

# Context Information Management and Privacy



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2017 Chairman of ETSI ISC CIM

2012-2016 Home Gateway Initiative Board Member

2009-12 Group Chairman ETSI TISPAN WG5

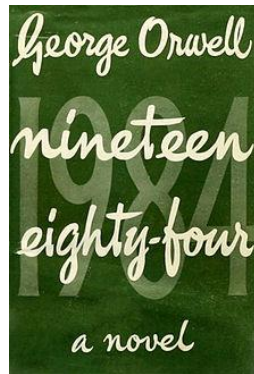
2003-9 NEC R&D manager 3GPP, WiMAX, BBF, Wi-Fi

1983 Ph.D. in experimental physics

# Audience Calibration: Hands up who knows of ...

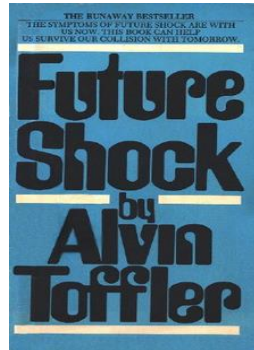
## "1984"

by George Orwell  
published 1949,  
re Big Brother



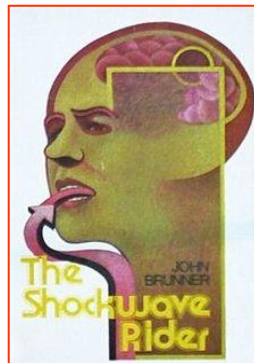
## "Future Shock"

by Alvin Toffler,  
published 1970,  
re "information  
overload"



