IoT Week 2022

Dr. Lindsay Frost
(NEC, ETSI OCG AI Chair)

Overview of AI Activities in ETSI

SESSION 14 : AI leveraging IoT

11.15 Overview of AI Activities in ETSI. Lindsay Frost, NEC
11.35 Artificial Intelligence, IoT Device Management:
the Indispensable Collaboration. Samuel Berlemont, Orange
11.55 Bringing the Power of Standards IoT Platform to AI
JaeSeung Song, Sejong University, oneM2M TP Vice Chair
12.15 Cross-Domain Data Usability in Ecosystem Comprising Devices,
Humans, Machines. Michelle Wetterwald, Netellany
12.35 Panel Discussion

14/10/2022

The Standards People

Overview of AI Activities

Dr. Lindsay Frost
(NEC, ETSI OCG AI Chair)

ETSI IoT Week, October 2022

14/10/2022

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The discussion in this document is purely the opinion of the speaker, informed by work in ETSI.

Lindsay Frost @NEC is

- NEC Labs Europe GmbH
  Chief Standards Engineer
  (Heidelberg, Germany)
- Member StandICT.eu
  Expert Advisory Group

Lindsay Frost @ETSI is

- Board member of ETSI
- Chair of ETSI ISG CIM
  Context Info. Management
- ETSI OCG AI Chair (outgoing)
- CEN/CLC/ETSI delegate to
  +CG SmartManufacturing
  +SF-SSCC Smart Sustainable Cities
  +CEN/CLC JTC21 AI

Previous roles included:

- Board member of Home Gateway Initiative
- Co-chair of HGI Smart Home group
- Chair of ETSI TISPAN WG5 Home Networks
- Chair WFA Mobile Convergence
- NLE R&D Mgr. in 3GPP, 802.11e
- Ph.D in experimental physics

Personal opinion: Leverage ETSI

Look at the future you will face: AI everywhere

- AI everywhere (to first approximation)
- Regulatory constraints on „high risk“ applications (health, safety, rights)
- Need to demonstrate compliance and prepare for liability complaints (end-to-end record of what was designed, implemented, running-operations)

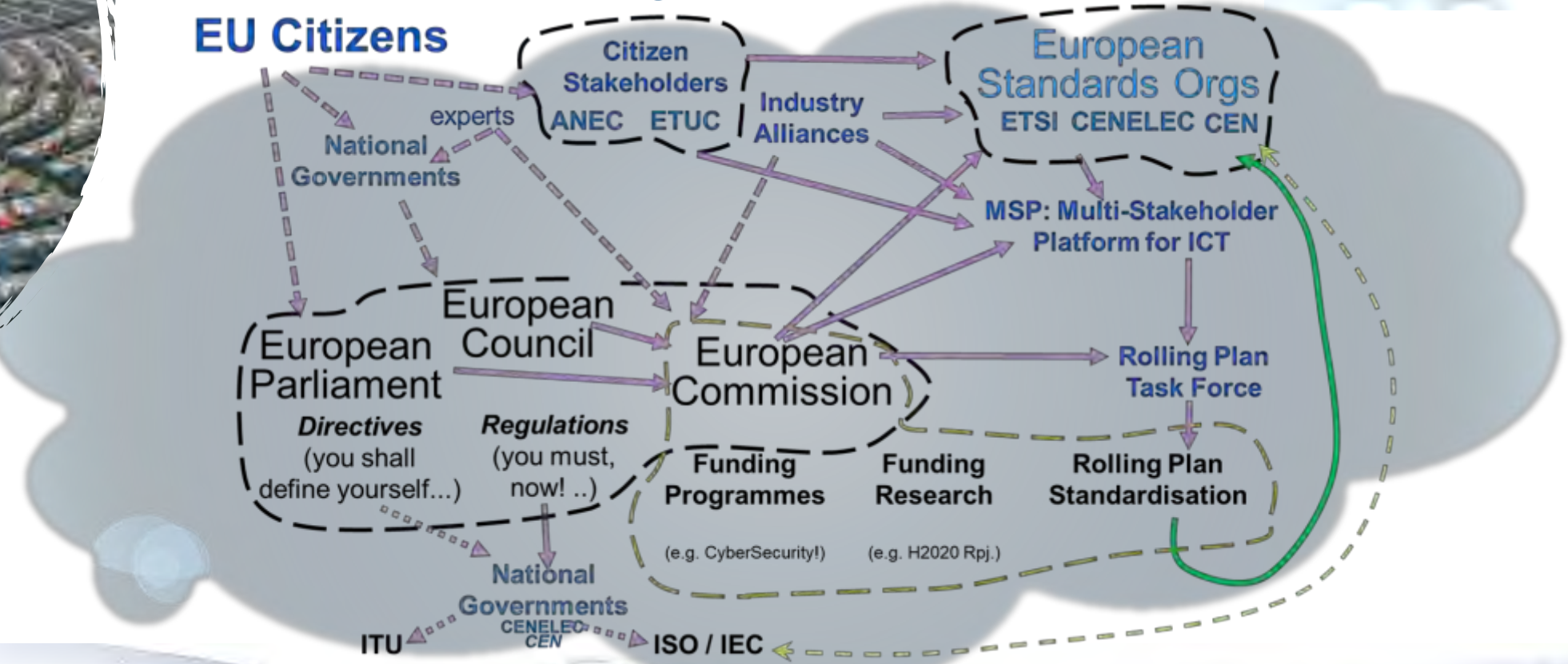
Leverage the SDOs: hear more, influence more

- SDOs continuously talk with regulators/EC, so members become aware of legislation
- Writing specs in SDOs can be timeconsuming, but feedback for updates can be faster

Complain now, or suffer later

- The legal and compliance constraints are human-made, therefore errors happen
- You can read any ETSI spec, and easily ask for intermediate drafts to critique them early
- If we don‘t (jointly) get the right specs, we will all meet again … in liability court cases!

