ITU-T '서비스형 머신러닝(MLaaS)' 표준 개발 성과와 인공지능 표준 동향

'인공지능 핵심 표준 및 머신러닝 서비스 플랫폼 표준 개발'

ETRI 표준연구본부
지능정보표준연구실
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Speaker Introduction

[2017-2020] : [SG13] : [Q17/13]

[Declared patent(s)] - [Associated work]

Work item:	Y.3531 (ex Y.MLaaS-reqts)
Status:	Consented on 2020-07-31
Approval process:	AAP
Type of work item:	Supplement
Version:	New
Provisional name:	Y.MLaaS-reqts
Equivalent number:	-
Timing:	2020-Q4 (Medium priority)
Liaison:	ITU-T SG16, SG17, SG20, JTC 1 SC 42, ETSI, IEEE
Subject/title:	Cloud computing - Functional requirements for machine learning as a service
Summary:	This Recommendation provides cloud computing requirements for machine learning as a service (MLaaS), which addresses requirements from use cases. Machine learning as a service is a cloud service category in which the capability provided to the cloud service customer is the provision and use of machine learning framework. Machine learning framework is a set of functionalities for provisioning machine learning data as well as training, deploying, and managing machine learning model. On the perspective of cloud computing service provisioning, this Recommendation provides the functional requirements for MLaaS to identify functionalities such as machine learning data pre-processing, machine learning model training, machine learning model testing, and etc. Also, this Recommendation aligned with the cloud computing reference architecture of [ITU-T Y.3502].
Comment:	-
Base text(s):	[TD 297-PLEN]
Contact(s):	Sungpil Shin, Editor Xiaowu He, Editor
ITU-T A.5 reference(s):	- [Submit new A.5 reference] See guidelines for creating & submitting ITU-T A.5 justifications

First registration in the WP: 2018-01-03 13:06:04

Last update: 2020-08-05 15:40:01

클라우드 머신러닝 표준
ITU-T Y.3531(ex. Y.MLaaS-reqts)

[2017-2020] : [SG13] : [Q17/13]

[Declared patent(s)] - [Associated work]

Work item:	Y.RaaS-reqts
Status:	Under study
Approval process:	AAP
Type of work item:	Recommendation
Version:	New
Provisional name:	Y.RaaS-reqts
Equivalent number:	-
Timing:	2023-Q2 (Medium priority)
Liaison:	JTC 1/SC 42, ISO/TC 299, IEEE
Subject/title:	Cloud Computing - Functional requirements for Robotics as a Service
Summary:	This Recommendation provides the overview and functional requirements for robotics as a service (RaaS) in the cloud environment. This Recommendation addresses the following subjects: - Concept and overview of robotics service; - System context of robotics as a service; - Functional requirements for robotics as a service; - Use cases of robotics as a service.
Comment:	-
Base text(s):	[TD 612-WP2]
Contact(s):	Sungpil Shin, Editor Linze Wu, Editor
ITU-T A.5 reference(s):	- [Submit new A.5 reference] See guidelines for creating & submitting ITU-T A.5 justifications

First registration in the WP: 2020-08-05 20:33:55

Last update: 2020-08-05 20:36:38

클라우드 로보틱스 표준
ITU-T Y.RaaS-reqts

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Speaker Introduction

[2017-2020] : [SG13] : [Q17/13]

[Declared patent(s)] - [Associated work]

Work item:	Suppl on Y. Sup.aisr (ex Y. Sup.aisr)
Status:	Under study
Approval process:	Agreement
Type of work item:	Recommendation
Version:	New
Provisional name:	Y. Sup.aisr
Equivalent number:	-
Timing:	2021-Q4 (Medium priority)
Liaison:	SG16, SG17, SG20, JTC 1/SC 42
Subject/title:	Artificial Intelligence Standard Roadmap
Summary:	This supplement provides the standards roadmap for artificial intelligence (AI) in the information technologies. This AI standards roadmap has been developed to assist in the development of AI standards in the IT fields by providing information about existing and under developing standards in key standards development organizations (SDOs). In addition, it describes the overviews of AI itself and AI related technical areas from standards perspective, AI related activities in standards development organizations (SDOs), and gap analysis.
Comment:	-
Base text(s):	[TD 608-WP2]
Contact(s):	Sungpil Shin, Editor
ITU-T A.5 reference(s):	-
	[Submit new A.5 reference] See guidelines for creating & submitting ITU-T A.5 justifications

First registration in the WP: 2019-07-10 15:49:35

Last update: 2020-08-06 09:51:44

인공지능 표준화 로드맵
ITU-T Y.sup.aisr

지능정보기반 기술위원회

홈 > 표준화 위원회 > TA > TC010 > PG1005

인공지능기반기술 프로젝트그룹 (PG1005) 선택 실무반을 선택해주세요 선택

회의문서 | 회의일정 | 위원명단 | 과제현황 | 제정/개정표준 | 메일발송 | 공지사항 | 정보게시판 | 유지보수

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TTA PG1005 인공지능기반기술 프로젝트그룹 간사

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ITU-T Y.3531 : Standardization for MLaaS

INTERNATIONAL TELECOMMUNICATION UNION
TELECOMMUNICATION STANDARDIZATION SECTOR
STUDY PERIOD 2017-2020

SG13-TD297/PLEN
STUDY GROUP 13
Original: English

Question(s):	17/13	Virtual, 20-31 July 2020

TD

Source:	Editors	
Title:	Draft new Recommendation ITU-T Y.3531 (formerly Y.MLaaS-reqts): "Cloud computing- Functional requirements for machine learning as a service" – for consent	
Purpose:	Decision	
Contact:	Sungpil Shin ETRI Korea (Republic of)	Tel: +82-42-860-1379 Fax: +82-42-861-5404 Email: spshin@etri.re.kr
Contact:	Xiaowu HE China Telecom People's Republic of China	Tel: +86 20 38639580 Fax: +86 20 38636215 hexw4.gd@chinatelecom.cn

Keywords: machine learning, machine learning as a service; cloud computing

Abstract: This document contains the proposed draft Recommendation ITU-T Y.3531(formerly, MLaaS-reqts): "Cloud computing - Functional requirements of machine learning as a service" for consent.

'2020.07. ITU-T SG13 RGM 회의에서 최종 Consent'

Draft new Recommendation ITU-T Y.3531 (formerly Y.MLaaS-reqts)

Cloud computing – Functional requirements for machine learning as a service

1 Scope

This Recommendation provides system context, functional requirements, and use cases for machine learning as a service (MLaaS).

In particular, the scope of this Recommendation includes:

– Overview of machine learning;
– Introduction to MLaaS;
– Functional requirements of MLaaS.

The use cases of MLaaS are developed to derive functional requirements of MLaaS.

NOTE – Developments of machine learning algorithms and methodologies are out of the scope on this Recommendation.

2 References

The following ITU-T Recommendations and other references contain provisions, which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below.

[ITU-T Y.3500] Recommendation ITU-T Y.3500 (2014), *Information technology – Cloud computing – Overview and vocabulary.*

[ITU-T Y.3501] Recommendation ITU-T Y.3501 (2013), *Cloud computing framework and high-level requirements.*

[ITU-T Y.3502] Recommendation ITU-T Y.3502 (2014), *Information technology – Cloud computing – Reference architecture.*

[ITU-T Y.3510] Recommendation ITU-T Y.3510 (2013), *Cloud computing infrastructure requirements.*

[ITU-T Y.3600] Recommendation ITU-T Y.3600 (2015), *Big data – Cloud computing based requirements and capabilities.*

[ITU-T Y.3172] Recommendation ITU-T Y.3172 (2019), *Architectural framework for machine learning in future networks including IMT-2020*

3 Definitions

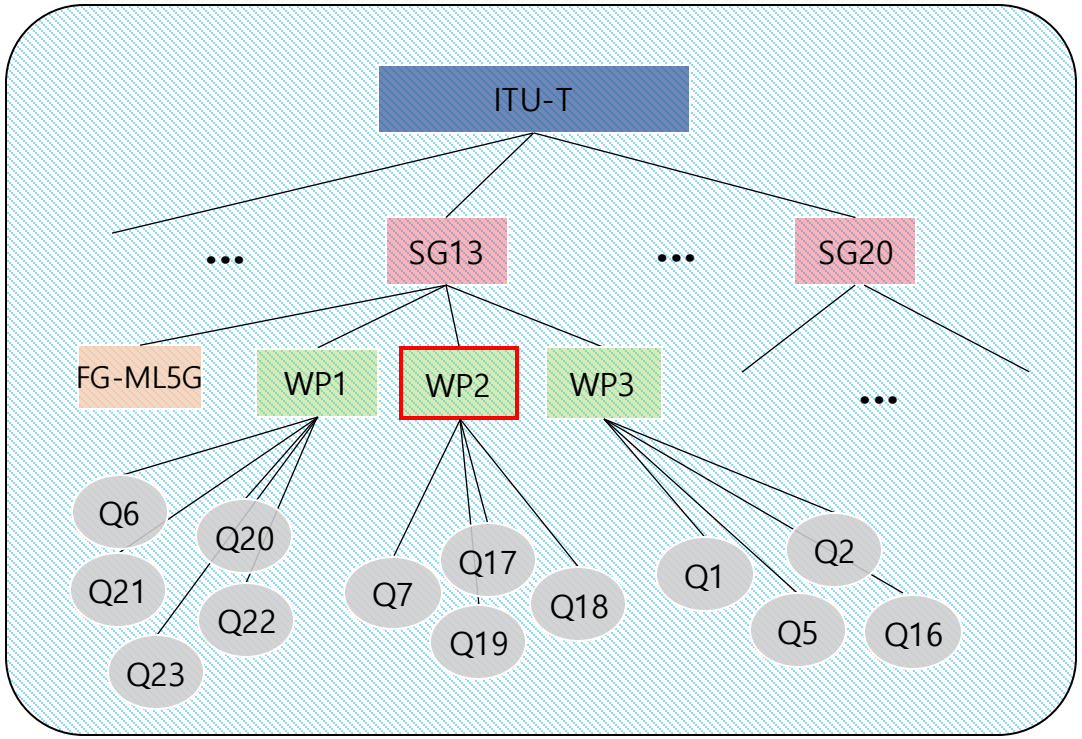
3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 activity [ITU-T Y.3502]: A specified pursuit or set of tasks.

