Collaboration on Standardisation across the 5G PPP and 5G-IA

The 5G Public Private Partnership has a very pro-active relationship with standards development, with many mechanisms in place to help vertical stakeholders participate in various ways in the process, through the 5G-IA Pre-Standardization WG. Perhaps in no other WG do European and industrial policy makers work so closely together to create a roadmap of relevant standardisation and regulatory topics for 5G, to ensure that European interests are considered. This includes identification of Research and Development topics that could be important candidates for standardisation, influencing the timing of R&D Work Programmes. This is where vertical participants can potentially make their voice heard even prior to entering the standards development processes of specific standards organisations. The Pre-Standardization WG also cooperates with other WGs, e.g. chapter 7 authorship of the Architecture WG While Paper V3.0 (June 2019)[1].

The 5G-IA Pre-Standardization group, which enables collaboration between European policymakers, industrial players (large companies and SMEs) and specialised researchers, including members outside the 5G PPP, working together to:

- Support members in the 5G standardisation process, including down-streaming of R&I results, bring in experts from 3GPP and ETSI Board members, and ensure liaison with 5G-IA and its board.

- Define EU priorities for 5G standardisation with the support of the EC.

- Debrief WG members on these priorities after each 3GPP quarterly plenary, primarily Releases 16 and 17.

- Develop a gap analysis for future 3GPP releases and EC funding programmes.

- Track contributions from 5G PPP Phase 2 through a dedicated blueprint available on the shared workspace (BSCW – Eurescom), now also expanding to Phase 3 projects.

  - Inputs to 3GPP as the main standards body developing technical specifications for 5G.

  - Inputs to ETSI, spanning: Open Source MANO (management and network orchestration), ETSI Industry Specification Groups, e.g. Experimental Networked Intelligence (ETSI ISG ENI), Network Functions Virtualisation (ETSI ISG NFV), Zero Touch Network and Service Management (ETSI ISG ZSM).

  - Inputs from other groups targeted.

- Ensure cooperation across other WGs through the TB and SB, including the 5G-IA Verticals Task Force and the Task Force formed with a sub-set of 3GPP Market Representation Partners flanked by 3GPP TSG chairs and ETSI Board members. The Task Force is led by Global5G.org on behalf of 5G-IA.

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[1] https://5g-ppp.eu/wp-content/uploads/2019/07/5G-PPP-5G-Architecture-White-Paper_v3.0_PublicConsultation.pdf.

Analysis of Contributions to 5G Standardisation (PPP Level)

5G PPP Phase 2 projects submit input contributions to over 30 groups within standards organisations and industry alliances. Inputs come in diverse formats, such as technical reports, specification documents, white papers, proof of concepts, interoperability tests, and source codes.

The 5G-IA Pre-Standardization WG is tasked with tracking such inputs through its members, sometimes collaborating with other WGs, e.g. the Architecture WG, on assessing contributions from different perspectives. Each input is tracked in terms of contributing project, targeted SDO and its specific group, title of the input, reference documentation or link, history (e.g. Q2-2018) and partners involved. The data collected is used to generate statistical graphs and tables.

Impacts: In the past 12 months, a total of 295 inputs have been tracked by the Pre-Standardization WG. 219 of these inputs relate to the development of 5G architectures, analysed in close collaboration with the 5G PPP Architecture WG.

The table below shows a breakdown of the inputs for the development of 5G standardisation tracked in the last 12 months.

Number of contributions per category tracked	
Overall architecture: Mostly to 3GPP, with many inputs on the implementation of 5G V2X systems and multimedia broadcast or streaming services.	70
Core and transport architecture: Mostly to 3GPP, with most of the inputs related to terminals.	58
Management and orchestration architecture: Mostly to three ETSI groups, namely, the ZSM ISG, NFV ISG and OSM.	50
Radio and edge architecture: Mostly to 3GPP, with many inputs on 5G NR enhancements for V2X and multimedia broadcast.	41
Other 3GPP WGs: RAN 3 (new radio); SA1 (service requirements); SA5 (network management, including energy efficiency and architecture); SA4 (codec); SA6 (northbound APIs); SA4-5-6 (media and broadcasting).	21
ETSI Multi-Access Edge Computing (e.g. Instantiating a Network Slice integrating MEC applications, using 3GPP elements).	6
Industry groups (e.g. DVB for media and broadcasting); **other standards organisations** (e.g. IETF for network virtualisation, fog computing and northbound interfaces); not specified	49
Total	**295**