Policy making for AI



Policy making for AI = A risk-based approach to horizontal regulation

1 SAFETY COMPONENTS OF REGULATED PRODUCTS

(e.g. medical devices, machinery) which are subject to third-party assessment under the relevant sectorial legislation

2 SOME (STAND-ALONE) AI SYSTEMS IN FOLLOWING FIELDS

- ✓ Biometric identification and categorisation of natural persons
- ✓ Management and operation of critical infrastructure (incl. Road Traffic)
- ✓ Education (testing) and vocational training
- ✓ Employment and workers management, access to self-employment
- ✓ Access to and enjoyment of essential private services and public services and benefits
- ✓ Law enforcement
- ✓ Migration, asylum and border control management
- ✓ Administration of justice and democratic processes

Regulations & Specs: “WHAT”, “WHO”, “WHERE”

WHAT	*WHEN*	*WHO*	*WHERE*	*and many more*

Publication / Patent
F2F meetings
Whitepaper
Position Paper
Tech Requirements
Tech Specification
Whitepaper
Regulation / Directive
ESO Stds “Request”
Policy Document
Briefing Document
ICT Rolling Plan
SEC Rolling Plan
Tech Specification
???
???
???

FLOW/TIMING

Big Corporations
Technology RnD
Lobby Orgs.
Alliances/Forum
Digital Europe | AIOTI

I’nat SDOs
ISO | IEC | ITU
European SDOs
ETSI | CEN/CENELEC

Civil Society Orgs.
EDRI | Privacy I’nat | Human Righs Watch
I’nat Agencies
WEF | UNERF

EU Parliament
Regulation GDPR | Regulation DATA | Regulation AI
EC DG “ministries”
DG CNECT | DG JRC | DG GROW
EC Commission
HorizonEurope EC Projects | EU PPPs
EU Agencies
ENISA | EU-OSHA | EDPB | EDPO

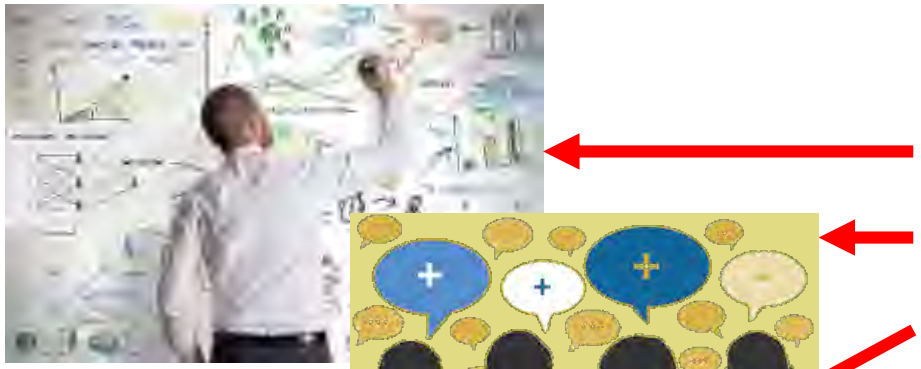
National Governments
National SDOs
DIN | AFNOR
National Agencies
DE DPA | FR DPA
National Regulators
Certification Orgs

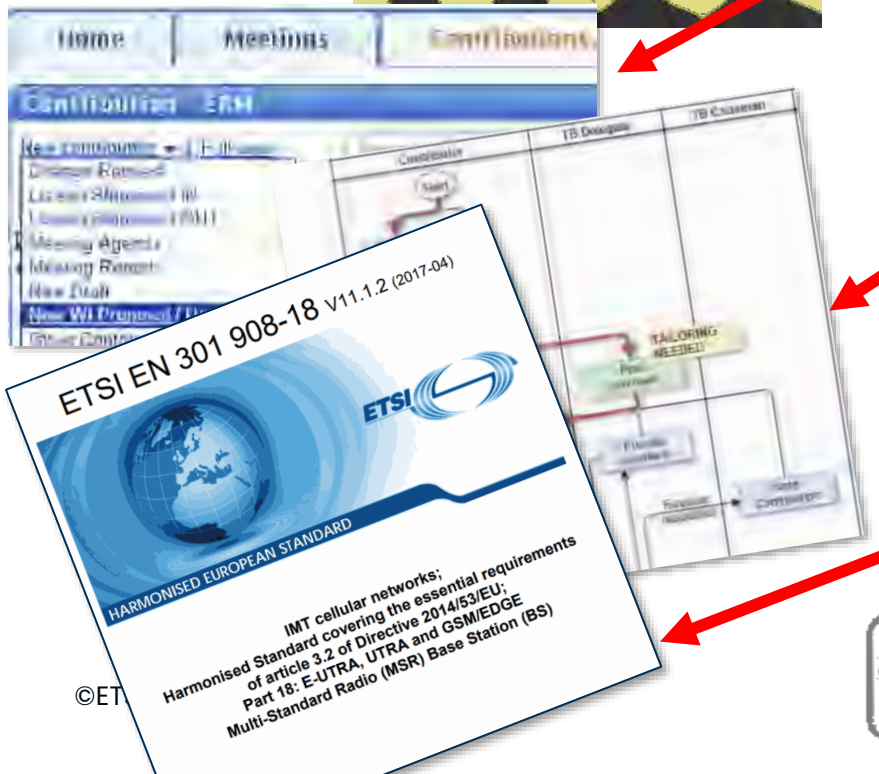
Draft AI ACT (04/2021) EU Parl.: >3300 CRs!