ITU-T 표준 그룹 구조

ITU-T : 국제 표준 기구인 ITU(International Telecommunication Union)에서 전기통신 표준화부문(Telecommunication Standardization Sector)을 담당하는 기구



- ITU-T 산하의 SG은 그룹별로 다양한 분야 및 산업영역의 국제표준을 개발 중

  * ex) **SG13(Future network, Cloud computing)**, SG16(Multimedia), SG20(IoT, smart cities)

- ITU-T SG13 WP2는 클라우드 컴퓨팅을 표준을 담당하며, ISO/IEC JTC 1 SC 38와 교류하며 클라우드 컴퓨팅 표준 개발

➢ Y.3500, ISO/IEC 17788 - 클라우드 컴퓨팅 용어 및 정의
➢ Y.3501 – 클라우드 컴퓨팅 프레임워크 및 요구사항
➢ Y.3502, ISO/IEC 17789 - 클라우드 컴퓨팅 참조구조

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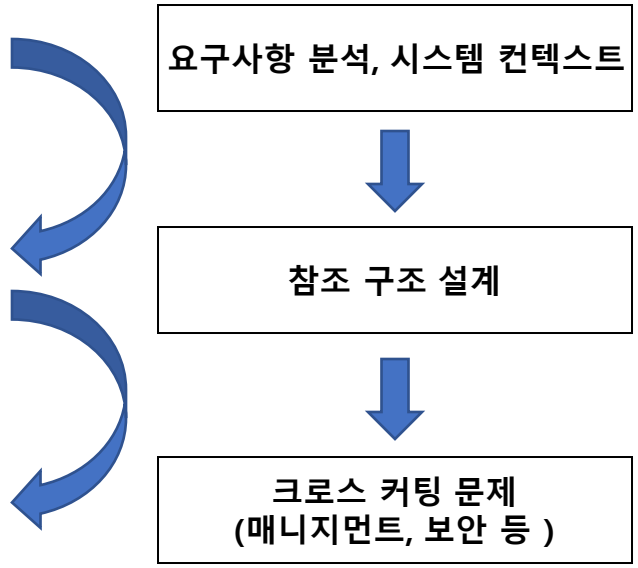
ITU-T SG13 WP2 (Cloud computing & Big data)

WP2 **Cloud Computing & Big Data**

Q17 **Requirements, ecosystem, and general capabilities for cloud computing and big data**

Q18 **Functional architecture for cloud computing and big data**

Q19 **End-to-end cloud computing management, cloud security and big data governance**



* Q7-Big data driven networking (bDDN) and deep packet inspection (DPI)

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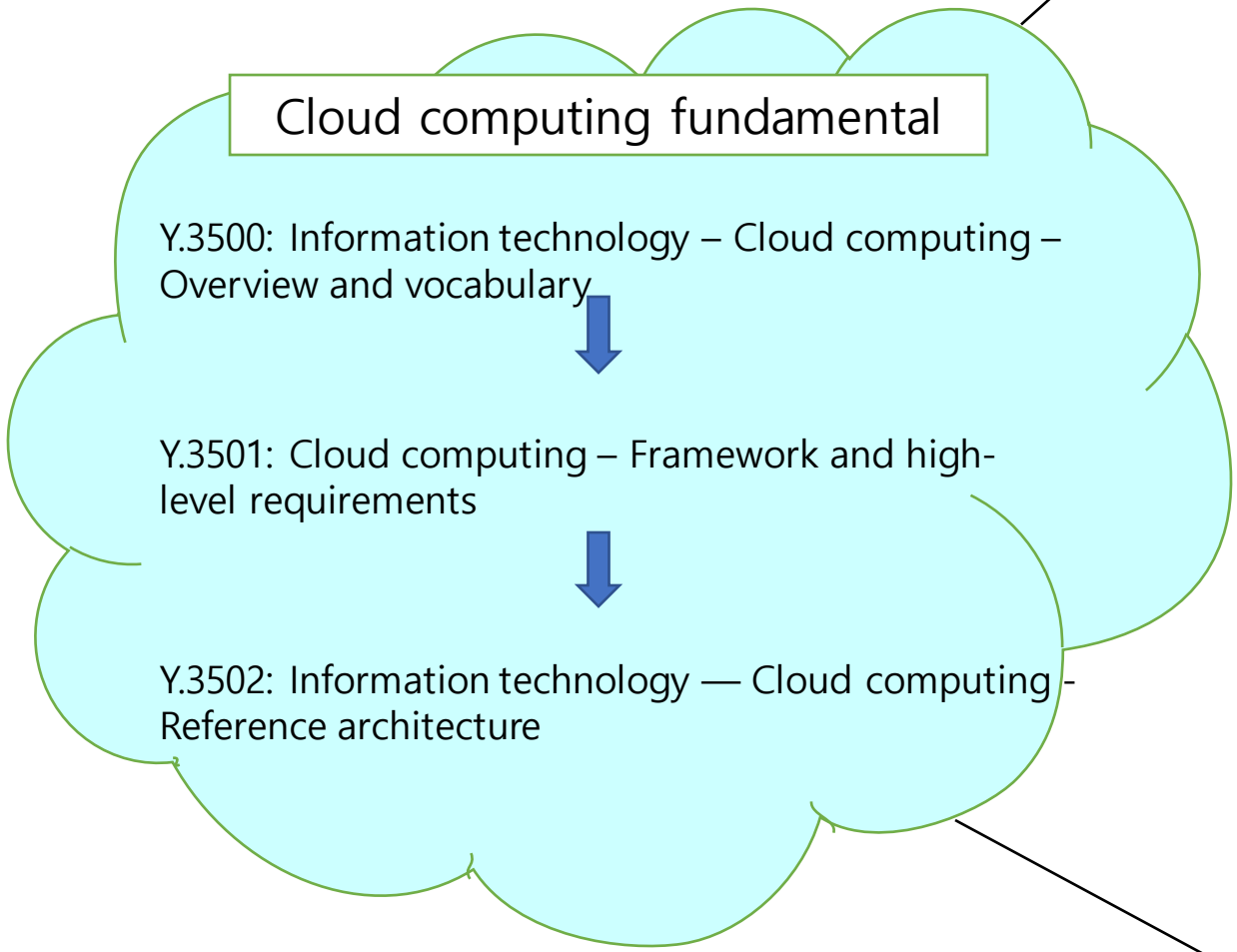
ITU-T Y.35xx series

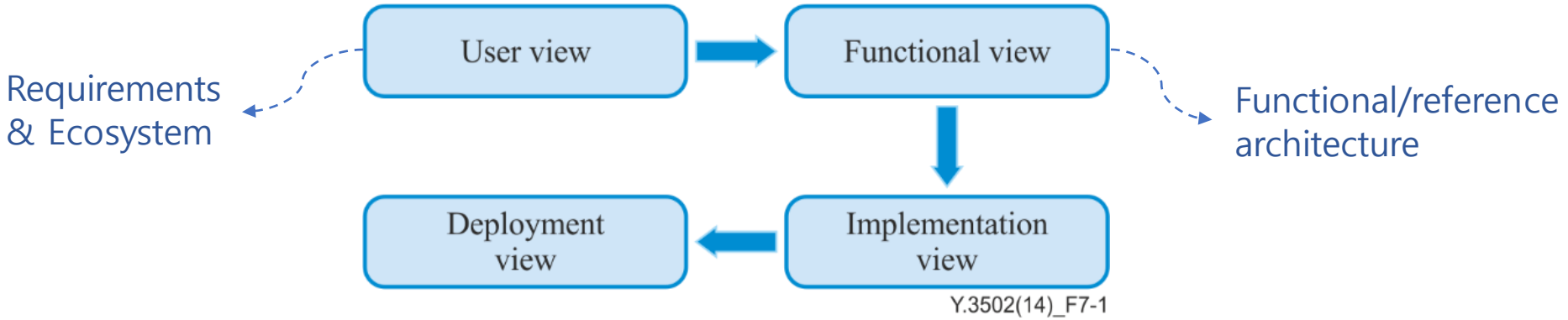


Y.3503: Requirements for desktop as a service
Y.3504: Functional architecture for Desktop as a Service
Y.3505: Cloud computing - Overview and functional requirements for data storage federation
Y.3508: Cloud computing - Overview and high-level requirements of distributed cloud
Y.3509: Cloud computing - Functional architecture for data storage federation
Y.3512: Cloud computing - Functional requirements of **Network as a Service**
Y.3513: Cloud computing - Functional requirements of **Infrastructure as a Service**
Y.3515: Cloud computing – Functional architecture of **Network as a Service**
Y.3516: Cloud computing - Functional architecture of inter-cloud computing
Y.3519: Cloud computing - Functional architecture of **big data as a service**

⋮

Y.3531: Cloud computing- Functional requirements for **machine learning as a service**

Fundamental Concepts for ITU-T Y.35xx series



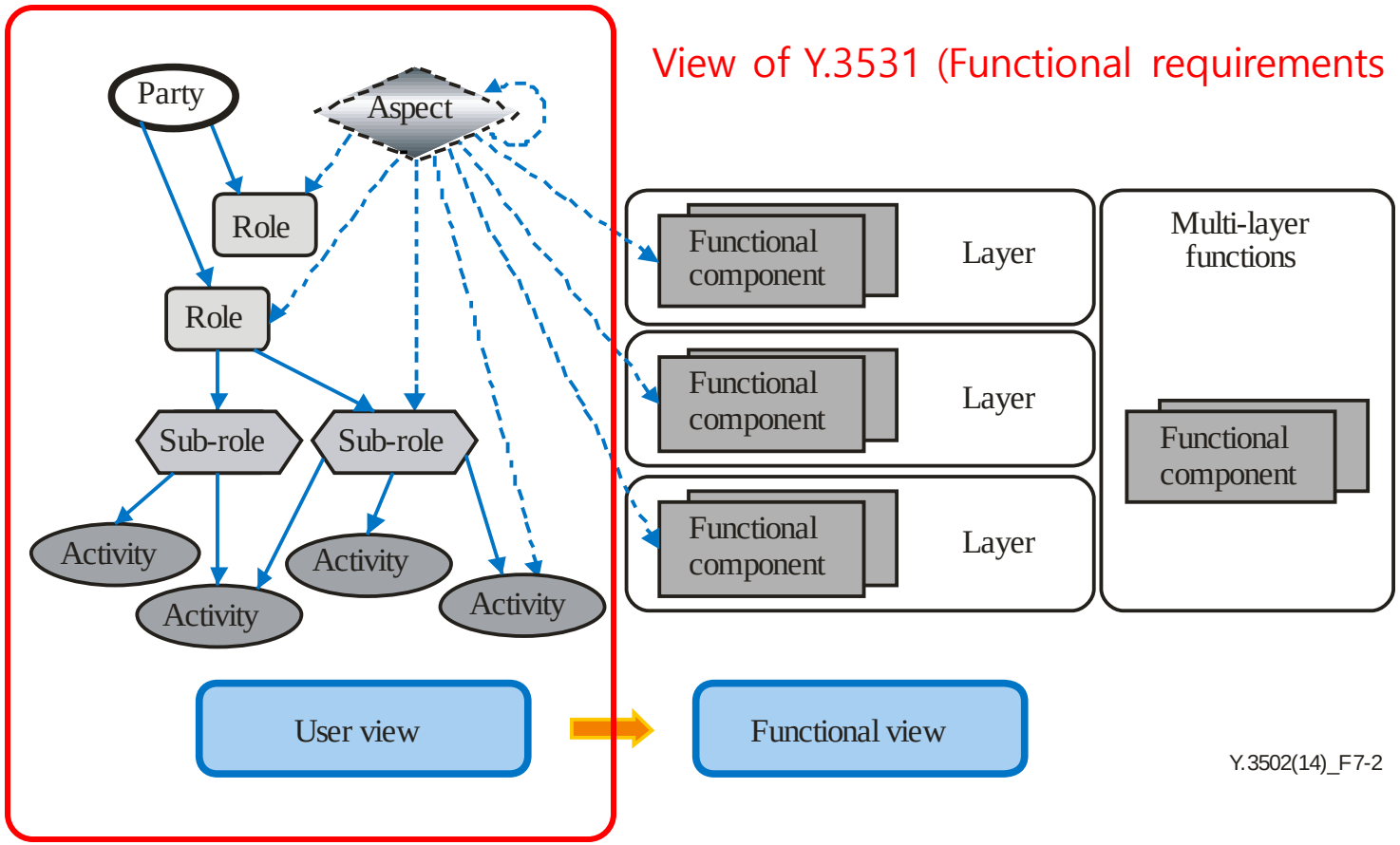
<Transformations between architectural views>

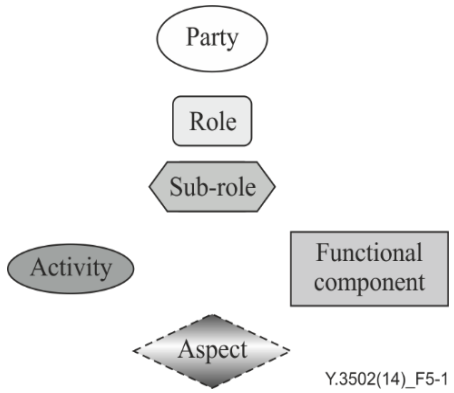
CCRA view	Description of the CCRA view	Scope
User view	The system context, the parties, the roles, the sub-roles and the cloud computing activities	Within scope
Functional view	The functions necessary for the support of cloud computing activities	Within scope
Implementation view	The functions necessary for the implementation of a cloud service within service parts and/or infrastructure parts	Out of scope
Deployment view	How the functions of a cloud service are technically implemented within already existing infrastructure elements or within new elements to be introduced in this infrastructure	Out of scope
NOTE – While details of the user view and functional view are addressed within this Recommendation | International Standard, the implementation and deployment views are related to technology and vendor-specific cloud computing implementations and actual deployments, and are therefore out of the scope of this Recommendation | International Standard.		

