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NG-eCall as a foundation of Novel services and Sources of information

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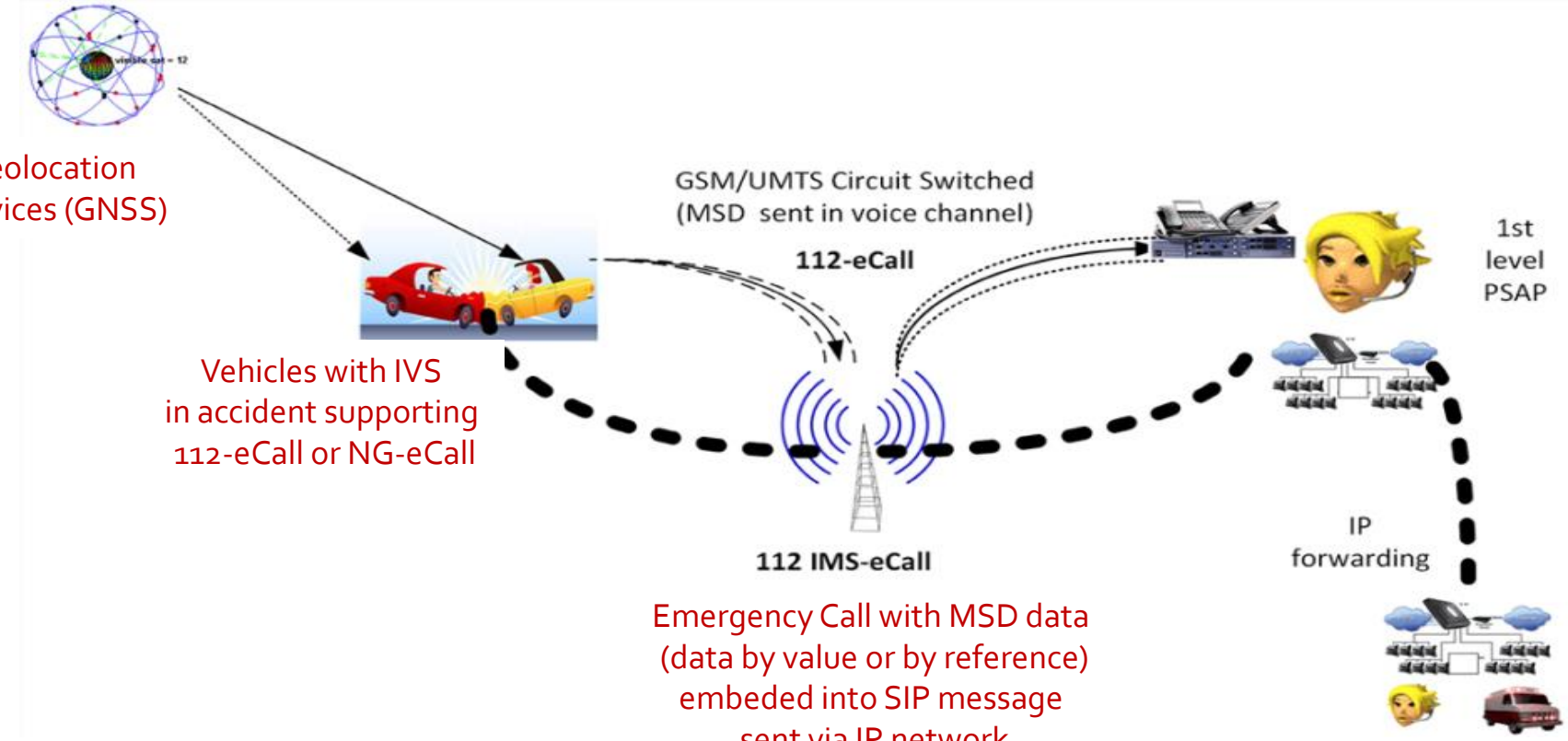
Agenda

- Circuit Switched and Packet Switched eCall
- Road-safety information and services

Iskratel is the lead partner of the Sub-activity 2.2: "eCall support over IMS" and Sub-activity 5.2: "Validation Slovenia" and the contributor to Sub-activity 3.6: "Integration of new vehicle categories into eCall enabled PSAP" within the European project sAFE After-market eCall for Europe.