Draft AI SR (05/2022) … to start specs work in October

Need specs by 10/2024 !

Life-cycle of Specifications (12-36 months)





1) Contribution(s) to explain idea(s)
2) Gather supporters
3) Get a New Work Item agreed (needs 4 members promising work, including 1 Rapporteur)
4) Agree an Early Draft (basically Table of Contents, gets changed a lot afterwards)
5) Agree a Stable Draft (all main ideas are “in”, or sometimes “out”). Lots of contributions needed?!
6) Agree a Final Draft (only typos remain)
7) EDIT-Help in ETSI checks formalities, it is approved and published
8) In parallel, collaboration of CEN/CENELEC/ETSI and of National Standards Bodies → Harmonised EN
9) hEN is validated by EC and cited in EU OJ

AI in ETSI
➔ AI is gradually impacting everywhere

Safe & Secure

Sustainable

Ethical Design

User Immersion
- Extended Reality
- Next-Gen User Interfaces (natural speech, tactile, neural)

Autonomity
- Cloud Computing
- Quantum Computing
- Artificial Intelligence
- Autonomous Systems

Data
- Dynamic Data & IoT
- Intelligent Distributed Edge

Networking
- Autonomous NW
- Packet IP NW
- Software Defined Networks

Radio
- Non-Terrestrial
- Reconfigurable Surfaces
- 5G Evolution
- (<) THz Radio
- Private Radio

Connecting
- Photonics
- Optical Wireless
- Device i/o

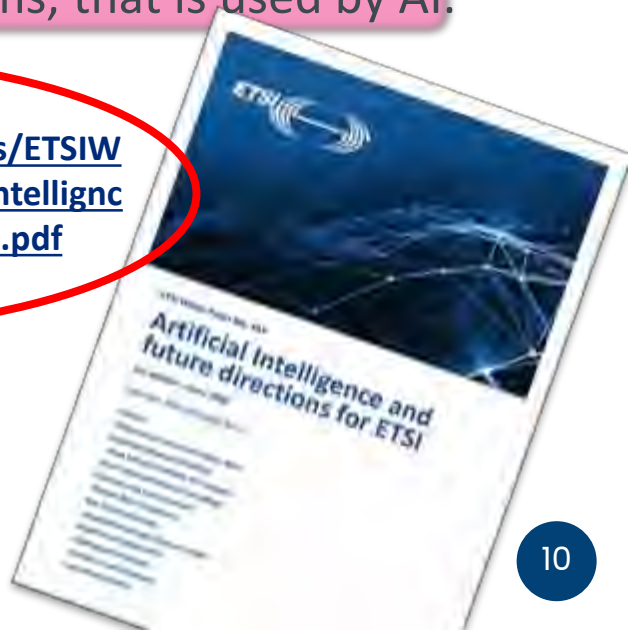
AI is at the heart of ETSI Technical Trends

= considering / = started / = strong	3GPP	TC eHEALTH	ISG ARF	ISG CIM	ISG ENI	ISG MEC	ISG NFV	ISG SAI	ISG ZSM	oneM2M	SC EMTEL	TC CYBER	TC INT AFI WG	TC SmartM2M	TC MTS	ISG PDL
Terminology					◕			◕	◕	◔			◕	◔	◕	
Use cases	◔	◔			◕	◑	◑	◑	◕	◔	◔		◕	◔	◕	
Impact of EU ethics guidelines		◕						◑		◔				◔	◔	
Trustworthiness & Explainability		◑						◑	◔	◔				◑	◔	◔
Security/privacy		◕		◔	◔			◑	◕	◔		◕	◔	◔	◔	◑
Acrchitectures and RPs			◔		◕	◑	◑	◑	◕	◔			◕	◕	◔	
Management of AIs					◔			◑	◕	◔			◕	◑		
Dataset requirements and quality		◕		◑	◕		◑	◑	◔	◔			◑	◑	◔	◑
Interoperability		◑			◕		◑	◑	◕	◔			◕	◑	◕	
Test methodology and systems					◔		◕	◑					◕		◔	
KPIs and conformance					◔						◔		◔		◔	
System maturity assessment			◔		◔								◔		◕	

ETSI aims to handle specific needs for AI:

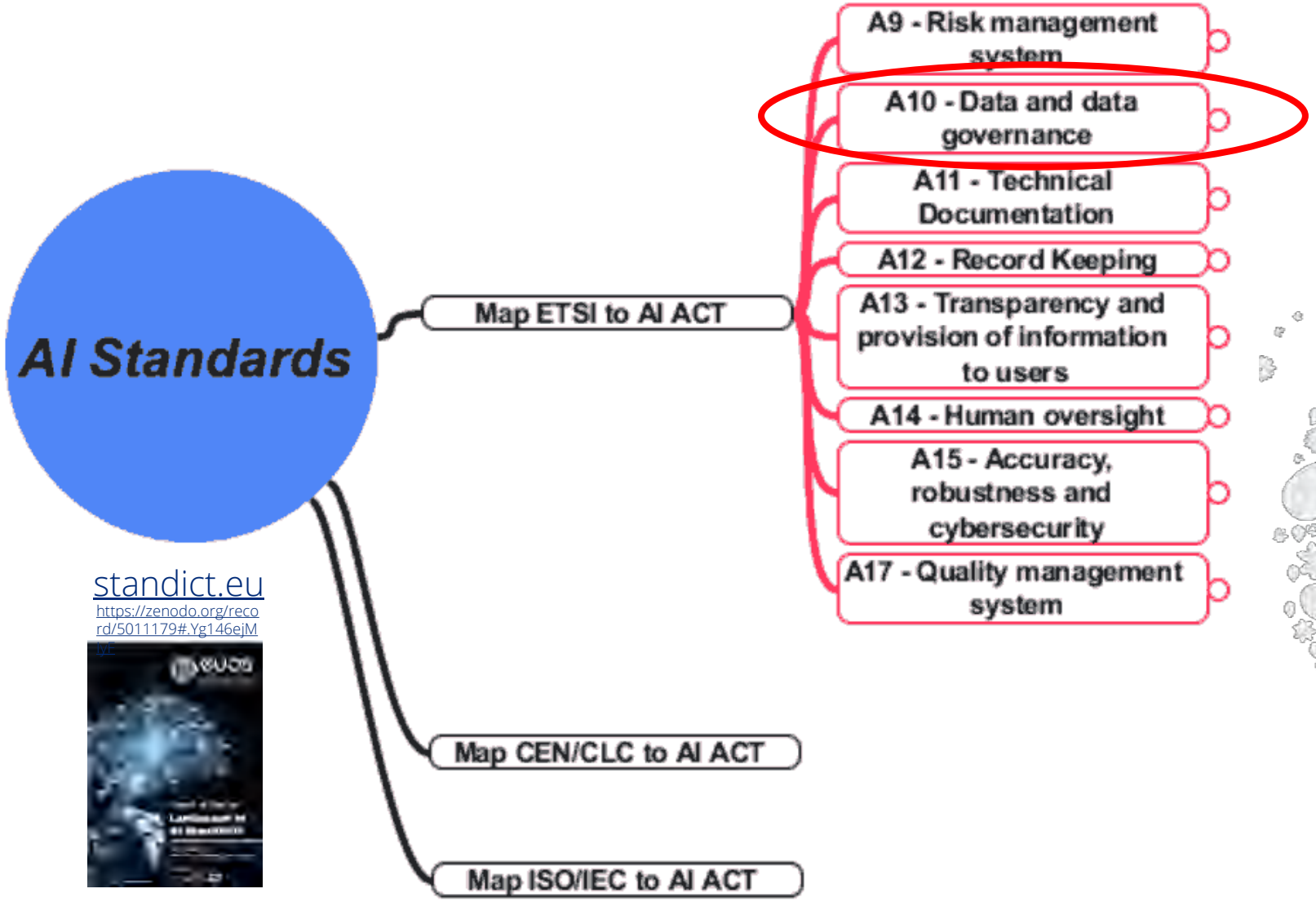
- to harness AI for optimization of ICT networks,
- to include ethical requirements in AI usage e.g. for eHealth, privacy/security
- to ensure reliability through appropriate testing of systems using AI,
- to overcome some AI-related security issues, and
- to better manage and characterize data, including from IoT systems, that is used by AI.

https://www.etsi.org/images/files/ETSIWhitePapers/etsi_wp34_Artificial_Intelligence_and_future_directions_for_ETSI.pdf