<Cloud computing reference architecture views in Y.3502>

Fundamental Concepts for ITU-T Y.35xx series

View of Y.3531 (Functional requirements for MLaaS)





Legend to the diagram

<Transition from user view to functional view>

[Reference] ITU-T Y.3502 Information technology – Cloud computing – Reference architecture, 2014.08.

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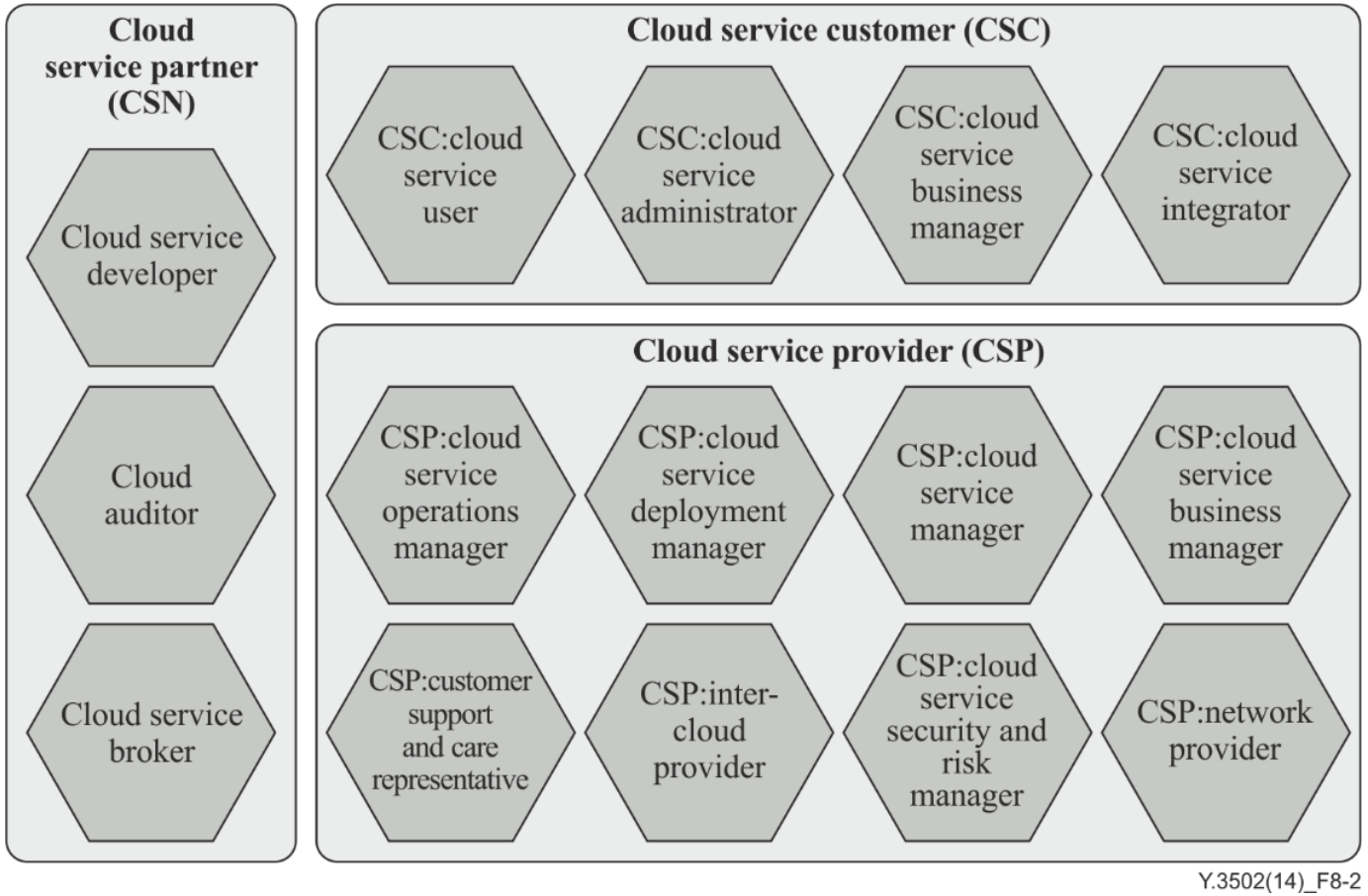

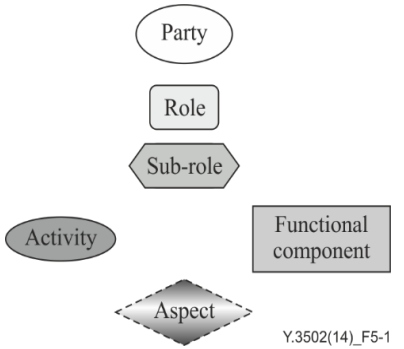

Legend to the diagram

<Existing cloud computing roles and sub-roles in Y.3502>

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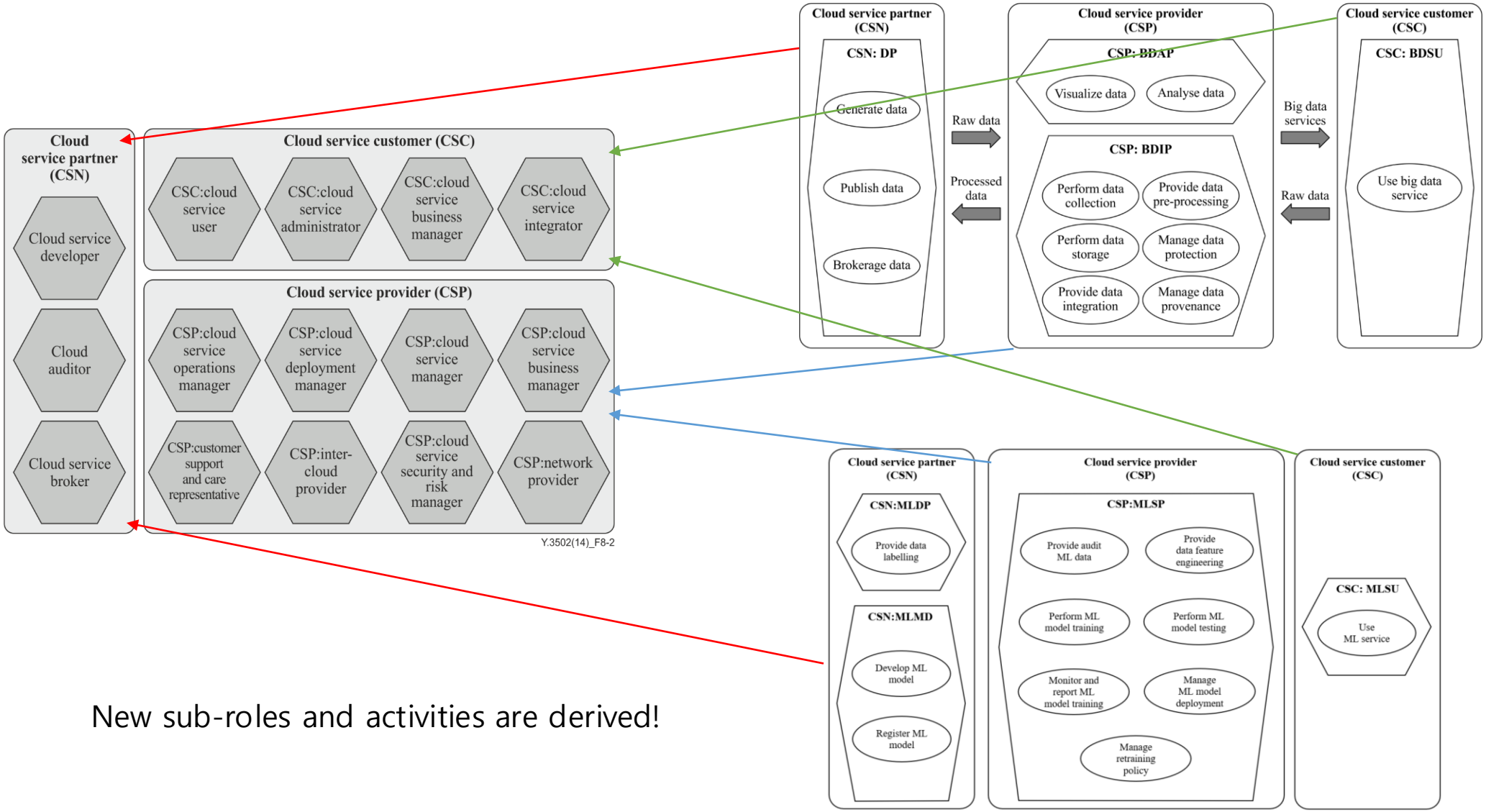

New sub-roles and activities are derived!

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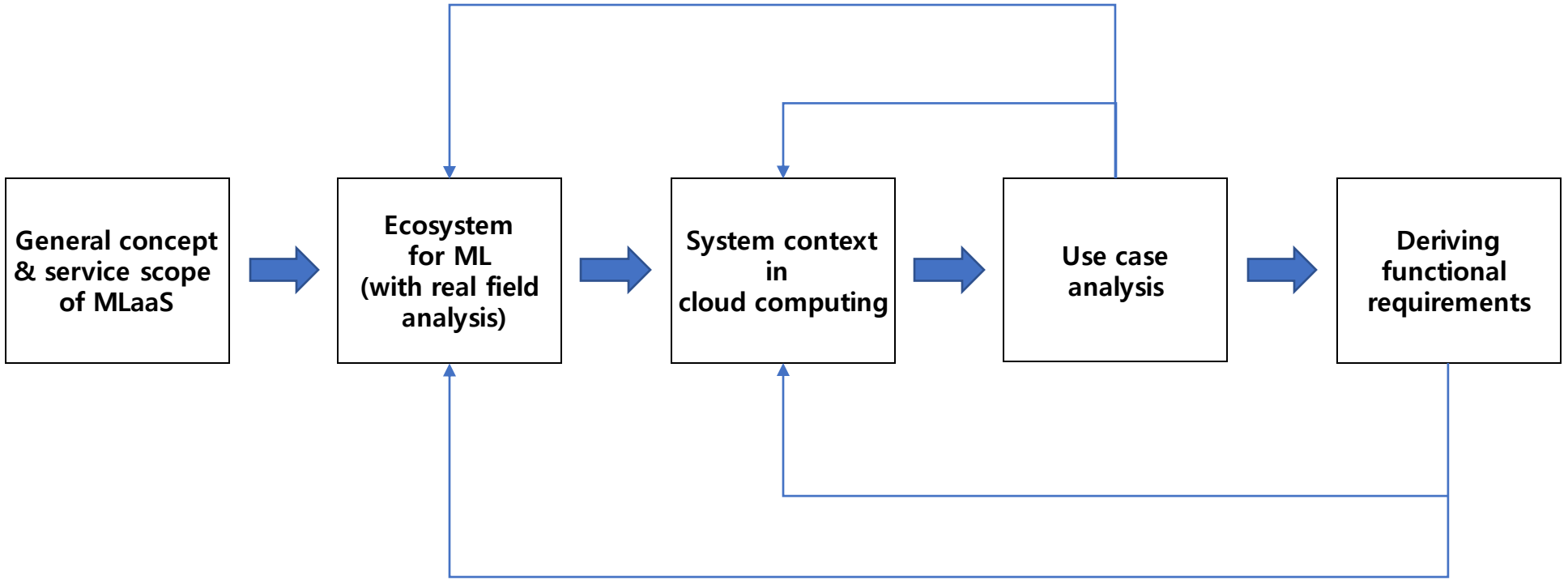
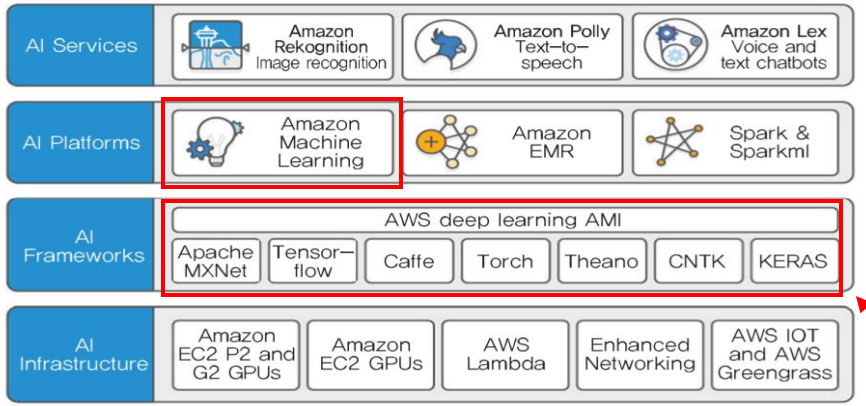
Standardization Steps for Functional Requirements