The figure below shows the overall spread of inputs tracked from phase 2 projects through the Pre-Standardization WG blueprint.
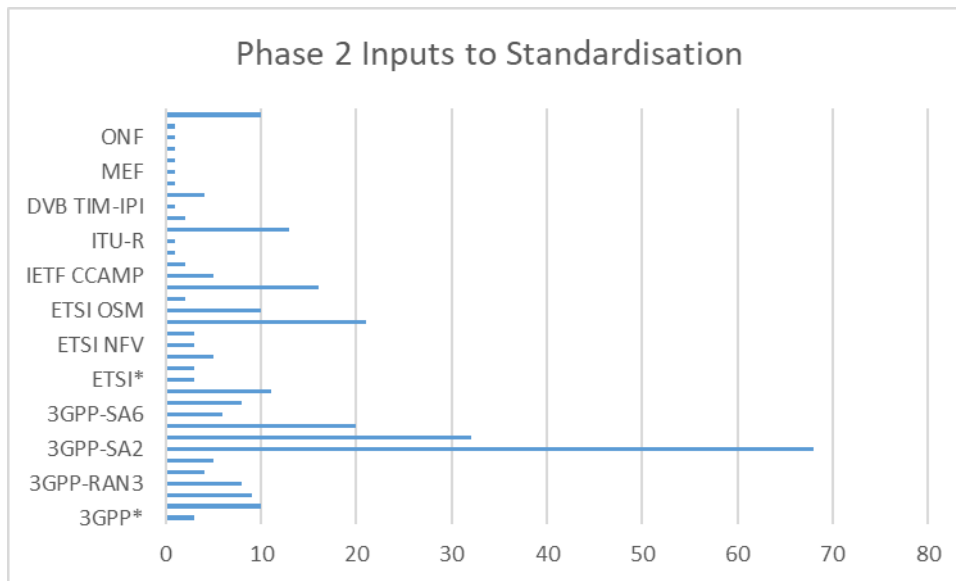
Figure 1: Phase 2 Project Inputs to 5G standardisation

3GPP is the most targeted standards organisation targeted with inputs to 10 of its 16 WGs. The most targeted group is SA2 – Architecture, which is the group responsible for developing the Stage 2 of the 3GPP network. The main functions and entities of the network are based on inputs from SA1 (services), looking at how they are inter-linked and the information they exchange.

Examples of vertical industries contributing to 3GPP standardisation work include the European Broadcasting Union (EBU), BBC (EBU member and chair of one of its 5G groups), IRT (member of New European Media – NEM), SWR (EBU member and 3GPP rapporteur) for media and broadcasting. Other examples are mostly related to the integration of satellite into 5G, with inputs from Thales Alenia Space (rapporteur), Airbus and Avanti Communications. These are also examples of the overall EU leadership in 3GPP in relation to verticals.

The image below shows the breakdown for 3GPP in terms of the inputs from phase 2 projects.
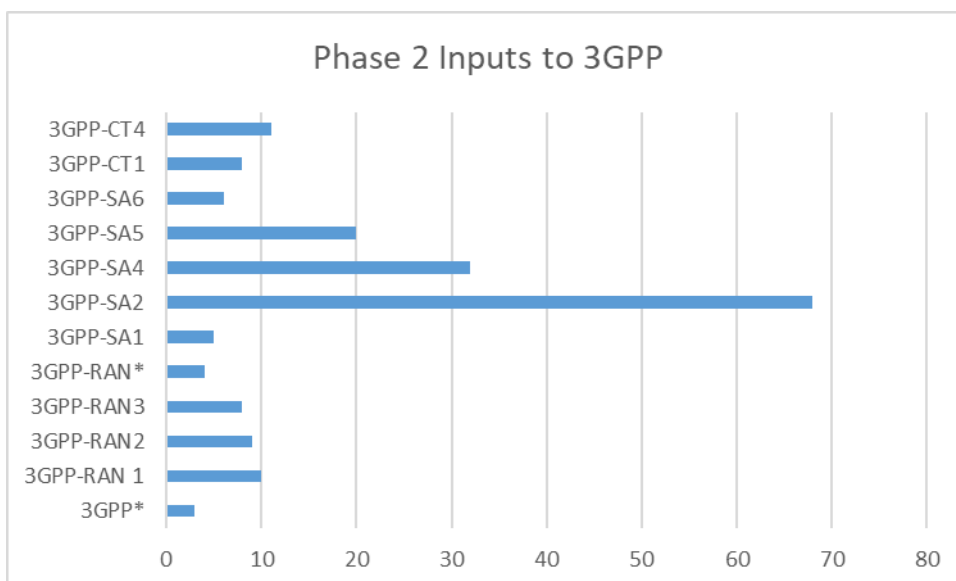

