ITRI
Industrial Technology
Research Institute

3GPP
A GLOBAL INITIATIVE

3GPP Service and Systems Aspects
The timeline for 3GPP architecture evolution

Daisuke Yokota
Vice Chairman of 3GPP TSG SA
(SoftBank Corp.)

3GPP Summit
Standards Timeline for 5G

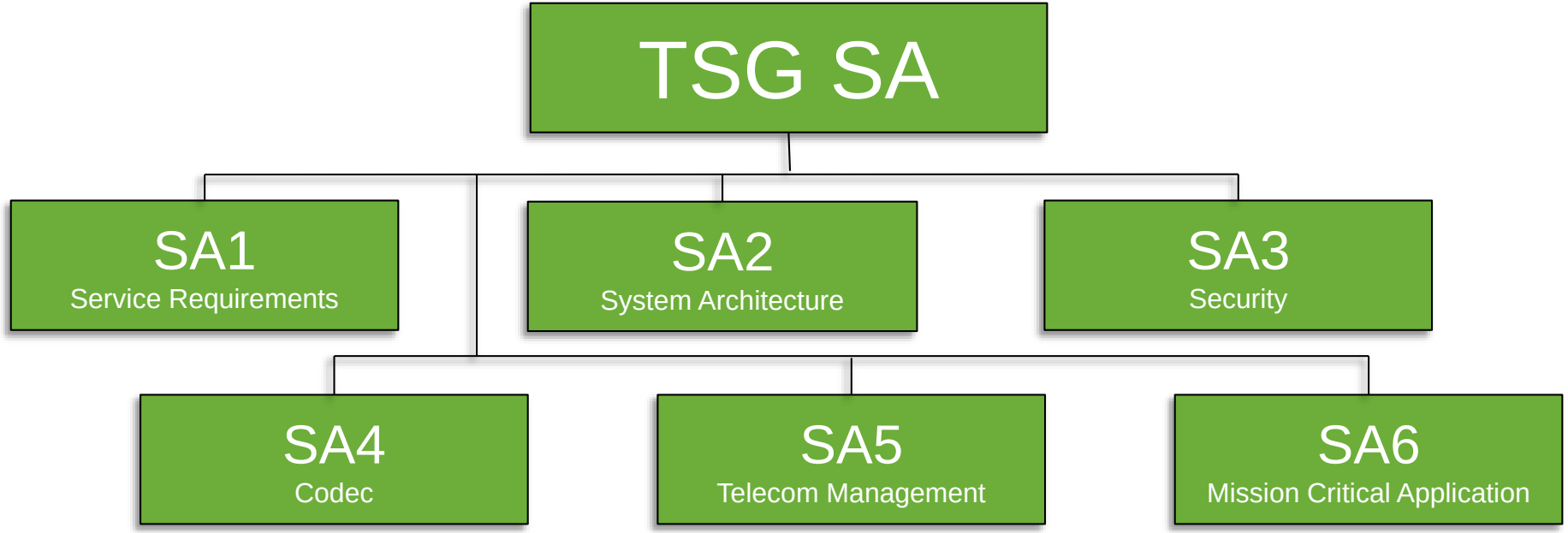
GIS MOTC Convention Center
Taipei, Taiwan, 24 November 2015

工業技術研究院
Industrial Technology
Research Institute

Outline

- SA working groups structure
- History of major steps in system architecture
- Major tasks of SA towards next generation system
- New service requirements “SMARTER”
- Study on next generation system architecture
- Expected timeline for next generation system