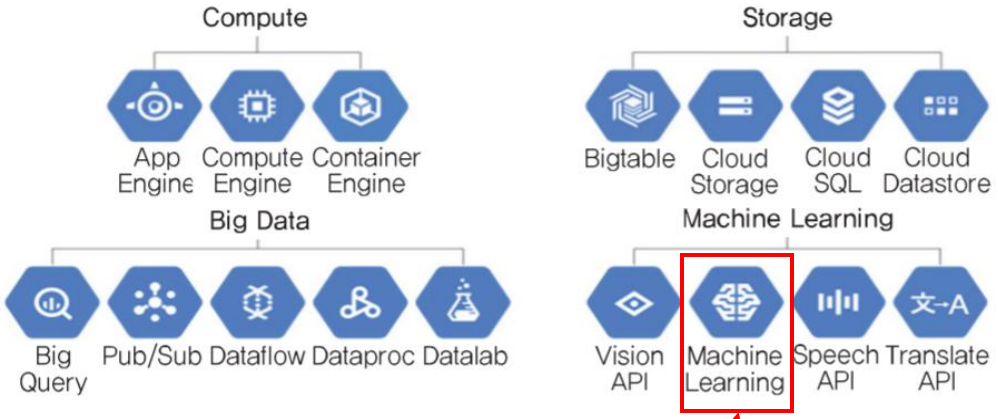


- Iteratively validated the sub-roles and activities for MLaaS
- Derived functional requirements with use cases

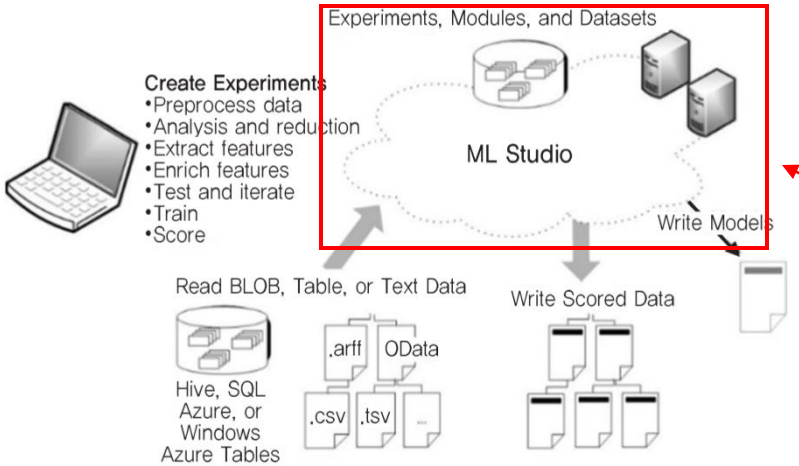
Global services of MLaaS in the field



AWS AI & ML services



Google Cloud Platform



MS Azure ML studio

Scope of Machine Learning as a Service (MLaaS)
= ML framework in cloud computing

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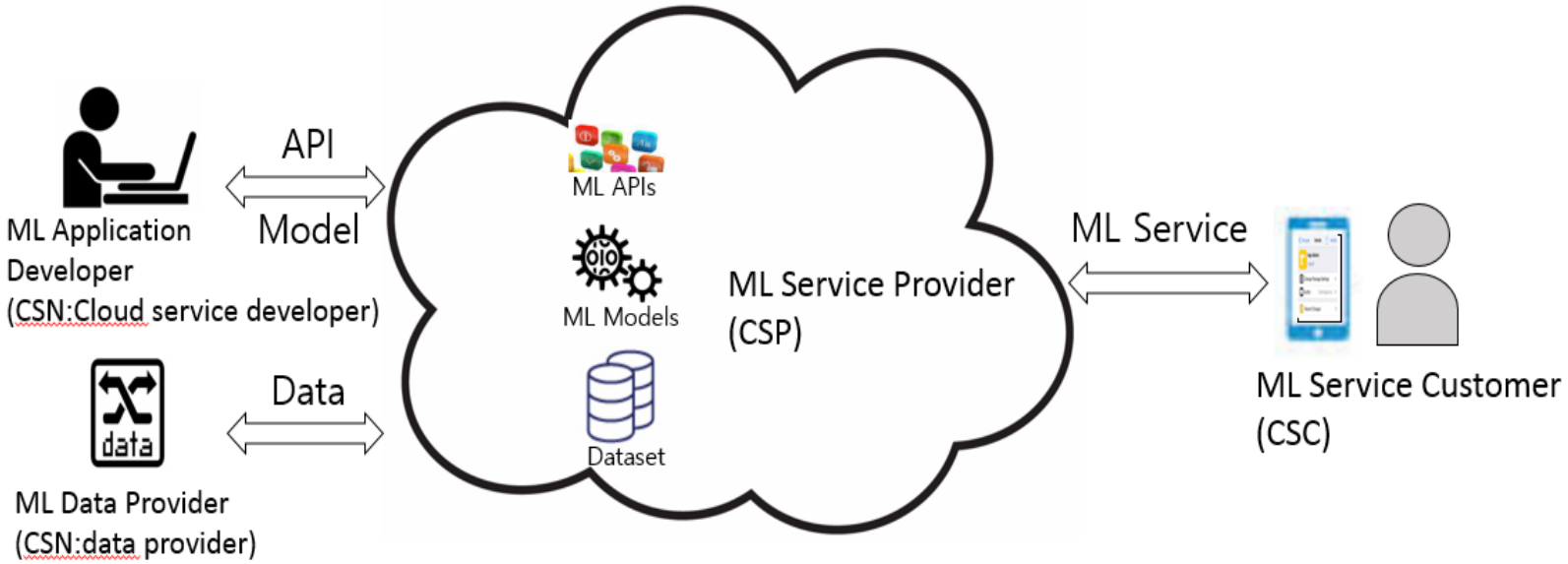
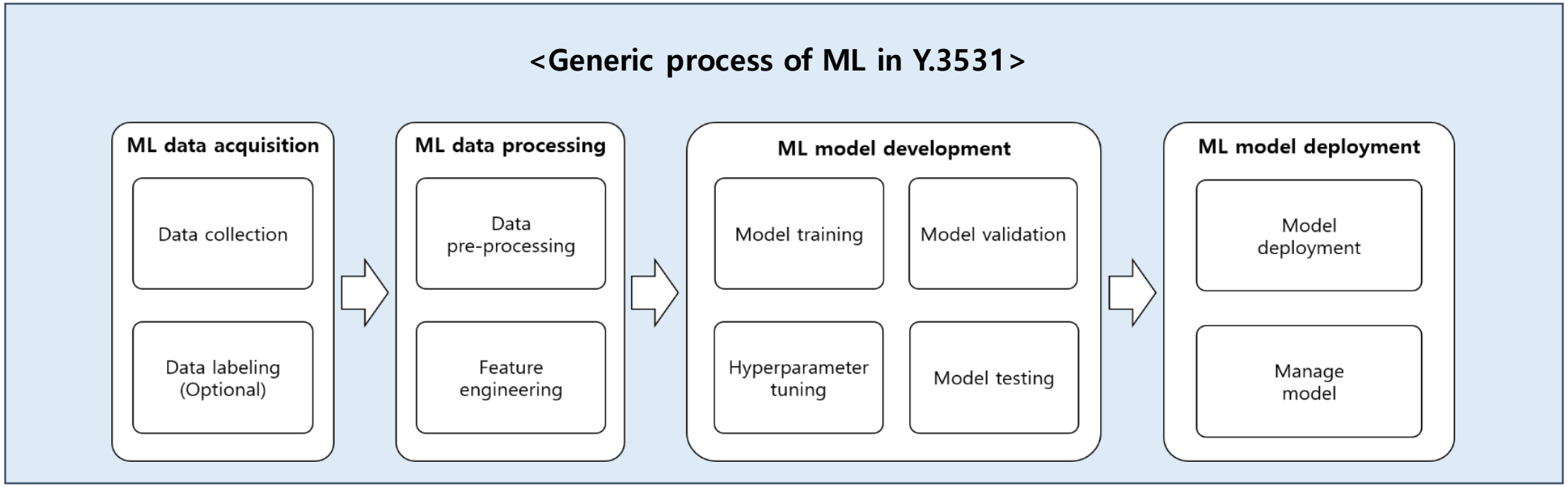
Definition & Scope of MLaaS in ITU-T Y.3531

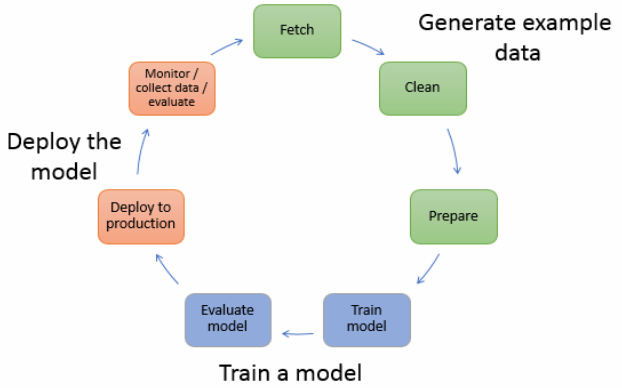
Machine Learning as a Service (MLaaS): A cloud service category in which the capabilities provided to the cloud service customer is the provision and use of machine learning framework



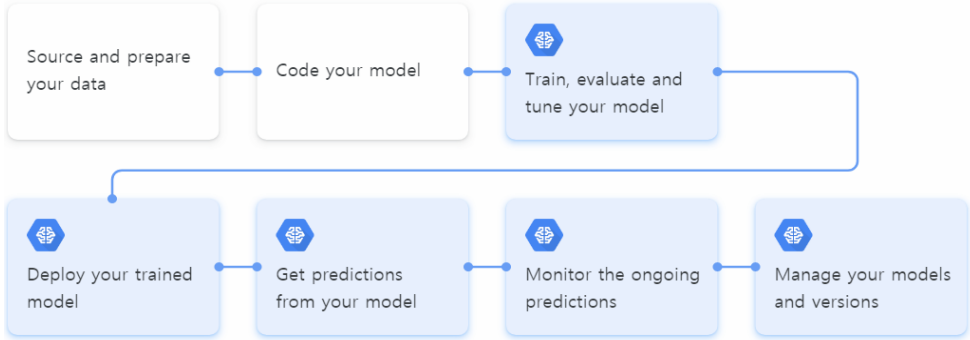
***Infrastructure as a service (IaaS)**	Cloud service category in which the cloud capabilities type provided to the cloud service customer is an infrastructure capabilities type.
***Platform as a service (PaaS)**	Cloud service category in which the cloud capabilities type provided to the cloud service customer is a platform capabilities type.
***Network as a service (NaaS)**	Cloud service category in which the capability provided to the cloud service customer is transport connectivity and related network capabilities.