## "Shockwave Rider"

by John Brunner,  
published 1975,  
re internet world  
with wurms/bots



## "General Data Protection Regulation" by EU Parliament

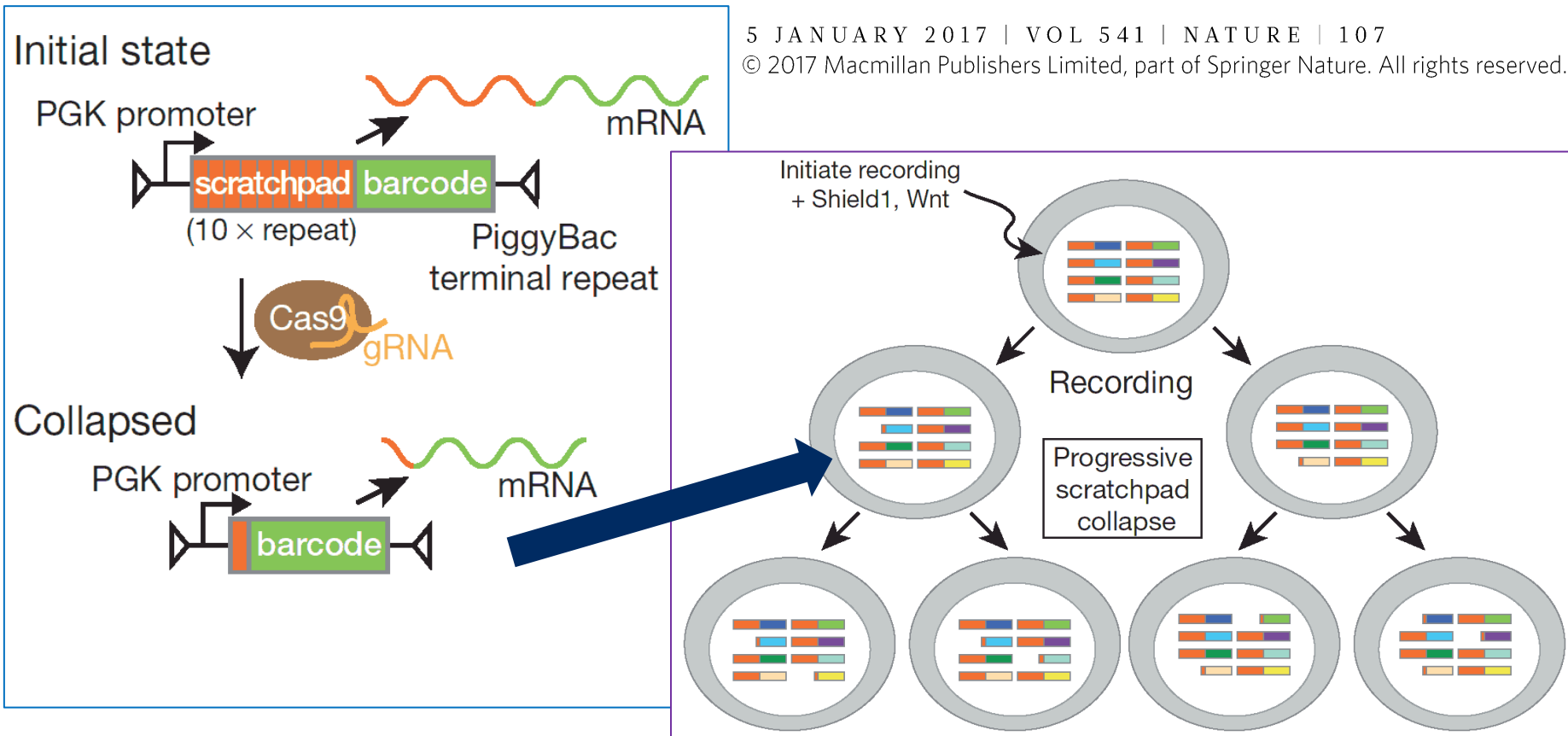


- Request for consent must be intelligible and easily accessible, with purpose attached
- It must be as easy to withdraw consent as it is to give it.
- Privacy by design (minimalist)
- Organizations in breach of GDPR can be fined up to 4% of annual global revenue or €20 Million (whichever is greater)

## Synthetic recording and *in situ* readout of lineage information in single cells

Nature doi:10.1038/nature20777

Kirsten L. Frieda<sup>1\*</sup>, James M. Linton<sup>1\*</sup>, Sahand Hormoz<sup>1\*</sup>, Joonhyuk Choi<sup>2</sup>, Ke-Huan K. Chow<sup>1</sup>, Zakary S. Singer<sup>1</sup>, Mark W. Budde<sup>1</sup>, Michael B. Elowitz<sup>1,3§</sup> & Long Cai<sup>2§</sup>



## Synthetic recording and *in situ* readout of lineage information in single cells

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"Here we describe a synthetic system that enables cells to record lineage information and event histories in the genome in a format that can be subsequently read out of single cells *in situ*. This system [...] is based on a set of barcoded recording elements [which] can be irreversibly altered by CRISPR/Cas9-based targeted mutagenesis, and later read out in single cells through multiplexed single-molecule RNA fluorescence hybridization (smFISH)."

**Translation for "1984" and wiki-leaks readers:**

**We show how in principle the cell genome could be made to record events (cell division now, but in future chemical, endocrinal, emotional...?) impacting "your" cells, AND read out later even after multiple cell divisions.**

## Outline of this talk

- Smart City Trials ... and privacy?
- Smart Cities and standards
- Context Information Management
- Privacy Issues and Solution Space
- Conclusion ... Help!

# Smart Cities Trials ... and privacy ?



# Digital Transformation for Wellington, New Zealand

## Objectives/Intention

## Comfort for living and social improvement

## Right decision-making for city operation

## Key issues

## Information on city's health scattered in agencies

## ...Anti-Social Behavior, Congestion, Pollution

## Enabler

## City Council's strategy

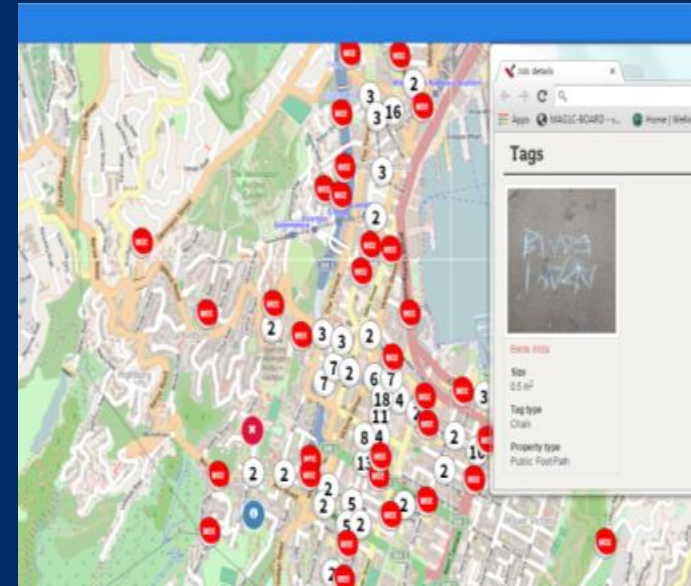
- Data-sharing platform for collaboration among agencies