Iskratel has been the technical partner and the participant at the Next Generation eCall Plugtests™ interoperability testing event with its product NG PSAP.

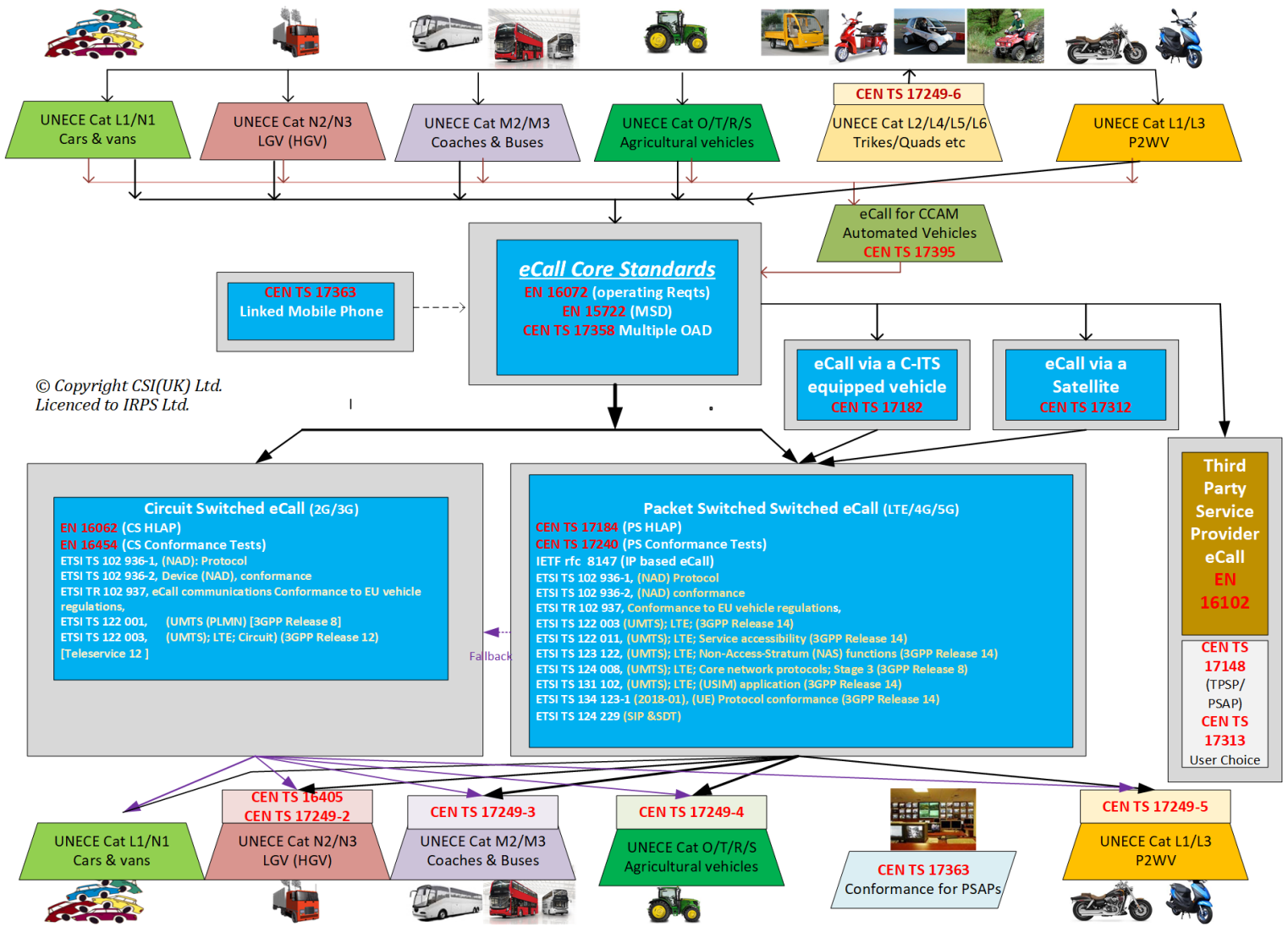
IMS-based eCall Architecture as a Foundation of new Services



Source: sAFE project

Abbreviations:
IVS - In-vehicle System, *PSAP* – Public Safety Answering Point, *ERO* – Emergency Response Organisation,
GSM/UMTS - Global System for Mobile Communications/Universal Mobile Telecommunications System, IMS – IP Multimedia Subsystem
MSD - Minimum Set of Data, GNSS - Global Navigation Satellite System