Generic Process of ML framework



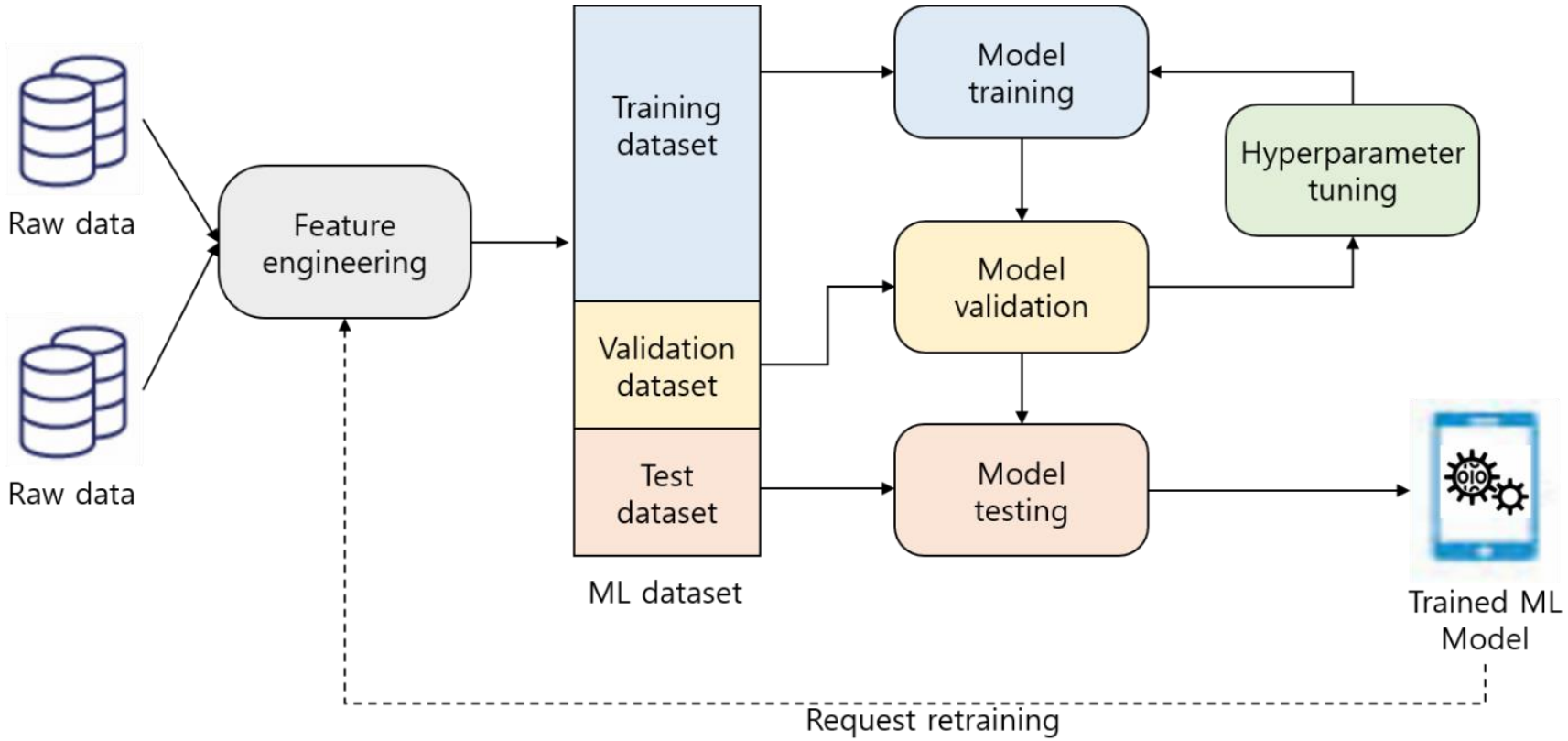


<AWS ML process>



<Google Cloud Platform ML process>

Implementations of Generic Process of ML



[Reference] ITU-T Y.3531 Cloud computing - Functional requirements for machine learning as a service, 2020.07.

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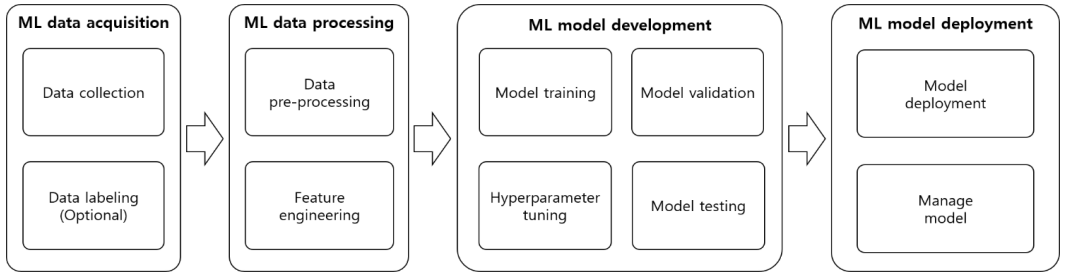
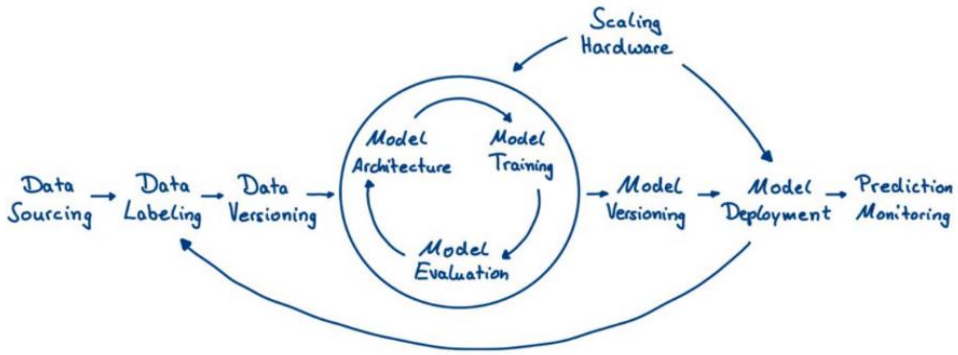
Companies in Real Field

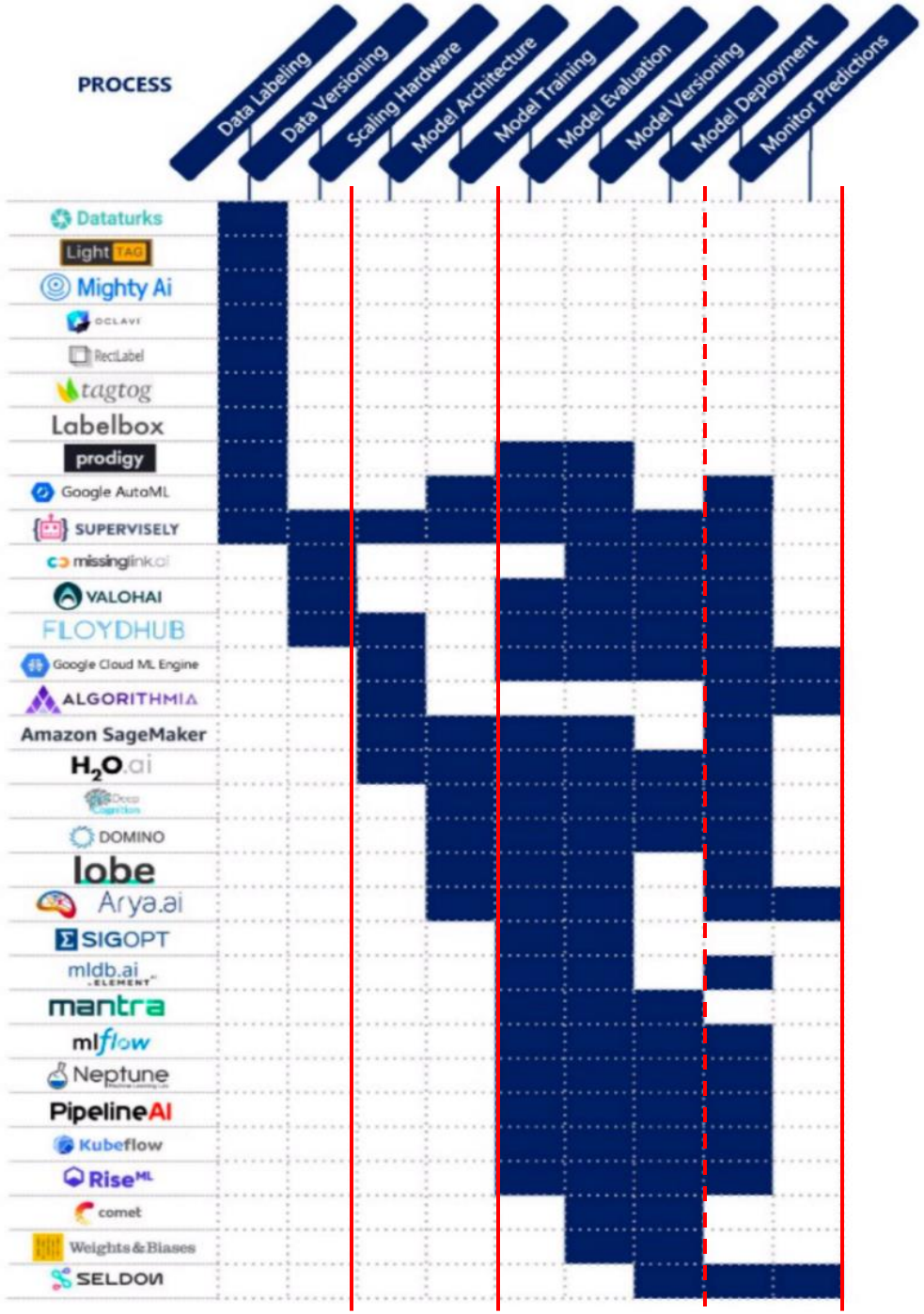
Real field analyzing : Step for deriving ecosystem and sub-roles



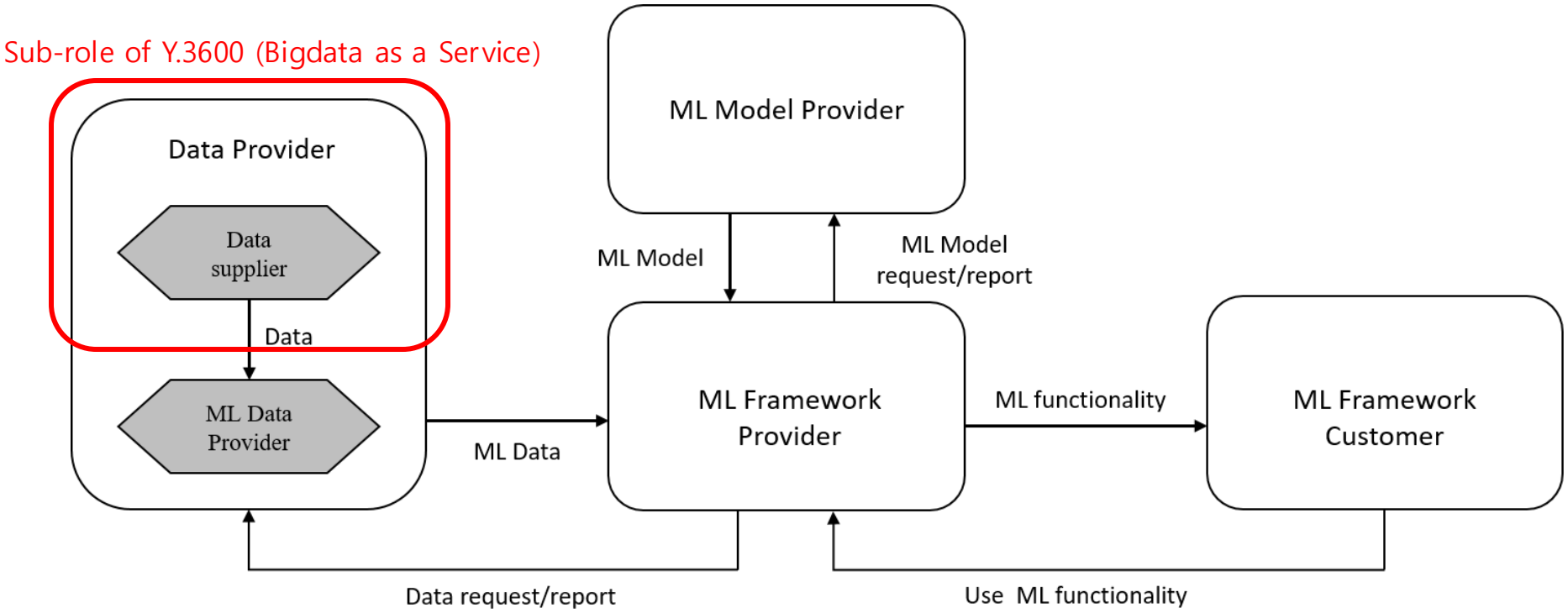


<An example of ML life cycles>

[Reference] The Deep Learning Toolset - An Overview, Medium, URL: https://medium.com/luminovo/the-deep-learning-toolset-an-overview-b71756016c06



Ecosystem for ML in Y.3531



[Reference] ITU-T Y.3531 Cloud computing - Functional requirements for machine learning as a service, 2020.07.