Figure 2: Phase 2 inputs to 3GPP

Key findings from the cross-WG collaboration between the 5G-IA Pre-Standardization WG and the 5G PPP Architecture WG are reported below.

5G PPP inputs on **5G overall architecture** focus mostly on the implementation of 5G V2X systems and multimedia broadcast or streaming services. The breakdown for 3GPP is:

- 3GPP SA2 – Architecture: 40 contributions.
- 3GPP SA4 – Codec: 25 contributions.
- 3GPP SA6 – Mission-critical applications: 3 contributions
- 3GPP SA1 – Services: 1 contribution
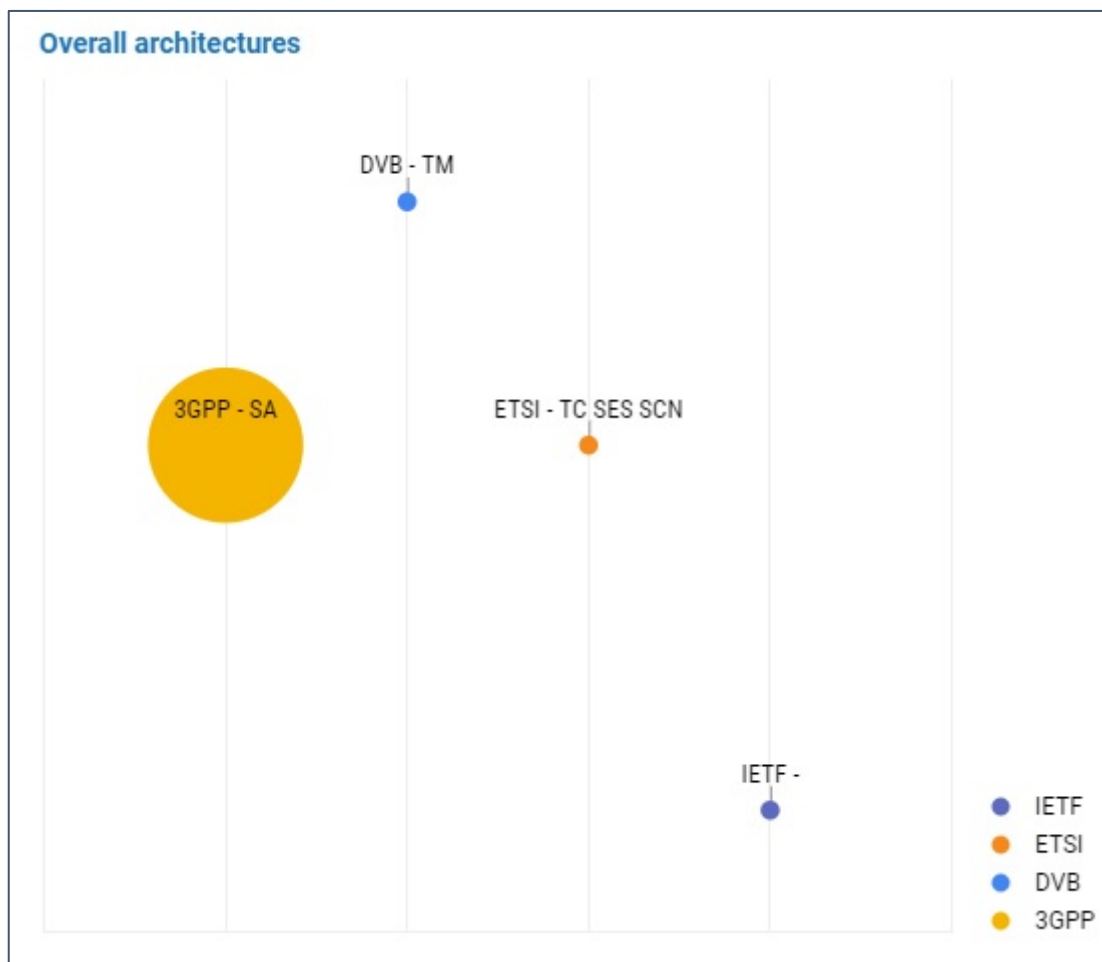- 3GPP SA5 – Telecom Management: 1 contribution.