Circuit Switched eCall (2G/3G) and Packet Switched eCall (LTE/4G/5G)



Abbreviations/Remarks:
LGV(HGV) – Large Goods Vehicle
(Heavy Goods Vehicle)
P2WV – Powerred Two-Wheeled Vehicles
CCAM – Cooperative, Connected, Automated and Autonomous Mobility
C-ITS - Cooperative Intelligent Transport Systems
L1 (Cars) – should be M1

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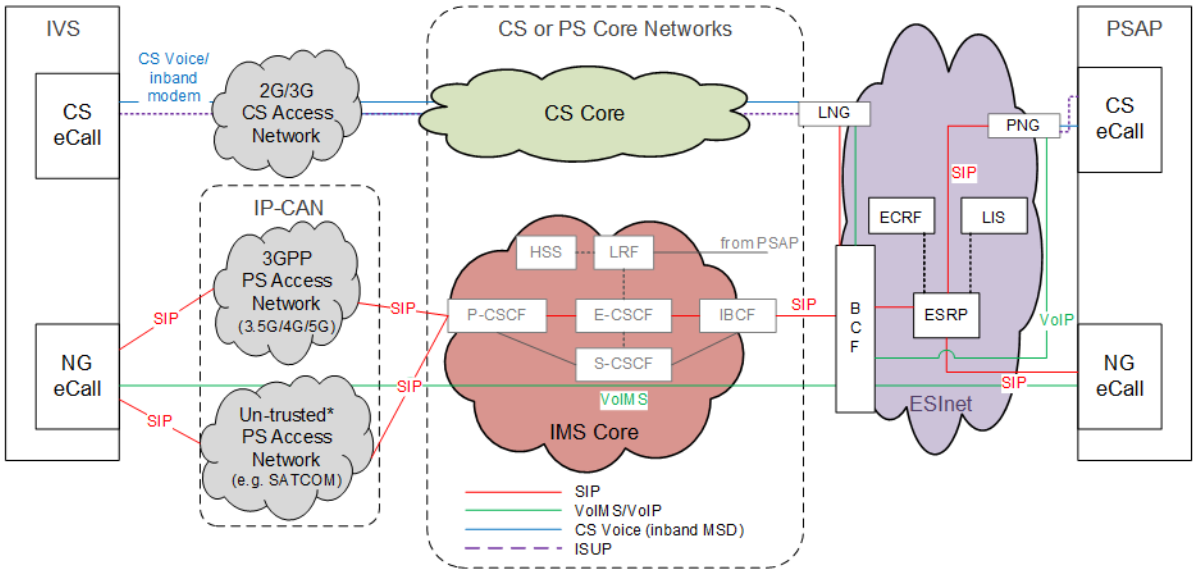
Architecture for End-To-End NG-eCall (eCall over IMS)

- *In-vehicle system (IVS)*
  - Supporting CS/NG eCall
- *Access to a Network*
  - Circuit-Switched Access Network (2G/2.5G) /
  - Packet-Switched Access Network
    (IP Connectivity Access Network – 3G/4G/5G)
- *Satellite Access Network*
  - Opt 1: Un-trusted Access through EPC/5G Core
  - Opt 2: Opt1 And Satellite Core Network with IMS
- *Core Network*
  - Circuit-Switched Core/
  - Packet-Switched Core and IMS with Media
- *Emergency Services IP Network (ESINet)*
- *Public Safety Answering Point (PSAP)*
  - Supporting CS/NG eCall
- *Location Information/ Security and Privacy*



Source: Deliverable 2.2 Architecture specification eCall over IMS (EU project sAFE)

Abbreviations:
- *IVS* - In-vehicle system, *PSAP* – Public Safety Answering Point
- CS – Curcuit-Switched, PS – Packet-Switched, NG - Next Generation
- IP-CAN - IP Connectivity Access Network, IMS – Internet Protocol Multimedia Core Network Subsystem, ESINet –Emergency Services IP Network