## AI-IoT solutions

- Sensing analytics : Unsocial behaviors, Traffic
- Air quality sensing
- Cloud City Operation Centre (CCOC)

## Privacy-protecting crowd sensing

## Traffic Hazards (no V-IDs)



## → CONTENTS

Orchestrating a brighter world **NEC**

# Digital Transformation for Christchurch, New Zealand

## Objectives/Intention

City prosperity and Urban regeneration

Encouraging modal shift for efficiency and sustainability

## Key issues

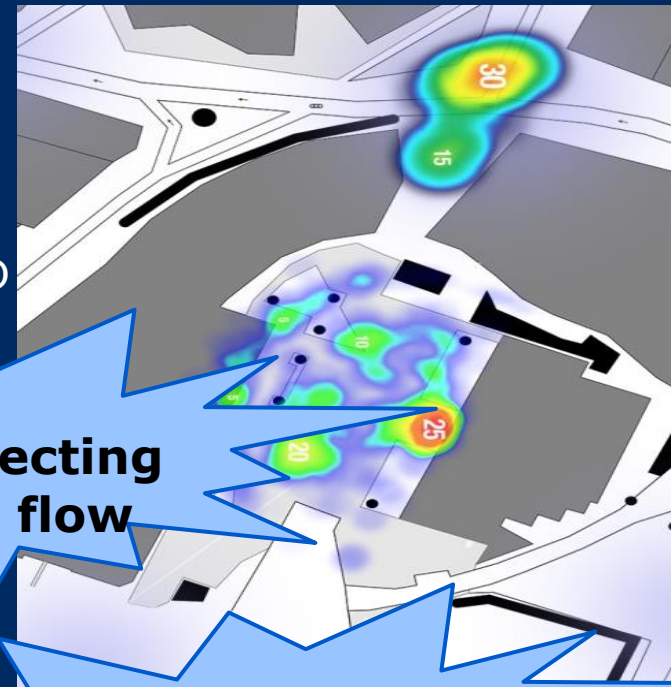
Empirical evidence required

- to understand the effectiveness of Council interventions to encourage pedestrian access in CBD
- to assess impacts of efficiency, sustainability, and modal shift implementation plans

## Enabler

AI-IoT solutions

- Smart City Block: monitoring pedestrian flow, car parking, rubbish bin level, etc.
- Air quality monitoring
- Cloud City Operation Centre (CCOC)



[→ CONTENTS](#)



# Smart Cities ... and standards

Several thin, flowing orange lines originate from the right side of the slide, looping and crossing each other in a dynamic, abstract pattern that extends from the top right towards the bottom right.

# Standards help all stakeholders

## Standards help

- **enable** interoperability, avoid "vendor lock-in"
- **improve** economies of scale and cost savings
- **create** a common market, improve global market access
- **disseminate** awareness and knowledge
- **foster** progress, cross-education and innovation

## Standardization is voluntary/dynamic, not from regulators

- „Self regulation“ by the market and best practice benchmark
- **... and creates an ecosystem of experts**

## Governments/Citizens need to reference them for

- Protection of health and the environment, ensuring safety
- Compatibility and interoperability of public services

## Standards help all stakeholders, including:

- industry at large, small and medium-size enterprises
- public authorities and regulators
- academia and the research community
- consumers, etc etc

**Proprietary  
Specifications  
not sufficient !**

[→ CONTENTS](#)

# Standards REDUCE RISKS

## Standards help

**EXECUTION RISKS**

and "vendor lock-in"

and cost savings

market, improve global market access

- disseminate awareness and knowledge

- foster progress, cross-education and innovation

## Standardization is voluntary/dynamic

not from regulators

- "Standards are the market and best practice by definition"

**an ecosystem**

**OBSOLESCENCE**

citizens need to reference

**PHYSICAL RISKS**

health and the environment, ensuring safety

compatibility and interoperability of public services

## Standards help all stakeholders, including:

- industry at large, small and medium-size enterprises

- public administration and regulators

- academia and research community

- etc.