Figure 3: Inputs to SDOs for Overall Architecture

5G PPP inputs related to **RAN architectures** mostly target the WGs of 3GPP TSG RAN. Most of the focus is on 5G NR enhancements for V2X and multimedia broadcast. The latter is also targeted towards the DVB industry alliance. Contributions to edge architectures mostly target two ETSI Industry Specification Groups: ETSI MEC and ETSI NFV.

The breakdown for 3GPP is:

- 3GPP RAN 1: 10 contributions.
- 3GPP RAN 2: 8 contributions.
- 3GPP RAN 3: 6 contributions.
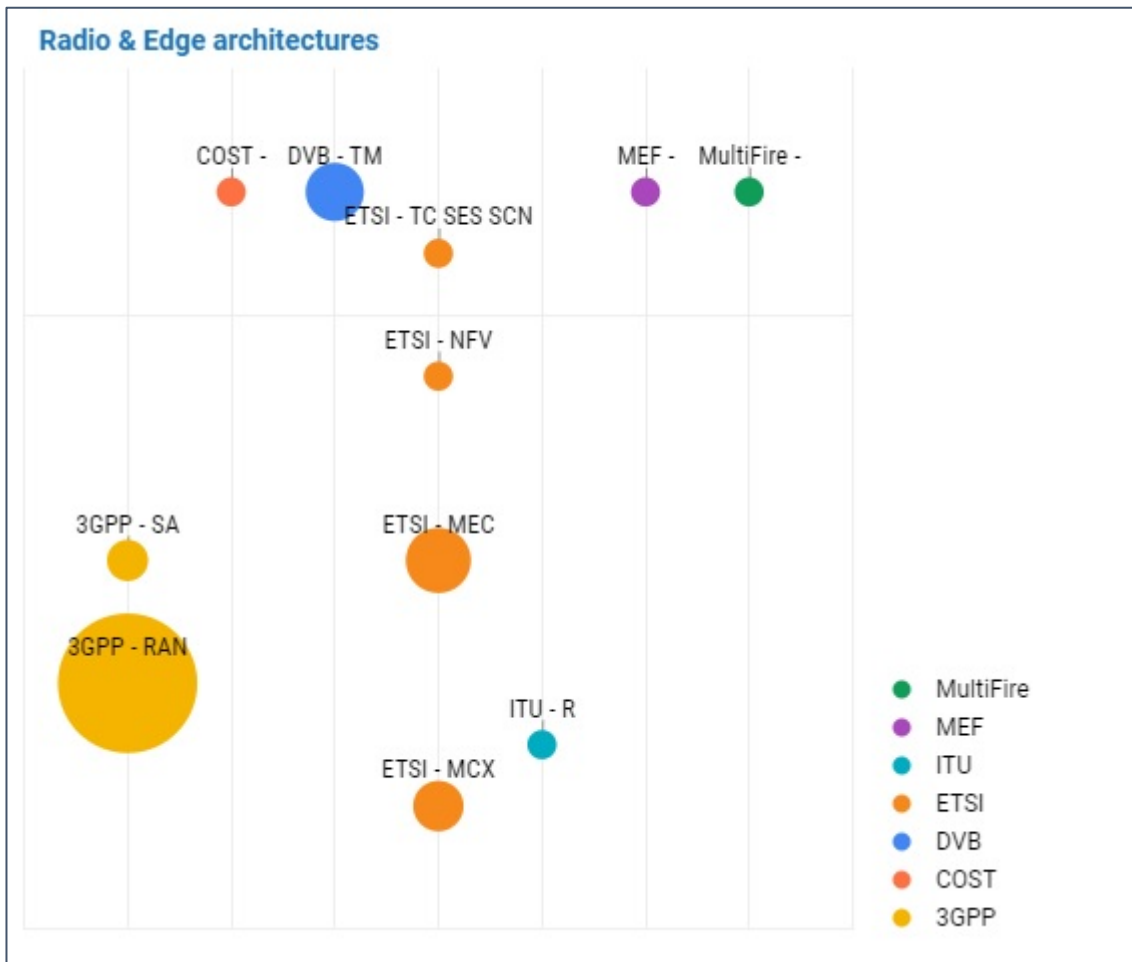- 3G RAN (WG not specified): 4.