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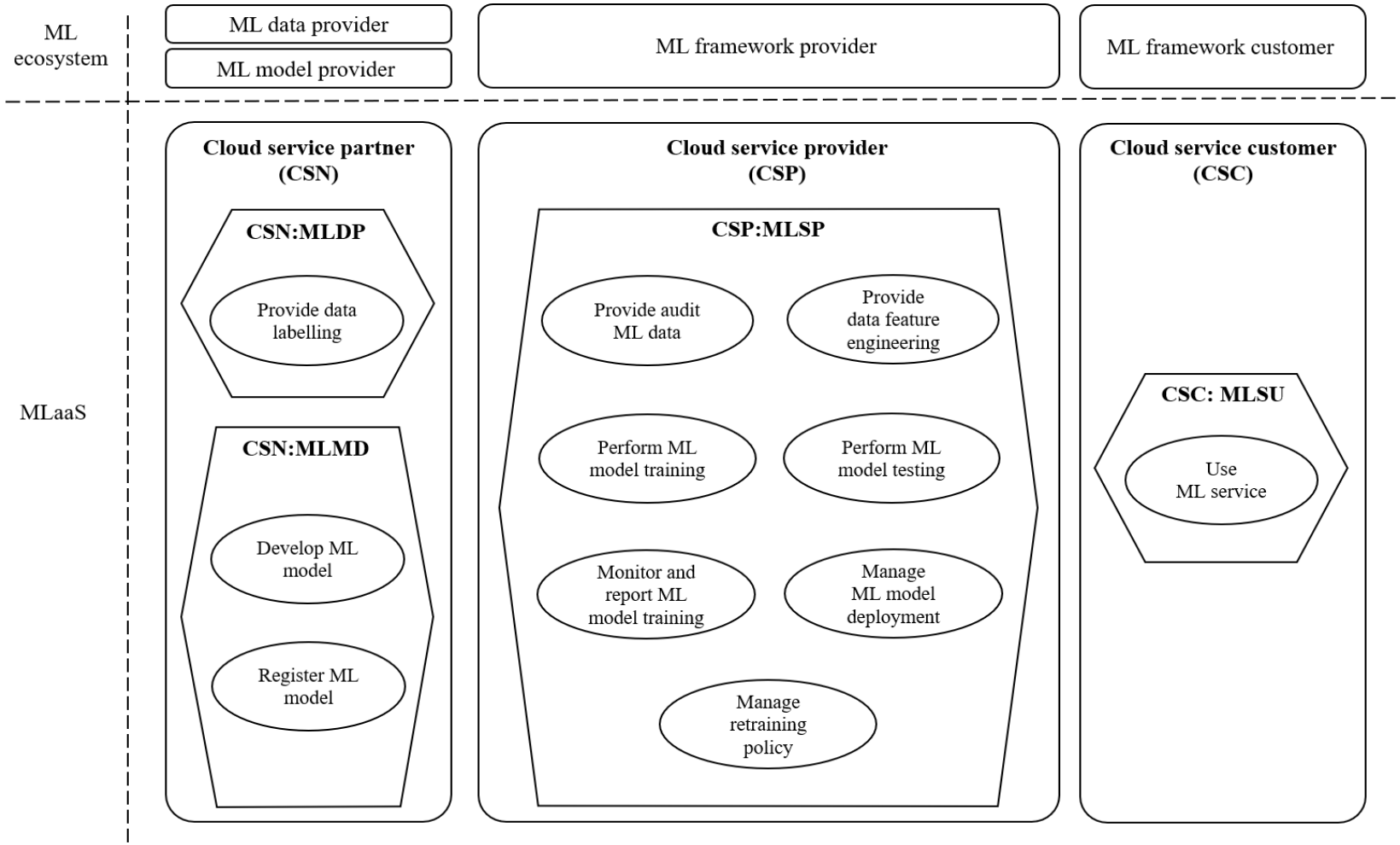
MLaaS System Context (cloud computing aspect)



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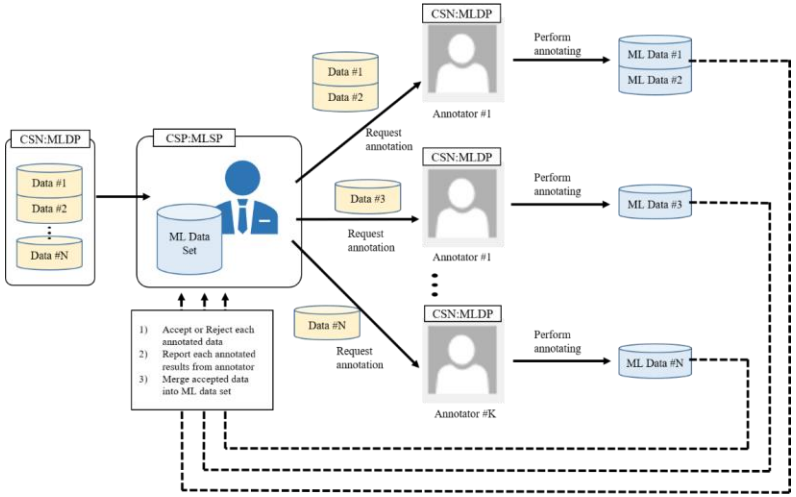
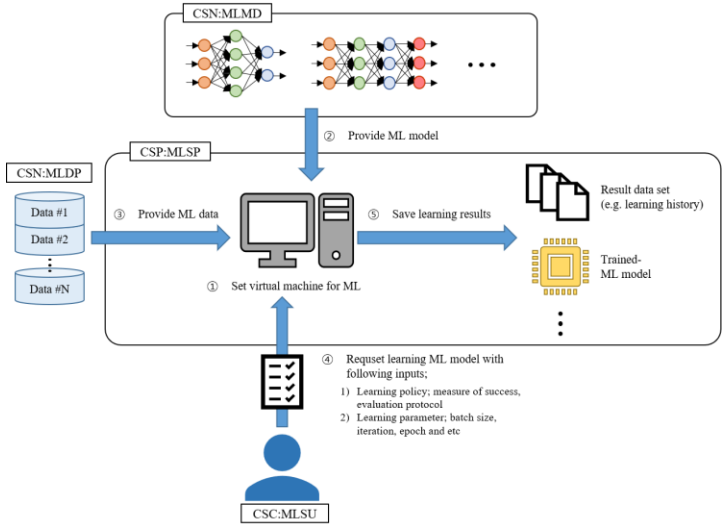
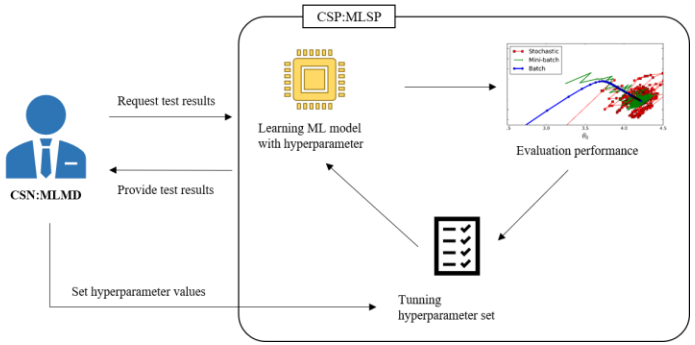
Functional Use cases



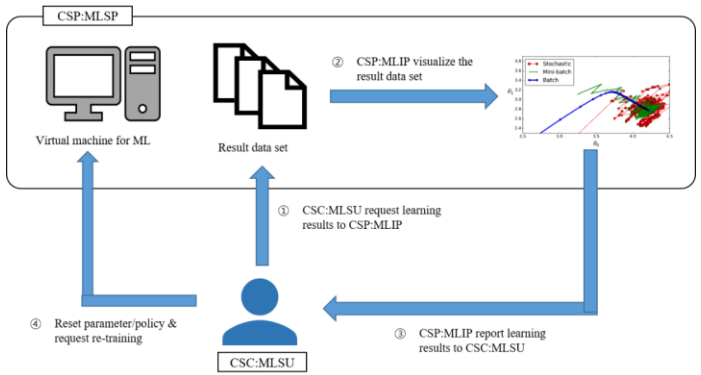
<ML Data Annotation/Labelling Management>



<Model Training with User Configuration>



<Model Testing and Optimizing the Hyperparameter>



<Reporting Learning Result and Re-training>

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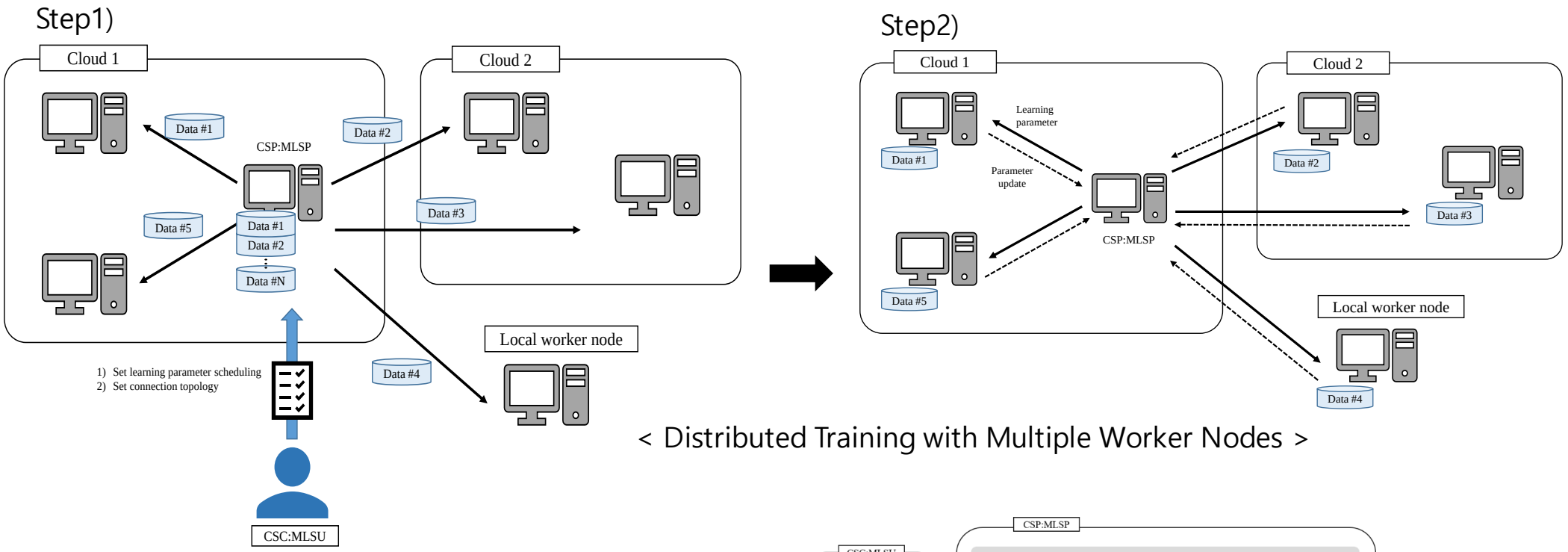
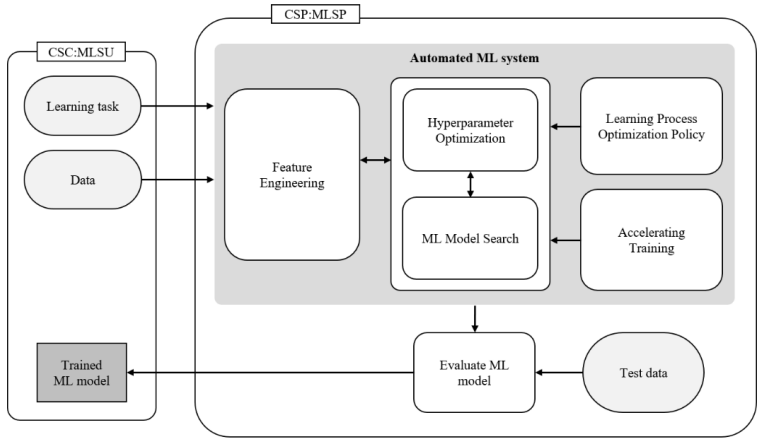