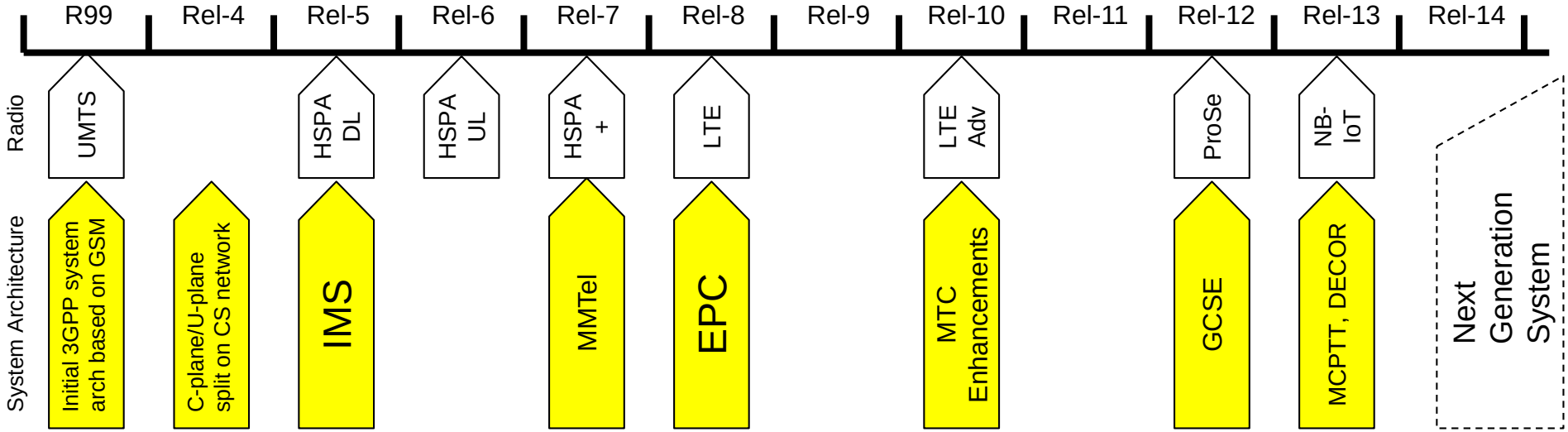
SA Working Groups Structure



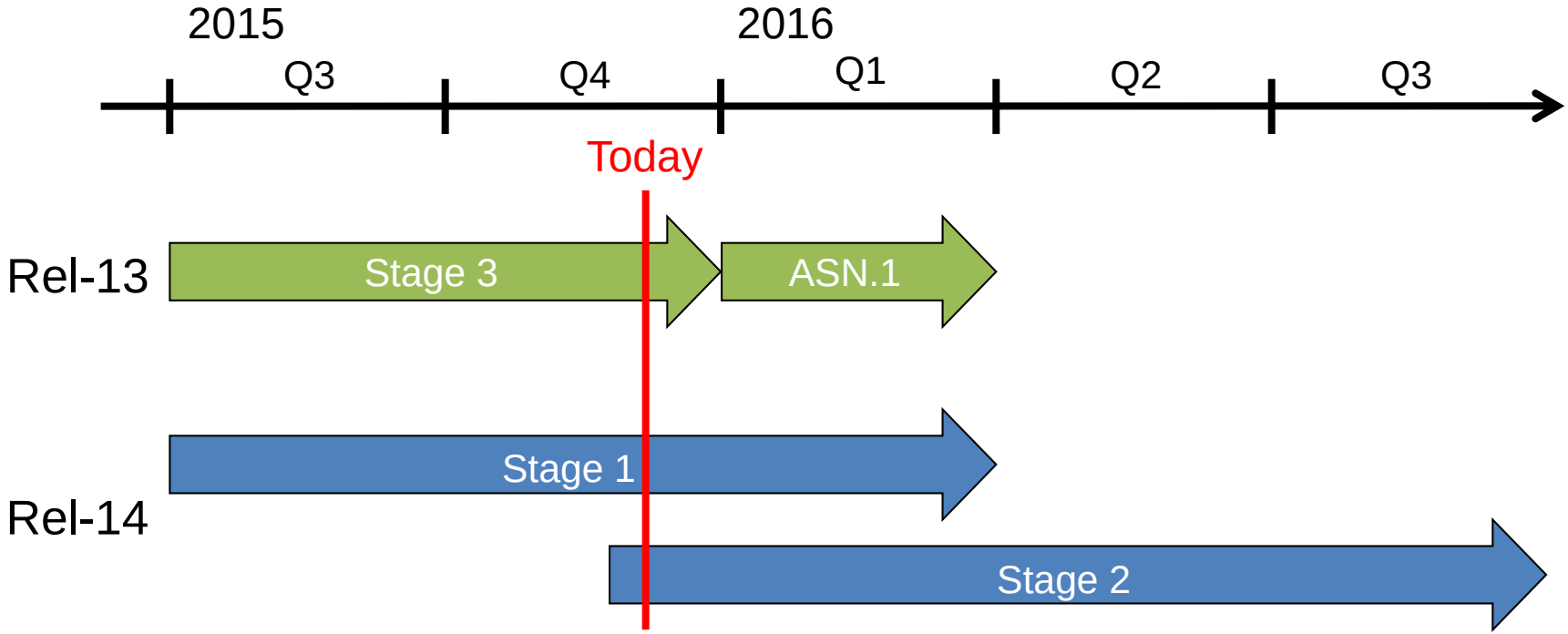
工業技術研究院
Industrial Technology Research Institute