ETSI continuously working on AI issues

Work can be mapped to EU Policy for AI

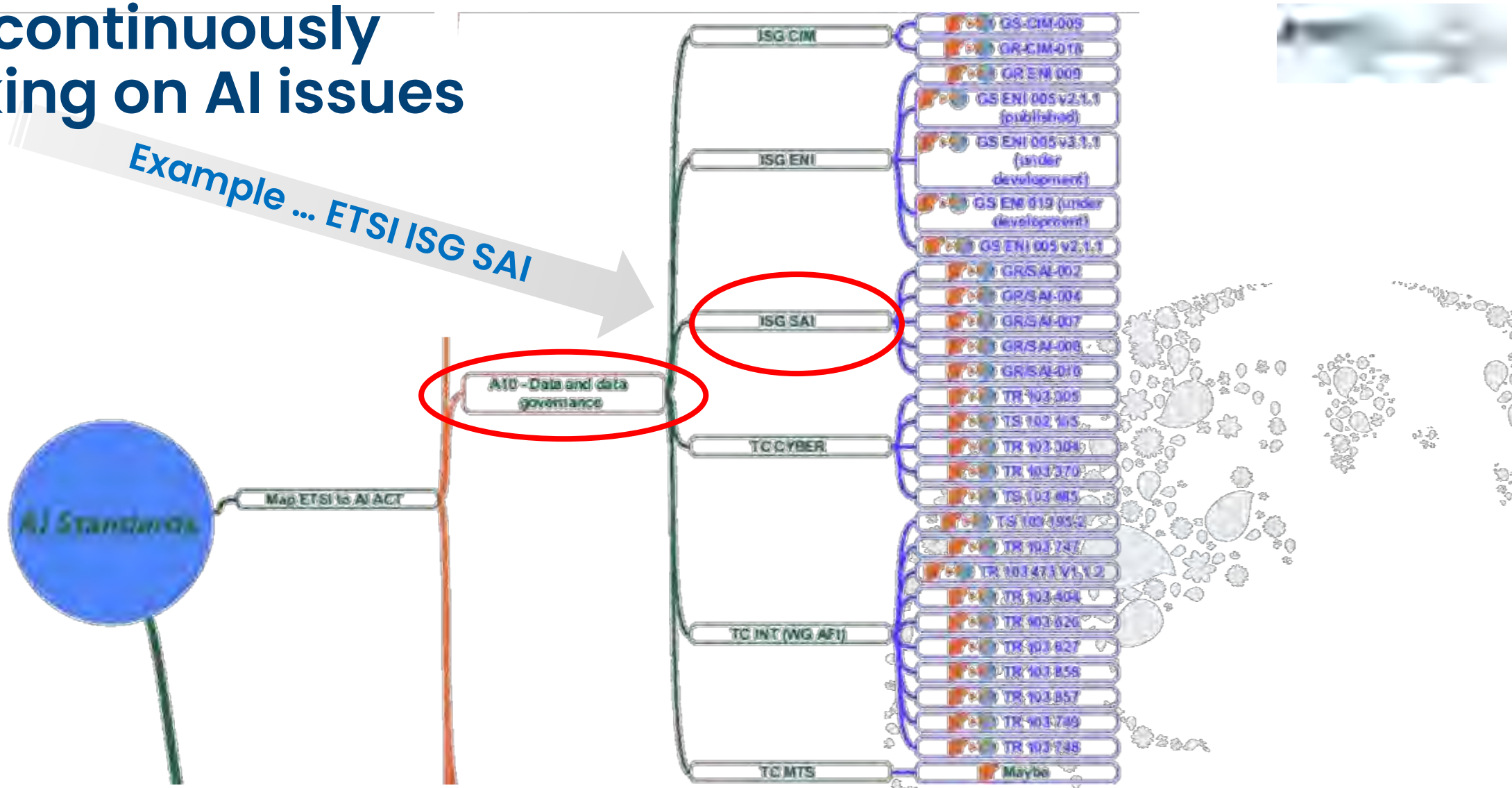


standict.eu

https://zenodo.org/record/5011179#.Yg146ejM

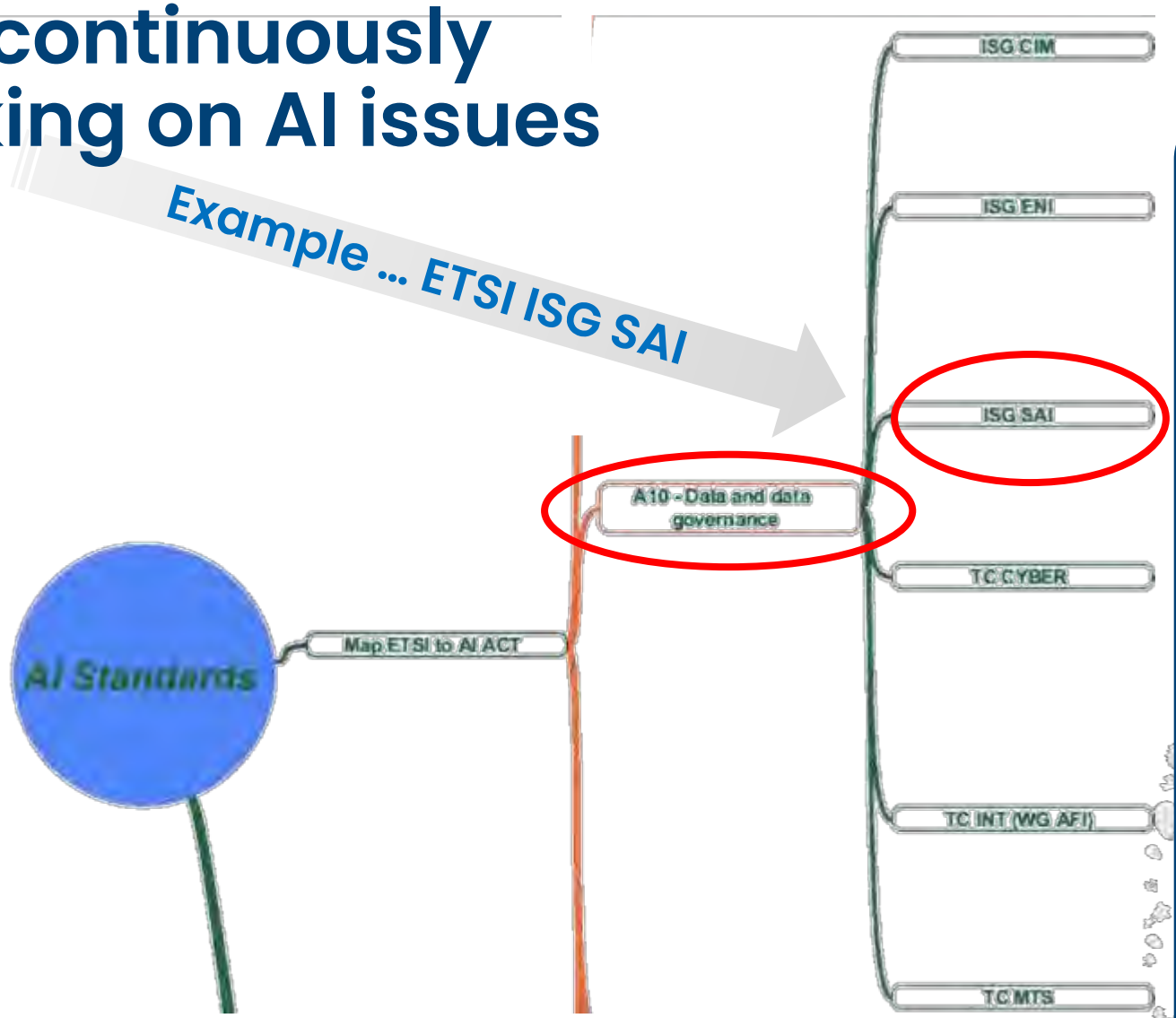
ETSI continuously working on AI issues

Example … ETSI ISG SAI



ETSI continuously working on AI issues

Example … ETSI ISG SAI



e.g. ETSI ISG SAI

Attack Types		Model Enhancement Mitigation Approaches
Training	Poisoning attack	Clause 5.2.2 • Enhance data quality • Data sanitization • Block poisoning
	Backdoor attack	Clause 5.3.2 • Enhance data quality • Data sanitization • Trigger detection • Model restoration
Inference	Evasion attack	Clause 6.2.2 • Data preprocessing • Model hardening • Robustness evaluation
	Model stealing	Clause 6.3.2 • IP management
	Data extraction	Clause 6.4.2 • Embed data privacy • Training with privacy

https://portal.etsi.org/tb.aspx?tbid=877