< Distributed Training with Multiple Worker Nodes >



< Auto ML in Cloud Computing >

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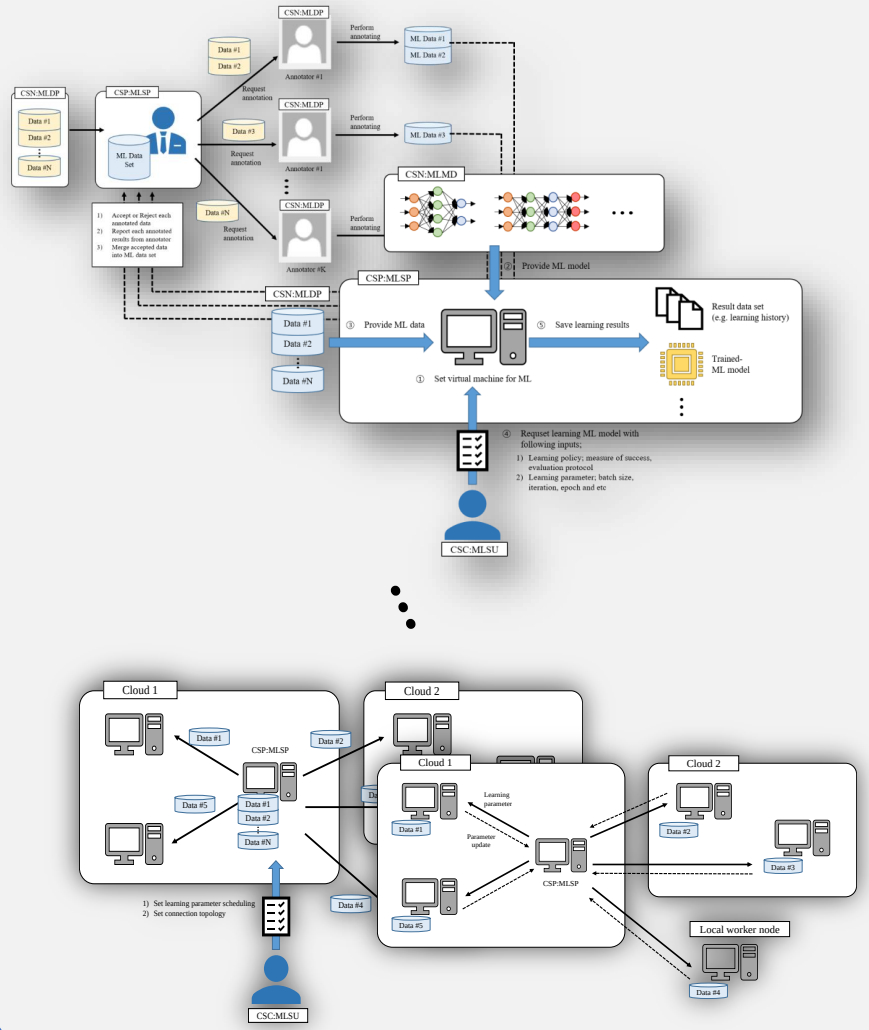
Functional Requirements from use cases

Functional Use Cases



- ✓ ML data collection requirements
- ✓ ML data storage requirements
- ✓ ML data labelling requirements
- ✓ ML data pre-processing requirements
- ✓ ML data analysis requirements
- ✓ ML data feature engineering requirements
- ✓ ML model training requirements
- ✓ ML model monitoring requirements
- ✓ Trained ML model deploying requirements
- ✓ Trained ML model retraining requirements

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ITU-T Y.sup.aisr : Artificial Intelligence Standardization Roadmap

[2017-2020] : [SG13] : [Q17/13]

[Declared patent(s)] - [Associated work]

Work item:	Suppl on Y. Sup.aisr (ex Y. Sup.aisr)
Status:	Under study
Approval process:	Agreement
Type of work item:	Recommendation
Version:	New
Provisional name:	Y. Sup.aisr
Equivalent number:	-
Timing:	2021-Q4 (Medium priority)
Liaison:	SG16, SG17, SG20, JTC 1/SC 42
Subject/title:	Artificial Intelligence Standard Roadmap
Summary:	This supplement provides the standards roadmap for artificial intelligence (AI) in the information technologies. This AI standards roadmap has been developed to assist in the development of AI standards in the IT fields by providing information about existing and under developing standards in key standards development organizations (SDOs). In addition, it describes the overviews of AI itself and AI related technical areas from standards perspective, AI related activities in standards development organizations (SDOs), and gap analysis.
Comment:	-
Base text(s):	[TD 608-WP2]
Contact(s):	Sungpil Shin, Editor
ITU-T A.5 reference(s):	-
	[Submit new A.5 reference] See guidelines for creating & submitting ITU-T A.5 justifications

First registration in the WP: 2019-07-10 15:49:35

Last update: 2020-08-06 09:51:44

<Y.sup.aisr의 주요 컨텐츠>

✓ 인공지능 개요

✓ 국제 인공지능 표준 목록

(* ITU 뿐만 아니라, ISO/IEC, IEEE, W3C, Khronos group 등 주요 표준 기구를 커버)

✓ 인공지능 표준 갭분석

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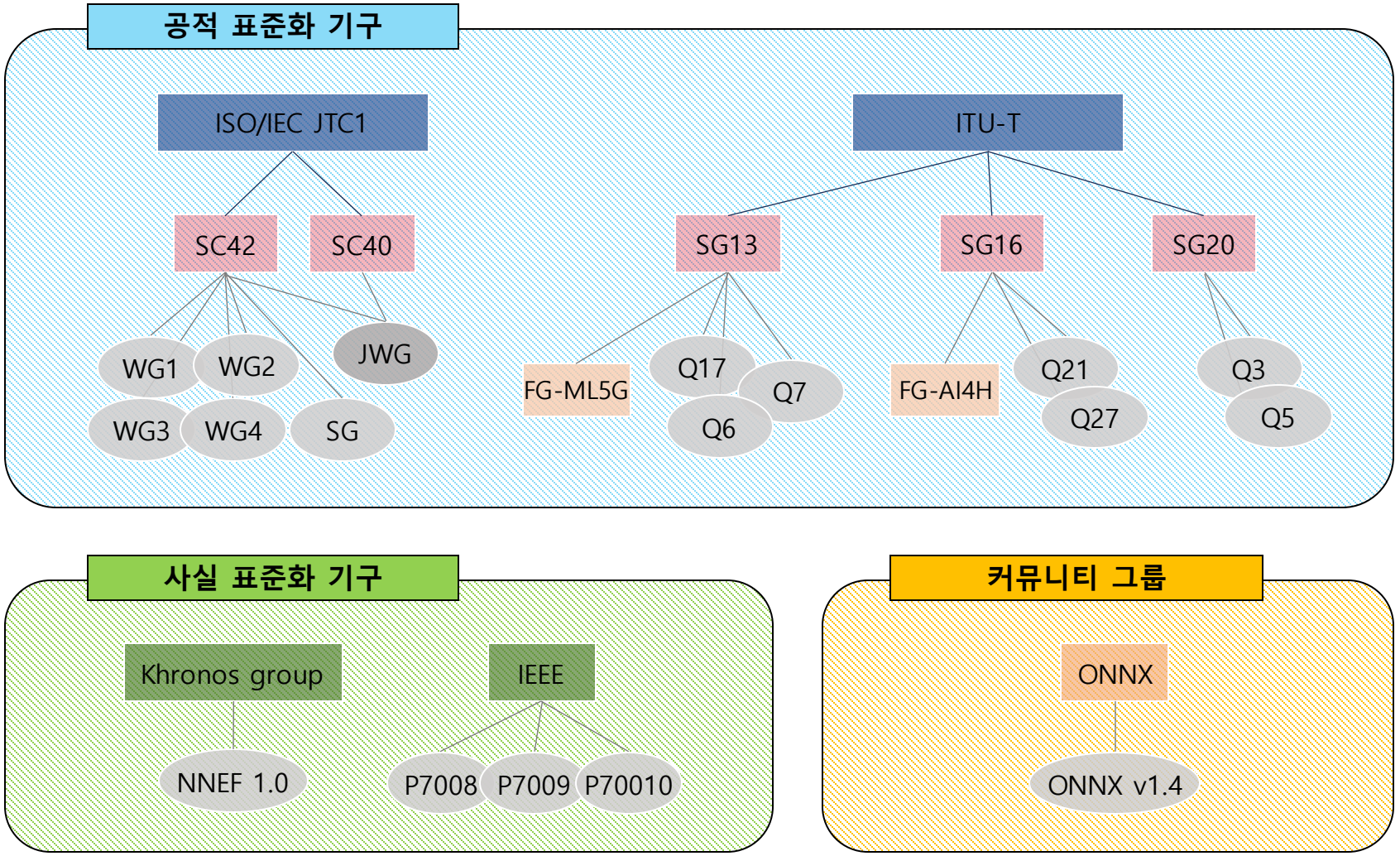
인공지능 주요 표준 기구(2019 ver)