History of Major Steps in System Architecture

3GPP A GLOBAL INITIATIVE



Current Status
(Where are we now?)



工業技術研究院
Industrial Technology Research Institute

Major tasks of SA towards Next Generation System

3GPP A GLOBAL INITIATIVE

Service Requirements

Identifying use cases and requirements which cannot be fulfilled by the current system i.e. EPS.

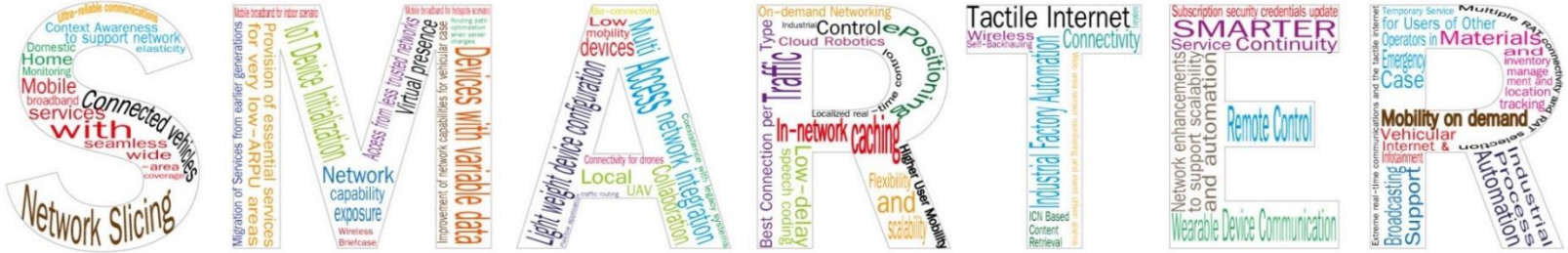
System Architecture

Developing the next generation system architecture that provides services as required above.

Service Requirements

“SMARTER” Overview

- Study on New Services and Markets Technology Enablers (SMARTER) has started.
- The objective is to develop high-level use cases and identify the related high-level potential requirements for the next generation system.



Status of SMARTER

- Use cases for the next generation system are being captured in TR 22.891.

> "TR 22.891 serves as a primary entry point for the service requirements for the next generation system."

- TR 22.891 at 80% at Oct 2015 (SA1 Ad-hoc on SMARTER)
  - >70 use cases, each with description, potential service requirements, and potential operational requirements

SMARTER Groups

- SMARTER Ad Hoc was just held in Oct 2015.
  - Similar/related use cases were grouped into 4 groups.
  - SIDs for each group to form new, detailed, TRs were drafted.
- 4 groups for new SIDs and TRs are as follows*:
  - **eMBB** = Enhanced Mobile Broadband
  - **mIoT** = Massive IoT
  - **CriC** = Critical Communications
  - **NEO** = Network Operation

* It was agreed to study V2X use cases and requirements in a separate SID to be started in Q2 2016

Enhanced Mobile Broadband (eMBB)

- For eMBB, the following use case families have been identified, with example requirements:
  - Higher capacity
    - E.g. indoor scenario with experienced data rates up to Gbps and traffic volumes at least at the level of Tbps/km^2 in indoor scenarios
  - Enhanced connectivity
    - E.g. connectivity for aerial objects with reliable mobile broadband connectivity
  - Higher user mobility
    - E.g. enhanced mobile broadband services in fast moving vehicles (e.g. up to 500 km/h)