Network technologies and IMS architecture

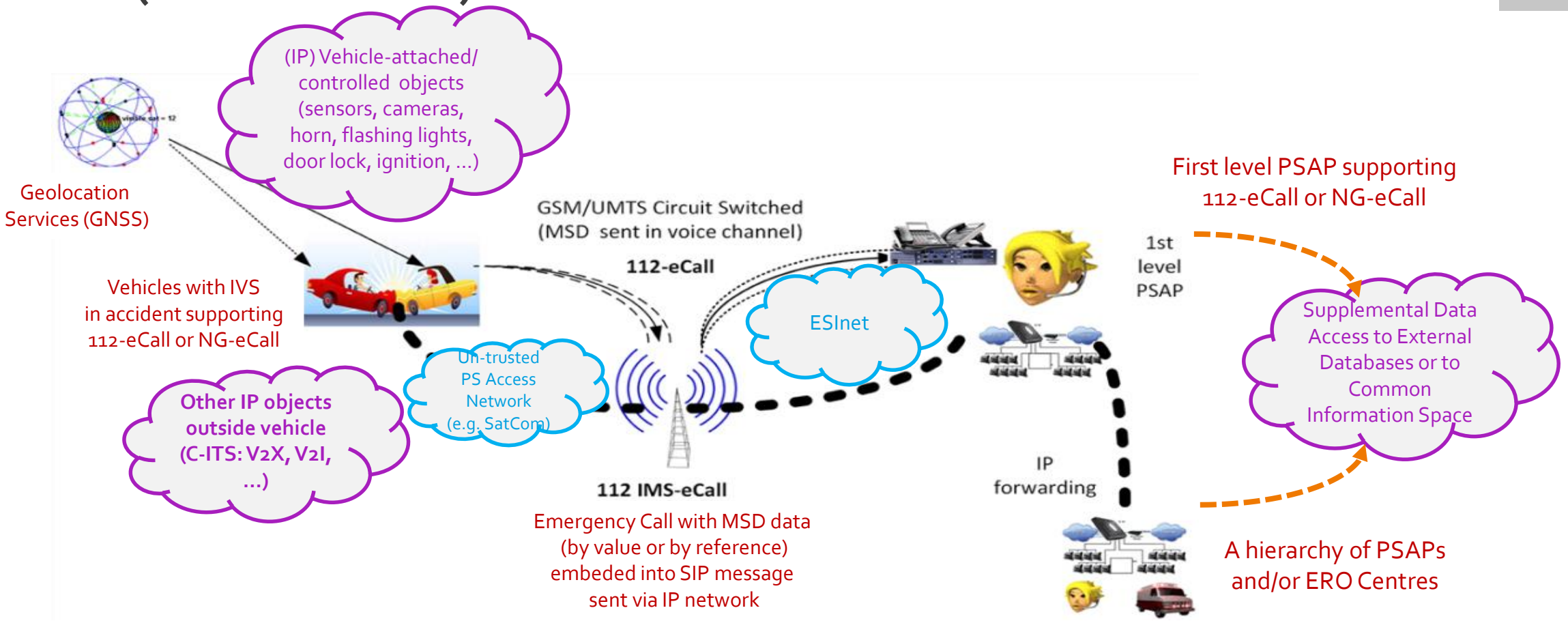
- Forward compatibility for long-term orientation and investments protection:
  - NG-eCall has to operate within an evolving **All-IP communication network** (3G/4G/5G) with Fall-back/ Handover to 2G, as legacy networks (2G/3G) get phased out
  - A clear separation of **Control Plane (Call signalling)** and **User Plane (Voice path)**
  - The support for IP traffic starting from 3G networks remained unchanged with **SIP** as a key signalling protocol
  - In addition to Signalling & Media paths **IP-based Data Path and Location Retrieval Path** are also available
  - The role of **IP Multimedia Systems (IMS) in Voice over 4G (VoLTE)/ VoNR (NSA)/ Vo5G (SA)** stays the same
- The domain selection rules by which the IVS decides whether to attempt the eCall using PS or CS Emergency call is defined in ETSI 123 167 V15 (2018-12), Annex H.6

	PS Available	VoIMS	EMS	ECL	First eCall Attempt	Second eCall Attempt
A	Y	Y	Y	Y	PS	CS if available
B	Y	Y	Y	N	CS if available	PS (UE establishes IMS emergency session)
C	Y	Y or N	N	N	CS if available	No attempt is made in the PS domain
D	Y	N	Y	Y	PS or CS if available	CS if first attempt in PS PS if first attempt in CS
E	Y	N	Y	N	CS if available	PS (UE establishes IMS emergency session)
F	N		-	-	CS if available	