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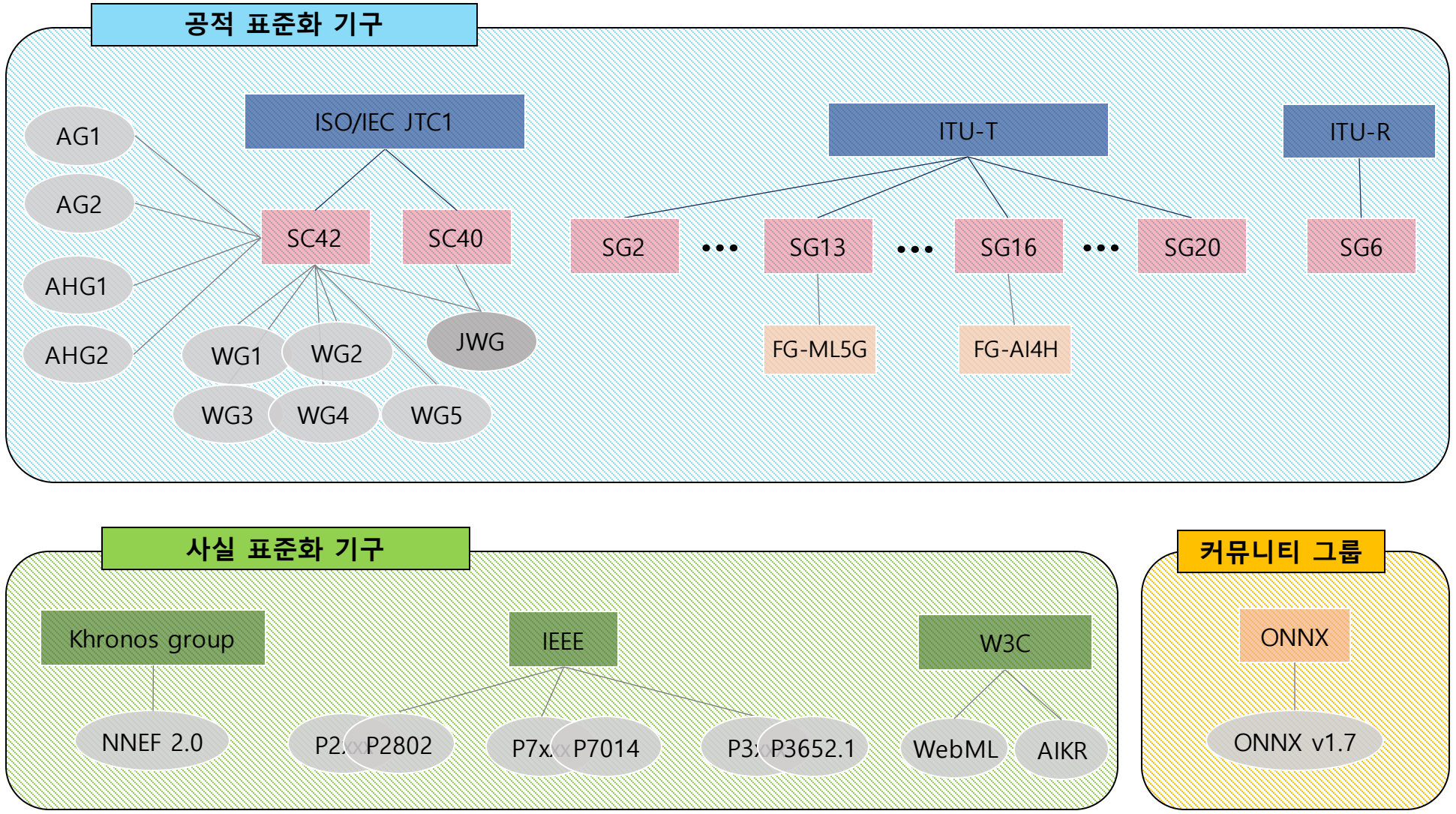
인공지능 주요 표준 기구(2020 ver)



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JTC 1/SC 42 표준 문서(2019 ver)

구분	표준 번호	표준명
WG 1	ISO/IEC 22989	Artificial intelligence - Concepts and terminology
	ISO/IEC 23053	Framework for Artificial Intelligence (AI) Systems Using Machine Learning (ML)
WG 2	ISO/IEC 20546:2019	Information technology - Big data - Overview and vocabulary
	ISO/IEC TR 20547-1	Information technology - Big data reference architecture - Part 1: Framework and application process
	ISO/IEC TR 20547-2:2018	Information technology - Big data reference architecture - Part 2: Use cases and derived requirements
	ISO/IEC 20547-3	Information technology - Big data reference architecture - Part 3: Reference architecture
	ISO/IEC TR 20547-5:2018	Information technology - Big data reference architecture - Part 5: Standards roadmap
	ISO/IEC24668	Information technology — Artificial intelligence —Process management framework for Big data analytics
WG 3	ISO/IEC 23894	Information Technology - Artificial Intelligence - Risk Management
	ISO/IEC TR 24027	Information technology - Artificial Intelligence (AI) - Bias in AI systems and AI aided decision making
	ISO/IEC TR 24028	Information technology - Artificial Intelligence (AI - Overview of trustworthiness in Artificial Intelligence
	ISO/IEC TR 24029-1	Artificial Intelligence (AI) - Assessment of the robustness of neural networks - Part 1: Overview
	ISO/IEC TR 24368	Information technology — Artificial intelligence (AI) — Overview of computational approaches for AI systems
WG 4	ISO/IEC NP TR 24030	Information technology - Artificial Intelligence (AI) - Use cases
WG 5	ISO/IEC NP TR 24372	Overview of computational approaches and AI systems
JWG 1	ISO/IEC NP 38507	Information technology - Governance of IT - Governance implications of the use of artificial intelligence by organizations

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ITU-T 표준개발 문서(2019 ver)

SG	표준 번호	표준 제목	목표일
SG13	[ITU-T Y.3170]	Requirements for machine learning-based quality of service assurance for the IMT-2020 network	Published 2018
SG13	[ITU-T Y.qos-ml-arc]	Architecture of machine learning based QoS assurance for IMT-2020 network	4Q 2019
SG13	[ITU-T Y.MecTa-ML]	Mechanism of traffic awareness for application-descriptor-agnostic traffic based on machine learning	4Q 2020
SG13	[ITU-T Y.MLaaS-reqts]	Cloud computing- functional requirements for machine learning as a service	4Q 2019
SG13	[ITU-T Y.3172]	Architectural framework for machine learning in future networks including IMT-2020	Consented 2019-03
SG13	[ITU-T Y.bDDN-MLMec]	Mechanisms of machine learning for big data driven networking	4Q 2021
SG13	[ITU-T Y.ML-IMT2020-Data-Handling]	Mechanism of traffic awareness for application-descriptor-agnostic traffic based on machine learning	4Q 2019
SG13	[ITU-T Y.Suppl to Y.317X series]	Machine learning in future networks including IMT-2020: use cases	4Q 2019
SG13	[ITU-T Y.IMT2020-NSAA-reqts]	Requirements for network slicing with AI-assisted analysis in IMT-2020 networks	3Q 2019
SG16	[ITU-T H.CUAV-AIF]	Framework and requirements for civilian unmanned aerial vehicle flight control using artificial intelligence	2020
SG16	[ITU-T F.VS-AIMC]	Use cases and requirements for multimedia communication enabled vehicle systems using artificial intelligence	2020
SG16	[ITU-T F.EMO-NN]	Emotion enabled multimodal user interface based on artificial neural network	2020
SG16	[ITU-T F.AI-MLTF]	Technical framework for shared machine learning system	2020
SG16	[ITU-T F.SCAI]	Requirements for smart class based on artificial intelligence	2020
SG16	[ITU-T FSTP-ACC-AI]	Guideline on the use of AI for ICT accessibility	2019
SG16	[ITU-T F.AI-DLFE]	Deep Learning Software Framework Evaluation Methodology	2020
SG16	[ITU-T F.AI-DLPB]	Metrics and evaluation methods for deep neural network processor benchmark	2020
SG5	[ITU-T L.1305]	Data centre infrastructure management system based on big data and artificial intelligence technology	Consented 2019-09
SG12	[ITU-T TR-ML]	Technical Report on Machine Learning	4Q 2019
SG12	[ITU-T P.MLGuide]	Guide for Development of Machine Learning Based Solutions	4Q 2019
SG17	[ITU-T TR.cs-ml]	Technical Report: Countering spam based on machine learning	3Q 2020
SG20	[ITU-T Y.SSC-AISE-arc]	Reference architecture of artificial intelligence service exposure for smart sustainable cities	4Q 2019
SG20	[ITU-T Y.Sup.AI4IoT]	Unlocking Internet of things with artificial intelligence: Where we are and where we could be	4Q 2019

IEEE 표준개발 문서(2019 ver)

프로젝트	표준명	상태
P7006	Standard for Personal Data Artificial Intelligence (AI) Agent	PAR Approval 2017-03-23
P7007	Ontological Standard for Ethically Driven Robotics and Automation Systems	PAR Approval 2017-03-23
P7008	Standard for Ethically Driven Nudging for Robotic, Intelligent and Autonomous Systems	PAR Approval 2017-06-15
P7009	Standard for Fail-Safe Design of Autonomous and Semi-Autonomous Systems	PAR Approval 2017-06-15
P7010	Wellbeing Metrics Standard for Ethical Artificial Intelligence and Autonomous Systems	PAR Approval 2017-06-15
P7012	Standard for Machine Readable Personal Privacy Terms	PAR Approval 2017-12-06
P7013	Inclusion and Application Standards for Automated Facial Analysis Technology	PAR Approval 2018-05-14
P7014	Standard for Ethical considerations in Emulated Empathy in Autonomous and Intelligent Systems	PAR Approval 2019-06-13
P2755.2	Recommended Practice for Implementation and Management Methodology for Software Based Intelligent Process Automation (SBIPA)	PAR Approval 2019-05-21
P2801	Recommended Practice for the Quality Management of Datasets for Medical Artificial Intelligence	PAR Approval 2018-12-05
P2802	Standard for the Performance and Safety Evaluation of Artificial Intelligence Based Medical Device: Terminology	PAR Approval 2018-12-05
P2807	Framework of Knowledge Graphs	PAR Approval 2017-03-23
P2841	Framework and Process for Deep Learning Evaluation	PAR Approval 2019-09-05
P2805.3	Cloud-Edge Collaboration Protocols for Machine Learning	PAR Approval 2019-02-08
P3333.1.3	Standard for the Deep Learning-Based Assessment of Visual Experience Based on Human Factors	PAR Approval 2017-09-28
P3652.1	Guide for Architectural Framework and Application of Federated Machine Learning	PAR Approval 2018-12-05

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인공지능 표준 갭분석표(2019 ver)

표준 문서 / 기술 분야	일반, 정의	요구사항, 유즈 케이스	아키텍쳐	API, 인터페이스	데이터 모델, 포맷, 스키마	기타, 가이드라인
기반	ISO/IEC WD 22989	ISO/IEC NP TR 24030	ISO/IEC WD 23053		NNEF	
신뢰성	ISO/IEC NP 23894, ISO/IEC NP TR 24027, ISO/IEC NP TR 24028, ISO/IEC NP TR 24029-1					
거버넌스	ISO/IEC NP 38507					
데이터	ISO/IEC FDIS 20546	ISO/IEC AWI TR 20547-2	ISO/IEC DIS 20547-3			ISO/IEC AWI TR 20547-1, ISO/IEC 20547-5
클라우드 인공지능		Y.MLaaS-reqts			P2805.3	P3652.1
스마트 네트워크		Y.3170	Y.qos-ml-arc, Y.3172			Y.MecTa-ML
스마트 시티			Y.SSC-AISE-arc			Y.Sup.AI4IoT
스마트 헬스						P2801, P2802
보안/개인정보	P7006					
윤리/사회적 관심	ISO/IEC NP TR 24368					P7010
자율 주행		H.CUAV-AIF, F.VS-AIMC				

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인공지능 표준 갭분석표(ITU & IEEE, 2020 ver)

표준문서 / 기술분야	개념/정의	유즈케이스/요구사항	기능/참조구조	데이터포맷/스키마	프로토콜/인터페이스
컴퓨팅	F.AI-MLTF		P3652.1, P.MLGuide, F.AI-DMPC		P2805.3, P2841, F.748.11, F.AI-DLFE
로봇 및 무인자동화	P7007, P7008, Y.Sup.AI4IoT	P2755.2, P7010, F.VS-AIMC	Y.SSC-AISE-arc		P7009
멀티미디어		P7014, F.SCAI, F.AI-RMCDP, F.AI-SCS, F.IMCS	FSTP-ACC-AI, F.AI-FASD		P3333.1.3, P7013, P.565, F.EMO-NN, F.AI-ILICSS, F.746.11
의료	P2802	P2801, H.AI-SaMD-Req	HSTP.Med-AI-CCTA		
네트워크	Y.MecTa-ML, Y.ML-IMT2020-Data-Handling, Y.ML-IMT2020-MP	M.resm-AI, Y.3170, Y.Suppl to Y.317X series	Y.qos-ml-arc, Y.IMT2020-AIICDN-arch, Y.ML-IMT2020-NA-RAFR, F.CDN-AINW		Q.INS-PM, Q.IMT2020-PIAS, Q.VoLTE-SAO-FP, E.475
데이터 운용 및 보안	P2807, M.AI-TOM, F.Supp-OCAIB	TR.cs-ml	P7006, L.1305		P7012

Thank You !

Q & A