ETSI ISG SAI

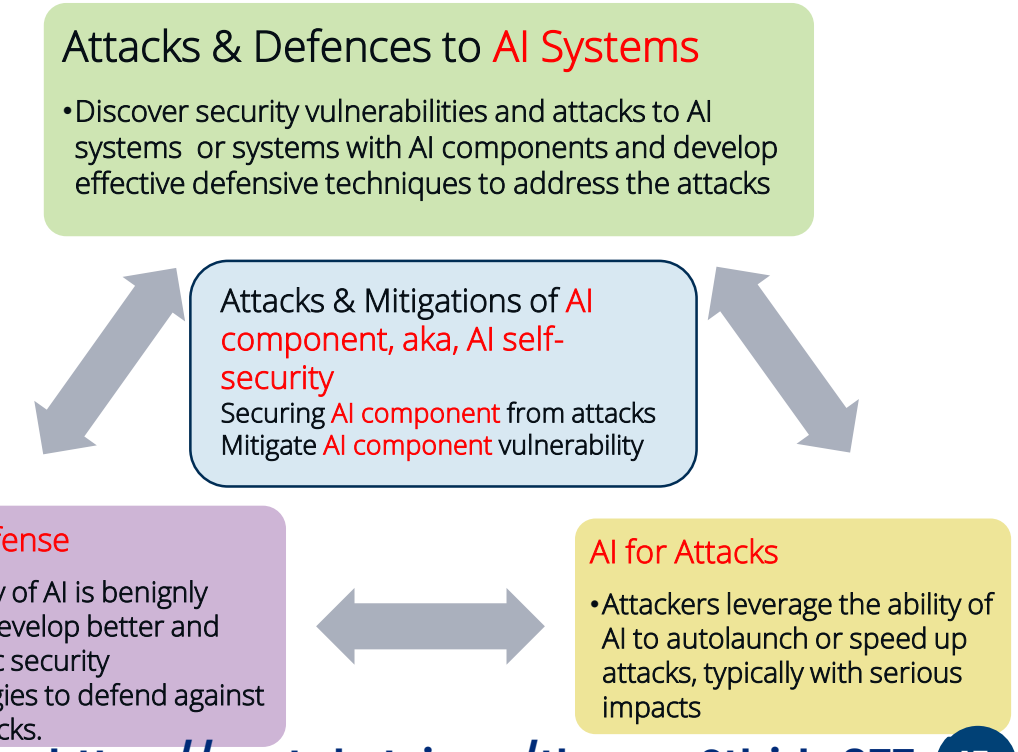
https://portal.etsi.org/tb.aspx?tbid=877

Scope: Autonomous mechanical and computing entities may make decisions that act against the users/parties either by design or as a result of malicious intent.

The conventional cycle of risk analysis and countermeasure deployment represented by the Identify-Protect-Detect-Respond cycle needs to be re-assessed.

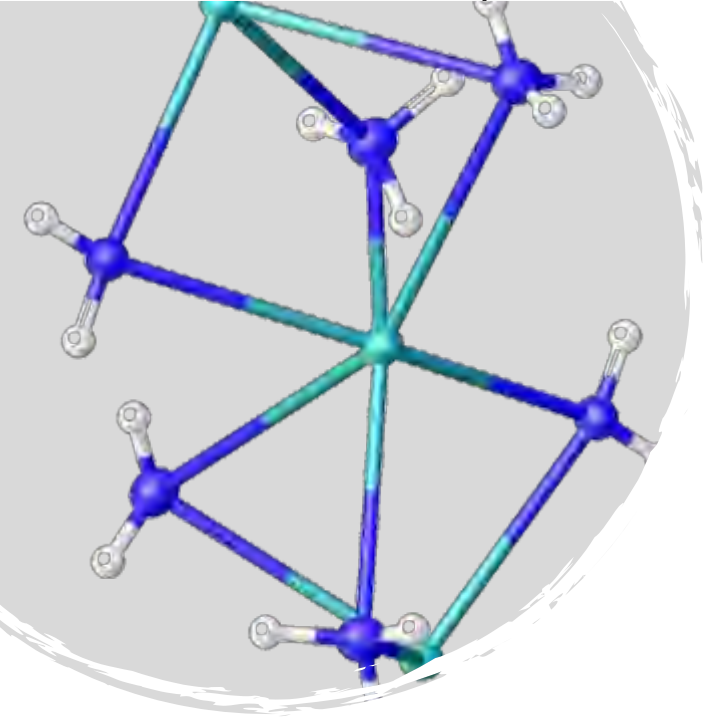
ISG SAI addresses 3 aspects of AI in standards domain:

1. **Securing AI from attack** e.g. where AI is a component in the system that needs defending.
2. **Mitigating against AI** e.g. where AI is the 'problem' (or used to improve and enhance other more conventional attack vectors)
3. **Using AI to enhance security** measures against attack from other things e.g. AI is part of the 'solution' (or used to improve and enhance more conventional countermeasures).