Figure 4: Inputs to SDOs for Radio and Edge

5G PPP phase 2 project inputs for **5G core network architectures** also confirm the trend towards 3GPP. In this case, the targeted TSGs are SA and CT (core network and terminals). As for contributions related to **transport architectures**, inputs on microwave/millimetre wave transport have been towards IETF. Contributions for optical-based transport have targeted mostly ITU-T and IETF.

The breakdown for 3GPP is:

- 3GPP CT1: 8 contributions.
- 3GPP CT4 – 11 contributions.
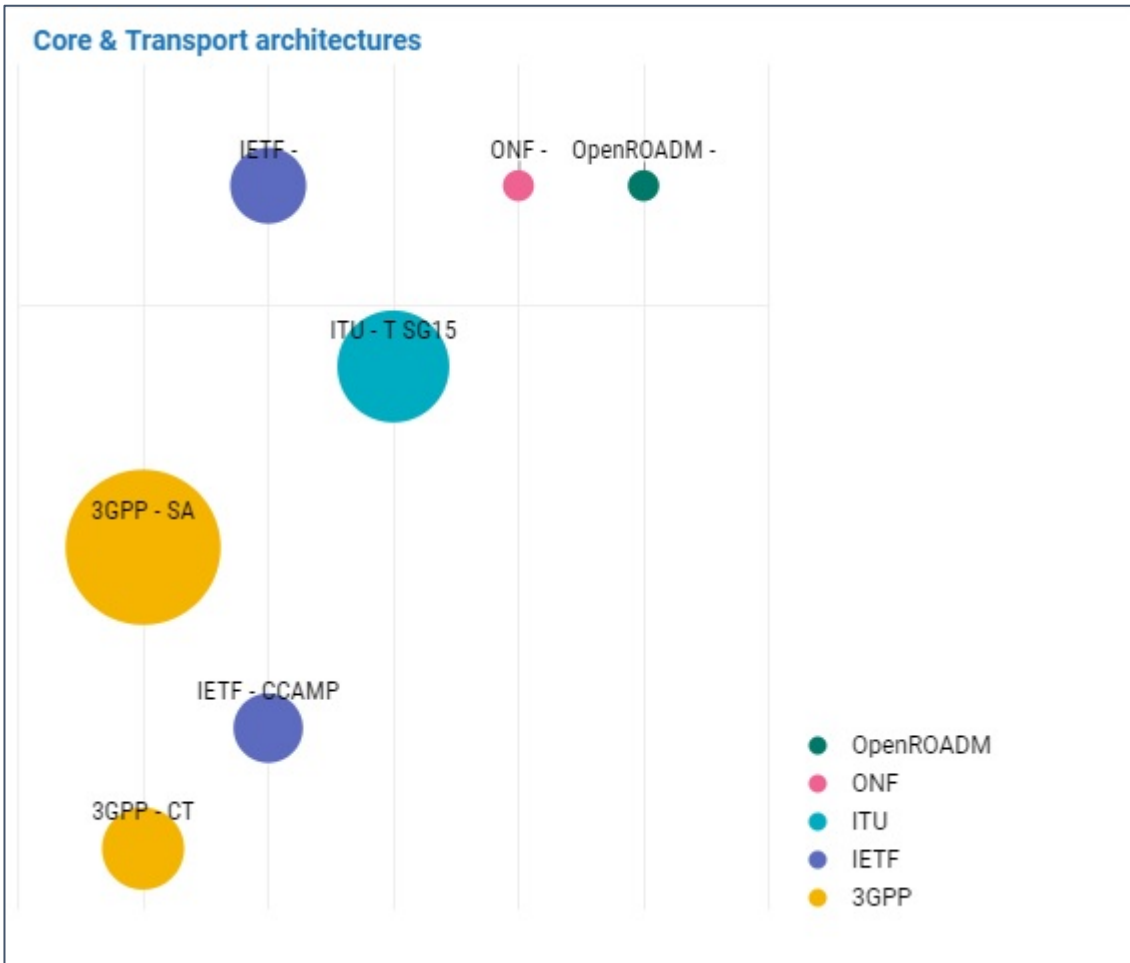- 3GPP SA 2 – 21 contributions.