VoIMS = Voice over IMS over PS sessions support as indicated by IMS Voice over PS session supported indication as defined in ETSI TS 123 401 for E-UTRAN connected to EPC and ETSI TS 123 502 for E-UTRA connected to 5GC only.
EMS = IMS Emergency Services supported as indicated by Emergency Service Support indicator as defined in ETSI TS 123 401 for E-UTRAN connected to EPC and ETSI TS 123 501 and ETSI TS 123 502 for E-UTRA connected to 5GC only.
ECL = eCall Over IMS support as indicated by the eCall support indicator defined in ETSI TS 123 401 for E-UTRAN connected to EPC and ETSI TS 123 501 for E-UTRA connected to 5GC only.

Supported:
VoIMS – IMS Voice over PS sessions
EMS – IMS Emergency Services
ECL – eCall Over IMS

PS eCall (eCall over IMS): Additional Paths and Sources of Information



Abbreviations:

IVS - In-vehicle System, *PSAP* – Public Safety Answering Point, *ERO* – Emergency Response Organisation, MSD - Minimum Set of Data

GSM/UMTS - Global System for Mobile Communications/Universal Mobile Telecommunications System, IMS – IP Multimedia Subsystem, GNSS - Global Navigation Satellite System, ESInet – Emergency Services IP Network

PS eCall (eCall over IMS): Additional Services

- A sound basis for building Additional Services to the NG112 eCall Service
  - **Data/Information** (IoPST) are getting more and more important together with **ML/AI/VR/AR** (Remote Assistance, Deep and Actionable Insight, Common Operational Picture, Enhanced Situational Awareness, …)
  - **Autonomous Driving** (C-ITS) and **Unmanned Arial Vehicles** (UAV) are a fact
- Additional services using media streams and data: processing and storage capacities
  - The IVS has the capability to transmit **real-time video** to the PSAP
  - The IVS has the capability to **record a video clip** and upload it to an online repository
  - The IVS has access to a number of **on-board sensors**
- Almost all promising technologies and new services come along with the relevant **Security and Privacy issues** and with the best possible solutions
- There are not just technology, architecture and security/privacy issues, but there are - in the first place - **regulatory and legislation issues**
- **Business aspects** should not be overlooked (112-eCall is free of charge service)

(NG-)eCall Regulations constraints and restrictions

- The eCall Regulations define 112-eCall (and therefore its scope and extent) as
  - *'eCall' means an in-vehicle emergency call to 112, made either automatically by means of the activation of in-vehicle sensors or manually, which carries a minimum set of data and establishes an audio channel between the vehicle and the eCall PSAP via public mobile wireless communications networks.*
- And constrain eCall to
  - *"a) The MSD sent by the 112-based eCall in-vehicle system shall include **only the minimum information** as referred to in the standard EN 15722:2011 'Intelligent transport systems — eSafety — eCall minimum set of data (MSD)'. **No additional data shall be transmitted by the 112-based eCall in-vehicle system**. That MSD shall be stored in such a way as to make its **full and permanent deletion possible**."*
- And further constrain that:
  - *"b) the detailed technical requirements and test procedures for ensuring that there is no exchange of personal data between the 112-based eCall in-vehicle system and third-party systems (Regulation 305-2013 Article 6 Rules on privacy and data protection and Regulation 758-2105 Article 6 Rules on privacy and data protection)"*
- This regulation therefore restricts that
  - *"No additional data shall be transmitted by the 112-based eCall in-vehicle system"*
- and restricts 112-based eCall to the
  - *"minimum set of data and establishes an audio channel between the vehicle and the 112-based eCall PSAP via public mobile wireless communications networks".*

Conclusion

- Further study in the area of Additional services and Information Sources in conjunction with different Vehicle Categories and Sources of Information is conducted in parallel and in relation to NG-eCall
- What everyone has loosely been describing as "next generation eCall" are therefore more accurately described as post eCall "Incident Support Services" for Emergency Response Organisations primarily
- As an example of a new, parallel system to NG-eCall:

  "eSafety: Incident Support Information System" has been introduced along with NG-eCall in the EU project sAFE

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