ETSI existing specs related to AI ACT

Item in EC Standards Request of 20.05.2022	ETSI Wis to reference (according to questionairre)	Contributing TBs
Risk management	ts_10319502v010101p.pdf; 45868; 57991; 58434; 58442; 58857; 58860; 59209; 59214; 59455; 59456; 62502; 62511; 63078; 63565; 63960;	TC INT; TC CYBER
Data governance and quality	gr_ENI009v010101p.pdf ; ts_10319502v010101p.pdf; tr_103747v010101p.pdf; tr_103473v010102p.pdf; tr_103404v010101p.pdf; tr_103626v010101p.pdf; gs_ENI005v020101p.pdf; 45868; 45884; 47531; 47652; 54805; 58857; 59209; 59455; 59456; 62591; 63078; 63106; 63499; 63527; 63565; 63594; 63930; 63960; 63979; CIM GR-018; CIM GR-019	ISG CIM; TC INT
Record keeping	GR SAI-007; GR SAI-010; CIM GR-018; CIM GR-019	ISG CIM; ISG SAI; ISG PDL;
Transparency and information to the users of AI systems	GS ENI-005v2.1.1 GR SAI-007 GR SAI-010	TC HF / TC USER
Human oversight of AI systems	GS ENI-005v2.1.1	TC HF
Accuracy specifications for AI systems	GR CIM-019 GR PDL-014 GR SAI-001 GR SAI-002 GR SAI-003 GR SAI-004 GR SAI-005 GR SAI-006 GR SAI-007 GR SAI-0008 GR SAI-009	TC CYBER
Robustness specifications for AI systems	GR CIM-019 GR PDL-014 GR SAI-001 GR SAI-002 GR SAI-003 GR SAI-004 GR SAI-005 GR SAI-006 GR SAI-007 GR SAI-0008 GR SAI-009	TC CYBER
Cybersecurity specifications for AI systems	GR CIM-019 GR PDL-014 GR SAI-001 GR SAI-002 GR SAI-003 GR SAI-004 GR SAI-005 GR SAI-006 GR SAI-007 GR SAI-0008 GR SAI-009	ISG SAI; ISG CIM; TC CYBER
Quality management system for providers of AI system	ts_10319502v010101p.pdf; 45868; 59455; 59456; 63979; TR 103 506 (TC INT)	TC INT / TC MTS / ERM TG 17
Conformity assessment for AI systems	GR SAI-007 GR SAI-0008 GR SAI-009 TS 103 195-2 (TC INT) TR 103 748 (TC INT) TR 103 749 (TC INT)	TC INT / TC MTS



OCG AI
= Coordination for AI in ETSI

OCG AI Portal: https://portal.etsi.org/tb.aspx?tbid=889

Contact: info@etsi.org

New chairperson: Markus Mueck

ETSI "Questionnaire to Chairs of all ETSI TBs"

- OCGAI(22)000003_Questionnaire_on_AI_ACT_topics.docx

ETSI Answers to Questionnaire on AI Act

- OCGAI(22)000039_ETSI__AI-ACT_Responses.xlsx

EC draft Standards Request to CEN/CLC/ETSI + Comments

- OCGAI(22)000042r1_LSin_EC_SR_AI_v1_20220520 DRAFT
- OCGAI(22)000001_Official_ETSI_Response_draft_SRAI
- OCGAI(22)026001_CEN_CENELEC_feedback_on_draft_SRAI

OCG AI Webinar #1
17.12.2021 (files in zip)

- **Explain importance of AI ACT**
- **Timetable of (re)action needed**
- **Outline status of ETSI and ESOs**
- **Maturity of existing standards**

OCG AI Webinar #2
(plans under discussion)

OCG AI Webinar #3
...

Figure: https://commons.wikimedia.org/wiki/File:Potassium-amide-K-coordination-3D-balls.png