Figure 5: Inputs to SDOs for Core Network and Transport

Inputs for **MANO architectures** within the 5G PPP phase 2 have targeted ETSI, mostly:

- ETSI Zero Touch Network and Service Management (ETSI ISG ZSM).
- ETSI NFV for the virtualisation of network functions (ETSI ISG NFV).
- ETSI Open Source MANO (ETSI OSM), an open source NFV Management and Orchestration (MANO) software stack aligned with ETSI NFV Information Models

Outside of ETSI, there have been contributions to 3GPP mostly targeting the SA WG5 (Telecom Management), which specifies architecture and solutions for provisioning, charging and management of mobile networks (including RAN and core) and their services.
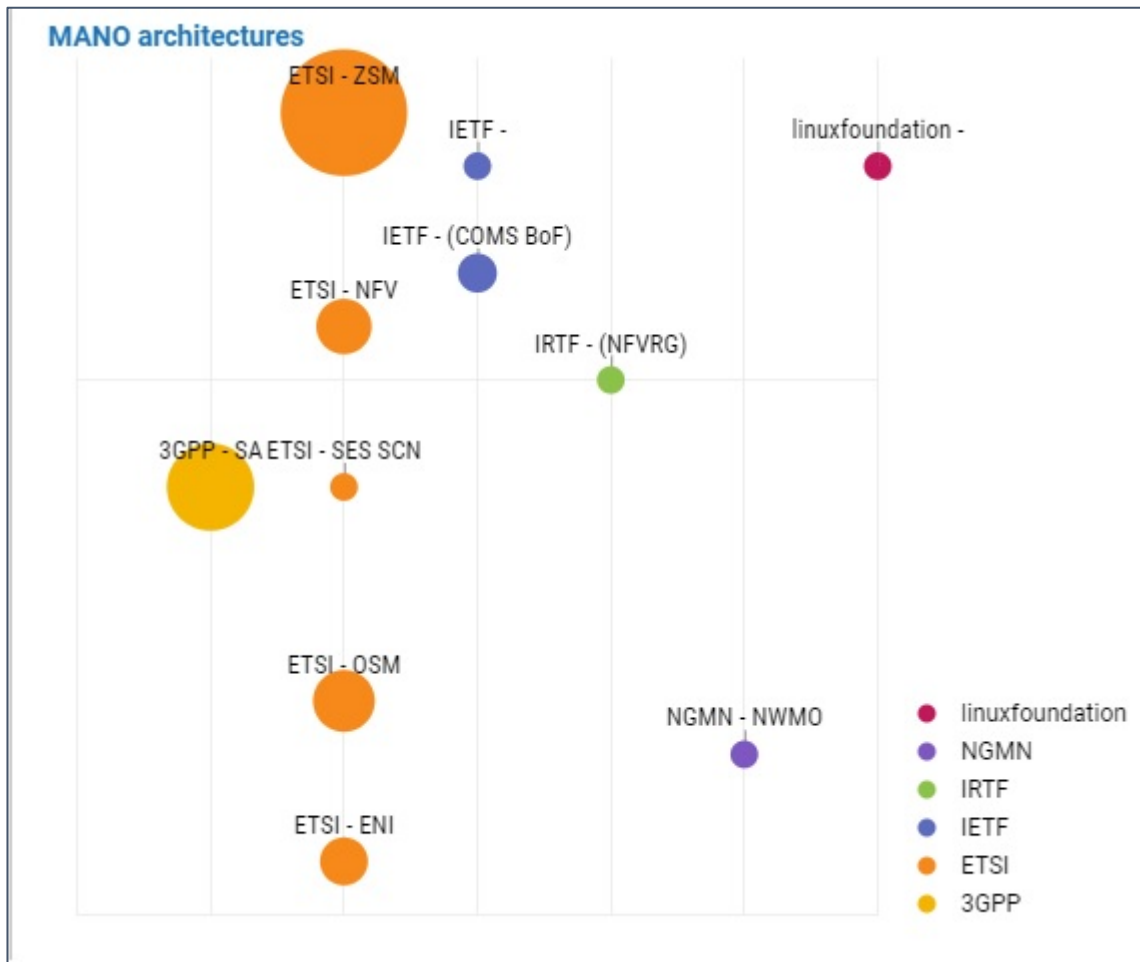
Figure 6: Inputs to SDOs for MANO