Massive Internet of Things (mIoT)

- For mIoT, the following use case families have been identified, with example requirements:
  - Internet of Things
    - E.g. enable mobiles that operate as concentrators of IoT capillary traffic towards 3GPP networks
  - Smart wearables
    - E.g. support of wearable devices to access to the 3GPP network directly or via a smart phone
  - Sensor networks
    - E.g. support of large numbers of stationary devices with reduced mobility management

Critical Communication (CriC)

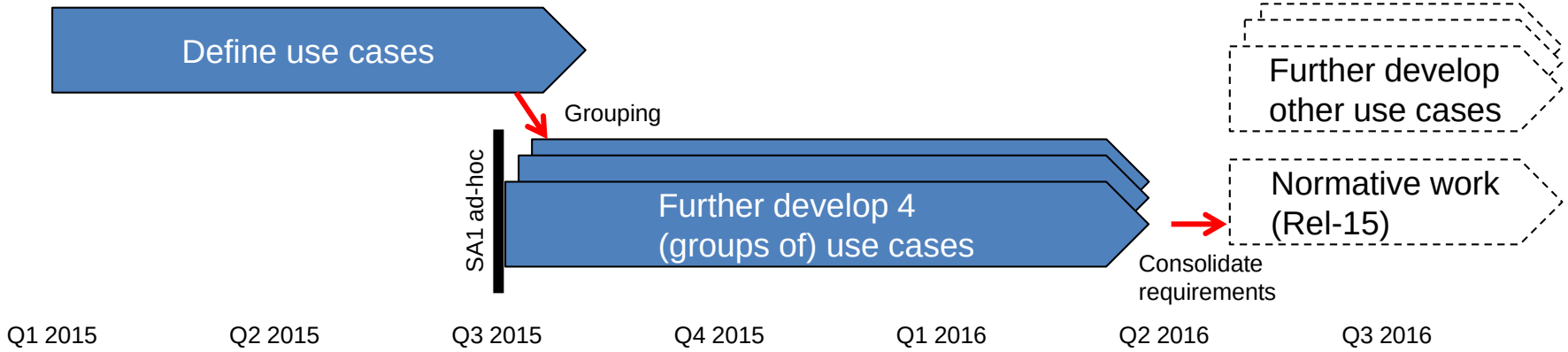
- For CriC, the following use case families have been identified, with example requirements:
  - Higher reliability and lower latency
    - E.g. for remote control of Unmanned Arial Vehicles (UAVs)
  - Higher reliability, higher availability and lower latency
    - E.g. for industrial control applications
  - Very low latency
    - E.g. for Tactile Internet with very low latency (~1 ms)
  - Higher accuracy positioning
    - E.g. accuracy location capability of less than [3 m] at [80%] of occasions.

Network Operations (NEO)

- For NEO, the following use case families have been identified:
  - System flexibility (e.g. network slicing)
  - Scalability
  - Mobility support
  - Efficient content delivery
  - Self-backhauling
  - Access (e.g. on demand networking)
  - Migration and interworking

SMARTER Schedule

- Use cases from TR 22.891, grouped in 4 groups, are further elaborated in 4 different SIDs each with a different TR.
- Normative work to follow in Release 15.