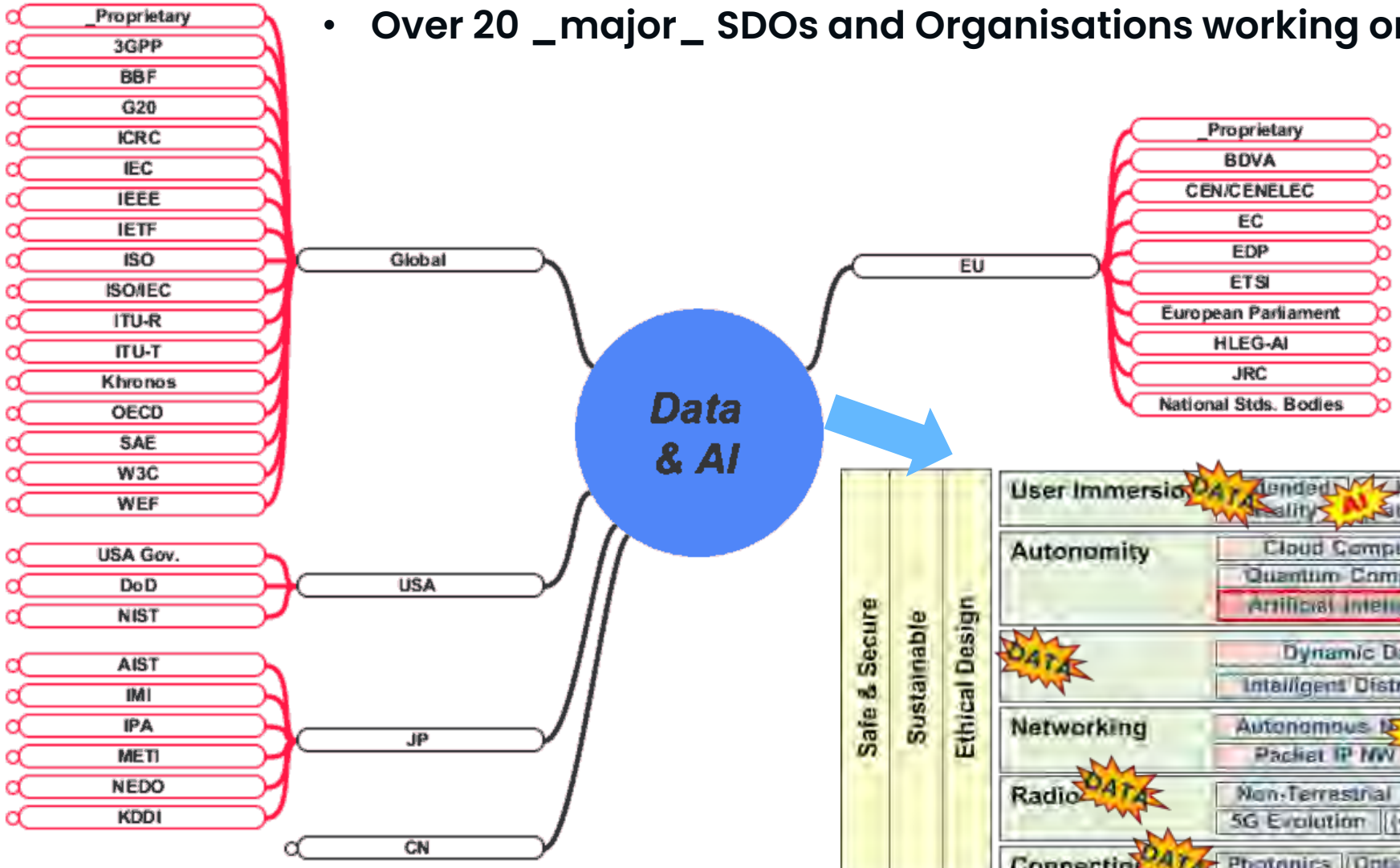
What's next?

- **ETSI will continue working on AI for network optimization, on Securing AI, on Digital Twins, on Human Factors for AI, on Data Governance …**
- ETSI OCG AI will be working on revised Whitepaper
- ETSI OCG AI plans webinar on "hENs for AI"
- EC will soon decide which SDOs to task to create new standards in preparation for AI ACT
- EU Parliament may finalize AI ACT in mid-2023
- EC by end of 2023, will confirm final requirements for European Harmonised Standards for AI
- By mid-2025, mandatory Harmonised Standards ?

Image is the Crab Nebula, 6500 light-years distant, remnant of a supernova seen 1054 A.D.

Personal opinion: ETSI needs a new TC for Data and AI

- Globally, >> 400 specifications, regulation drafts, landscaping documents on AI
- Over 1000 documents related to standards for IoT and Edge
- Over 20 _major_ SDOs and Organisations working on more specifications



ETSI needs to help members track what happens in diverse areas, find optimum solutions, support EU Policy objectives, cope with economic and social impacts … Work together !

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References

[1] Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL LAYING DOWN HARMONISED RULES ON ARTIFICIAL INTELLIGENCE (ARTIFICIAL INTELLIGENCE ACT) AND AMENDING CERTAIN UNION LEGISLATIVE ACTS https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12527-Artificial-intelligence-ethical-and-legal-requirements_en

[2] DIRECTIVE 2014/53/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC

[3] REGULATION (EU) 2019/881 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 April 2019 on ENISA (the European Union Agency for Cybersecurity) and on information and communications technology cybersecurity certification and repealing Regulation (EU) No 526/2013 (Cybersecurity Act)

[4] REGULATION (EU) 2016/679 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) https://eur-lex.europa.eu/eli/reg/2016/679/oj

[5] AI Watch, AI standardisation landscape state of play and link to the EC proposal for an AI regulatory framework, Joint Research Center of the EC, 2021. Available at https://op.europa.eu/en/publication-detail/-/publication/36c46b8e-e518-11eb-a1a5-01aa75ed71a1/language-en

[6] AI watch, defining Artificial Intelligence 2.0: Towards an operational definition and taxonomy for the AI landscape, 29 October 2021. Available at https://op.europa.eu/en/publication-detail/-/publication/83838dbc-3d1f-11ec-89db-01aa75ed71a1/language-en/format-PDF/source-search

[7] Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on adapting non-contractual civil liability rules to artificial intelligence (AI Liability Directive) https://ec.europa.eu/info/sites/default/files/1_1_197605_prop_dir_ai_en.pdf

Thank you for your attention

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