**PRIVACY**

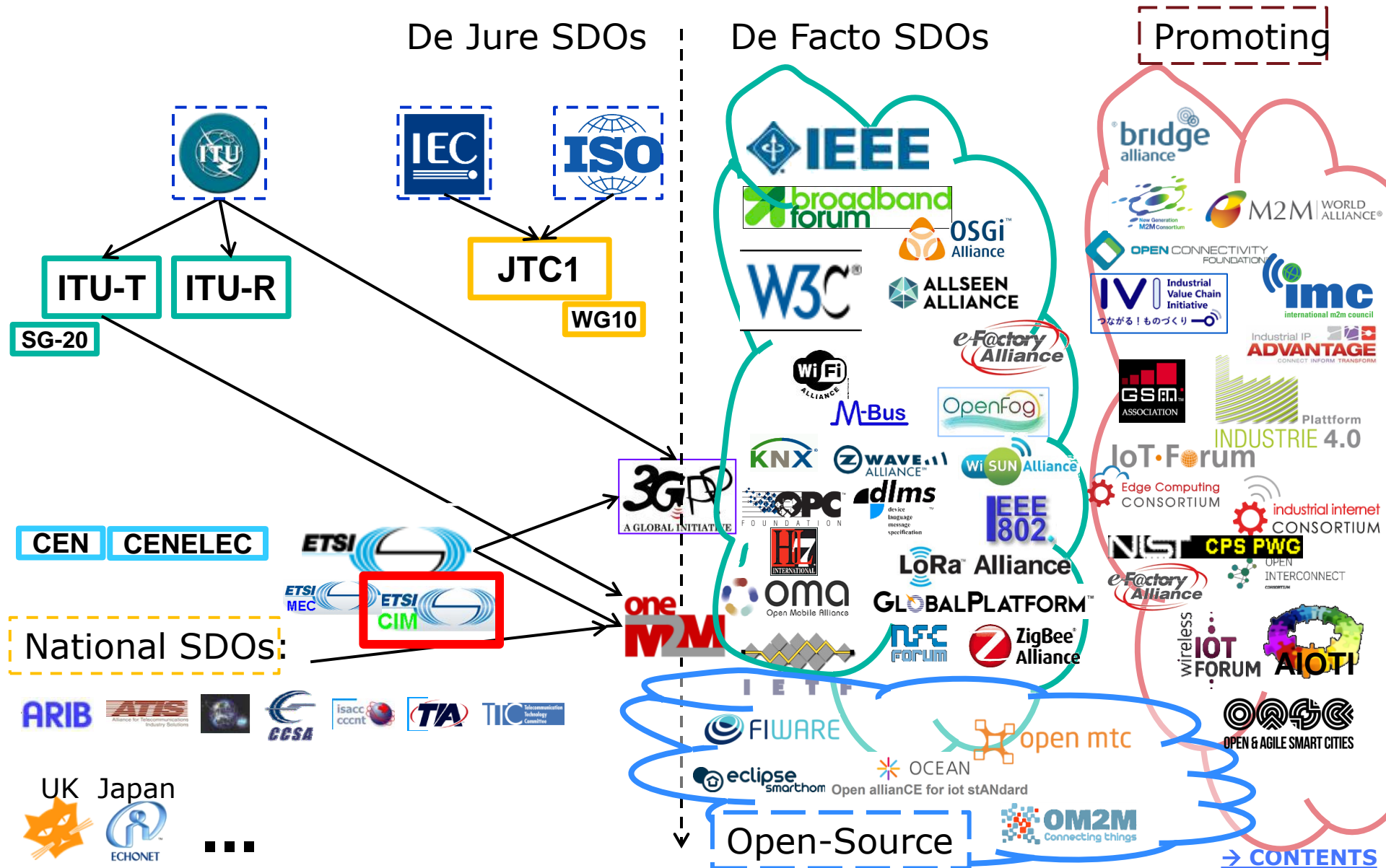
**LIABILITY**

not sufficient!