System Architecture

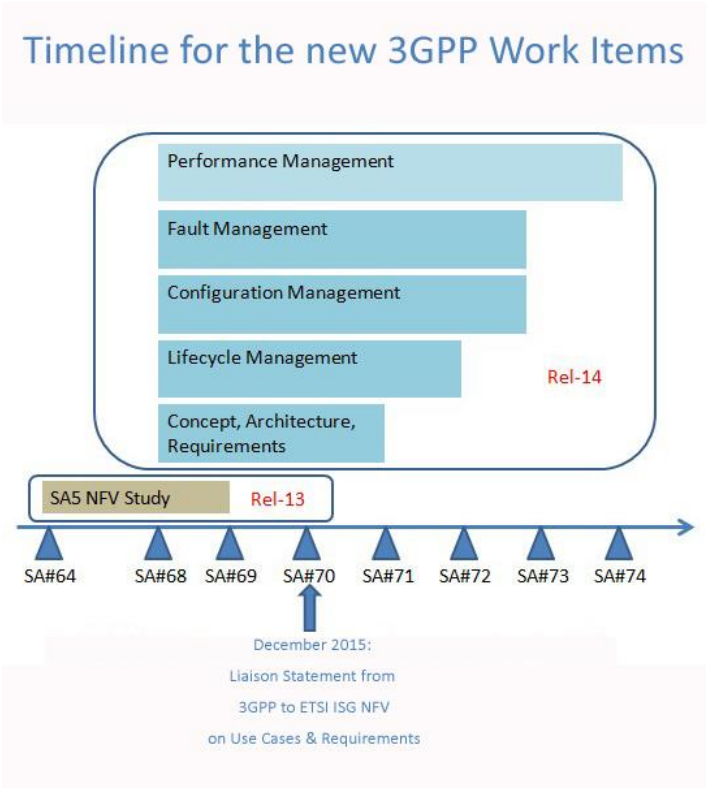
NFV & Network Management [1/2]

- The NFV technology brings benefits like Flexibility, Time-to-market, OPEX/ CAPEX saving to telecommunication network.
- Study on network management of virtualized networks was conducted in Rel-13 utilizing the outcome from ETSI ISG NFV, and the conclusions have been captured in TR 32.842.
- The use cases and requirements for network management involving virtualized networks, the potential impacts on the existing 3GPP Management reference models, and the management procedures have been identified.

Ref. 3GPP TR 32.842 V13.0.0

NFV & Network Management [2/2]

- Based on the conclusions of the study, 5 new Rel-14 work items were approved in June and Sept 2015, which are to standardize following features for mobile networks that include virtualized network functions:
  - Concept and Architecture
  - Performance Management
  - Fault Management
  - Configuration Management
  - Lifecycle Management



Enhancements for the Existing Architecture

- Feasibility Study on Control and User Plane Separation of EPC nodes (FS_CUPS)
  - Although not part of the next generation system study, it is assumed to share the motivation with it on coping with the data traffic challenges by separation of control and user plane functionalities.
- Feasibility Study on Enhancements of Dedicated Core Networks selection mechanism (eDecor)
  - This study aims to enhance the DECOR feature, which enables a PLMN to have multiple dedicated core networks to separately serve devices and/or customers with very different characteristics, such as machine type devices, MVNO, data usage, etc. Similar to the feature above, DECOR might be considered to bring some commonality with the next generation system by enabling something comparable to network slicing.

Ref. 3GPP SP-150518, SP-150519

Study on Architecture for Next Generation System

- A new study item, to design a system architecture for the next generation mobile networks, was agreed at an SA2 meeting in Nov 2015.
- The architecture should be developed with the following non-exhaustive list of operational efficiency and optimization characteristics:
  1. Ability to handle the rapid growth in mobile data traffic/device numbers in a scalable manner.
  2. Allow independent evolution of core and radio networks.
  3. Support techniques (e.g. Network Function Virtualization and Software Defined Networking) to reduce total cost of ownership, improve operational efficiency, energy efficiency, and simplicity in and flexibility for offering new services.

Ref. 3GPP S2-153703

Timeline for the Next Generation System

- Tentative agreements as of Sept 2015 on the timeline for the next generation system are:
  - Before IMT-2020 submission, there will be 3 releases.
  - Each release will be roughly 15 months long.
  - Release 15 intends to provide an initial next generation system.

- The study and the standardization of “Next Generation System Architecture” is expected to be aligned with above timeline, but the concrete schedule is yet to be confirmed.

Summary

- 3GPP is in the initial phase of Rel-14, which is important as the beginning of the work related to next generation system.
- The study on the new service requirements “SMARTER” is being conducted, and the study on the next generation system architecture is about to start.
- Joining 3GPP at this stage is meaningful to keep up with the work related to the next generation system from its beginning.

Thank you for your attention!