [accessible at http://www.iec.ch/whitepaper/pdf/IEC_WP_Edge_Intelligence.pdf]
- IEEE Smart Cities
- oneM2M TR-0001 and TR-0018 Use Cases [accessible at http://www.onem2m.org/technical/latest-drafts]
- ETSI ISG CIM [https://docbox.etsi.org/ISG/CIM/Open/]
- NIST SP.1500-3 (see also ISO/IEC JTC1 WG9 20547-2) Use Cases [accessible at https://www.nist.gov/publications/nist-big-data-interoperability-framework-volume-3-use-cases-and-general-requirements] (51 Use cases), NIST SP.1500-4 Security and privacy fabric (11 Use Cases)
- SynchroniCity / OASC [http://SynchroniCity-IoT.eu/about]
- Vicinity [http://vicinity2020.eu/vicinity/]
- ASTAP EG IOT TR on Smart City Use Cases in APAC region (http://www.apt.int/ASTAP-IOT)