5G Vertical User Workshop Series

A key link between the Pre-Standardisation WG and the Verticals Task Force is the Task Force formed by a **sub-set of 3GPP Market Representation Partners** (MRPs) upon the recommendation of the 3GPP Project Coordination Group (PCG). The main remit of the Task Force is to organise workshops targeting vertical industries with the aim of boosting inputs to 3GPP 5G standardisation. The sub-set of 3GPP market partners comprises: 5GAA – 5G Automotive Association; 5G-ACIA – Industrial Internet of Things; 5G-IA – Infrastructure Association, and its WGs (primarily Pre-Standardization WG) and Verticals Task Force and PSCE – Public Safety Communications Europe.

- The 1st 5G Vertical User Workshop took place on 10-11 February 2019 in Brussels, hosted by 5GAA and co-organised with 5G-ACIA, 5G-IA and PSCE. Its main aim was to chart a course towards vertical standardisation activities through the leadership of EU-based industry associations. An Executive Summary and Report of the Workshop was duly prepared and published on www.5g-ppp.eu, and its Newsflash April 2019, https://5g-ppp.eu/newsletter-16/.

- The 2nd 5G Vertical User Workshop took place 9-10 July in Rome, organised by 5G-IA (via Global5G.org), co-hosted with 5GAA, 5G-ACIA and PSCE. The workshop was co-located with the 3GPP SA6 Meeting to help boost technical discussions with direct access to the on the development of specifications applicable to many verticals. Another key feature of the

workshop was the gathering and discussion of common requirements across vertical industries, with the aim of boosting cross-industry support and thus help accelerate time to reach consensus. The post-event reports will be published on Global5G.org: https://www.global5g.org/snapshot-2nd-vertical-user-workshop and presentations here: https://www.global5g.org/2nd-5g-vertical-user-workshop-agenda#overlay-context=user.

Key features include:

- An extended number of vertical industry associations:
    - Automotive (5GAA) and selected members.
    - 5G-ACIA and selected members.
    - ESOA (EMEA Satellite Operators Association), also part of 5G PPP/programme with ESA (e.g. Thales Alenia Space).
    - The International Association of Lighthouse Authorities (IALA) - newcomer (autonomous/connected ships; communications ship-to-ship; ship-to-port): Newcomer.
    - European Broadcasting Union (EBU) - part of 5G PPP phase 2 (e.g. BBC, RAI) with a vision and roadmap for 5G, including the participation of 3GPP rapporteurs.
    - European Utilities and Telecoms Council (EUTC) - has a group on spectrum but is working towards closer collaboration on 5G & standardisation.
    - International Railway Union (UIC) - newcomer, making transition to 3GPP standards, with work in progress in SA6. SNCF also presented its R&I, including other types of mobility (e.g. commuter services).
    - Next Generation Mobile Network Alliance (NGMN Alliance), leading to plans to increase engagement with verticals.
    - The Critical Communications Association (TCCA).
    - Automotive and transportation (Continental, as a 3GPP newcomer).

Chairmen of 3GPP Technical Specification Groups RAN (radio access) and SA (systems and service aspects) Co-location: 3GPP SA6 Meeting (mission critical applications supporting increasing number of verticals). Other chairs present: SA1 - service requirements (TNO/KPN); SA2 – architecture. Phase 2 and Phase 3 project representatives.

- A dedicated session to help verticals maximise impacts from standardisation inputs with the resources available to them, reviewing current processes and looking for ways to lower entry barriers.
- Dedicated session with SA6 to understand work on mission-critical applications, pinpointing horizontal issues been tackled that are relevant across diverse verticals.
- A dedicated slot on common requirements and complementary with each topic presented by a selected "champion", namely the leaders of co-hosting MRPs and EU standards specialists. A dedicated template was produced for selected participants representing vertical industries to further boost consensus building.
    - Concrete actions defined for Release 17.
- Four reports (in progress at the time of writing this report):
    - Outcomes & Report to PCG & TSG.
    - Agreed action points moving forward.

- o Report for 5G IA Board & other SDOs, comprising a full report and Executive Summary.