[→ CONTENTS](#)

# Smart Cities ... WHICH standards ?

# IoT-related SDOs & Fora: "Formal" overview



# ETSI ISG CIM



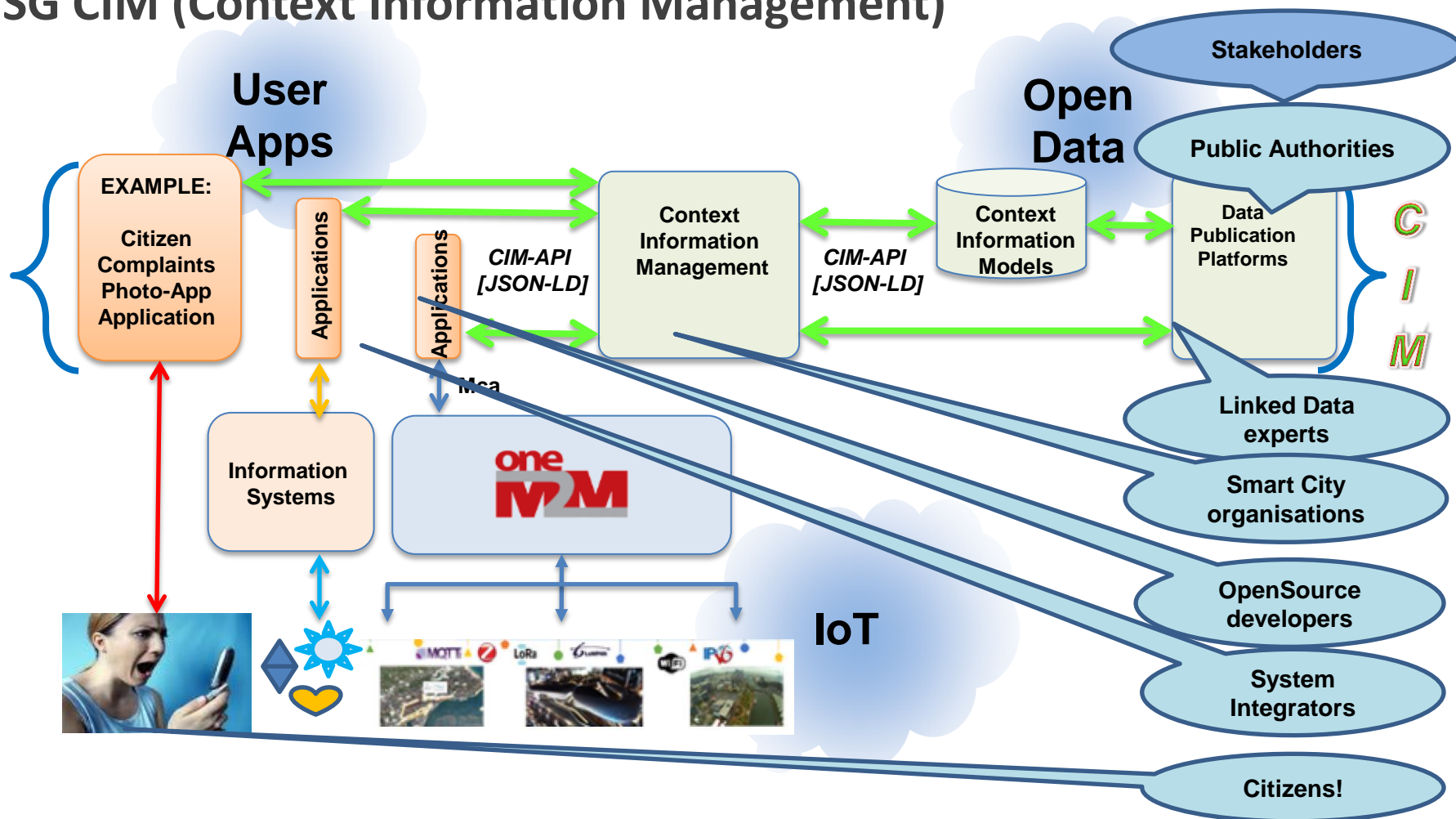
## CONTEXT INFORMATION MANAGEMENT

<https://portal.etsi.org/CIM>

[Outreach Document: Version 20170306.](#) Contact [CIM@neclab.eu](mailto:CIM@neclab.eu)



## ISG CIM (Context Information Management)



**Goal = interoperable exchange of data & metadata between systems**

# Currently >300 EU IoT/SmartCity RnD projects



Acronym	Content type	Title
5G STEP FWD	SmartCity	5G System Technological Enhancements Provided by Fiber Wireless Deployments
5GINFIRE	SmartCity	Evolving FIRE into a 5G-Oriented Experimental Playground for Vertical industries
ACROSSING	SmartCity	Advanced TeChnologies and PlatfoRm fOr Smarter ASSisted LiVING
ACTIVAGE	IoT	ACTivating InnoVative IoT smart living environments for AGEing well
ADAPT-SMART	SmartCity	Accelerated Development of Appropriate Patient Therapies: a Sustainable, Multi-stakeholder Approach from Research to Treatment-outcomes
AEOLIX	SmartCity	Architecture for EurOpean Logistics Information eXchange
AERFOR	SmartCity	Advanced Forecasting System for Proactive Airport Passenger Flow Management
AGILE	IoT	Adoptive Gateways for dlverse muLtiple Environments
AINARA	SmartCity	Automation and INtelligence solutions for Automated Road trAnsport systems
ALHTOUR	SmartCity	ASSISTED LIVING TECHNOLOGIES FOR THE HEALTH TOURISM SECTOR
AMUSIC	SmartCity	nonlineAr Multimode and mUlticore optical fiberS for multiple appliCations
ANASTACIA	IoT	Advanced Networked Agents for Security and Trust Assessment in CPS/IOT Architectures
ARMOUR	IoT	Large-Scale Experiments of IoT Security Trust
ATTO	IoT	A new concept for ultra-high capacity wireless networks
AUTOPILOT	SmartCity	AUTOMated driving Progressed by Internet Of Things
Auxilia	SmartCity	Hybrid Drive for Commercial Ships and Yachts
Be-IoT	IoT	The business engine for IoT pilots: Turning the Internet of things in Europe into an economically successful and socially accepted vibrant ecosystem
BIG IoT	IoT	BIG IoT - Bridging the Interoperability Gap of the Internet of Things
BigClouT	SmartCity	Big data meeting Cloud and IoT for empowering the citizen clout in smart cities
bloTope	IoT	Building an IoT OPen innovation Ecosystem for connected smart objects
BITRIDE BIKE SHARING	SmartCity	The solution for flexible bike sharing initiatives without fixed stations
BODEGA	SmartCity	BOrdDERGuArd - Proactive Enhancement of Human Performance in Border Control
Bonseyes	IoT	Platform for Open Development of Systems of Artificial Intelligence
BUSUP	SmartCity	BusUp: Multi-platform On-demand Crowdsourced Bus Transportation for Smart City Mobility
BuyZET	SmartCity	BuyZET – Procurement of innovative solutions for zero emission urban delivery of goods and services
etc etc etc	<a href="http://cordis.europa.eu/search/result_en?q=%27smart%27+AND+%27city%27+AND+/project/startDate%3D2015-05-01-2017-12-31+AND+contenttype%3D%27project%27&amp;searchType=advanced&amp;srt=contentUpdateDate:decreasing&amp;num=100">http://cordis.europa.eu/search/result_en?q=%27smart%27+AND+%27city%27+AND+/project/startDate%3D2015-05-01-2017-12-31+AND+contenttype%3D%27project%27&amp;searchType=advanced&amp;srt=contentUpdateDate:decreasing&amp;num=100</a>	



Microsoft Excel  
Worksheet

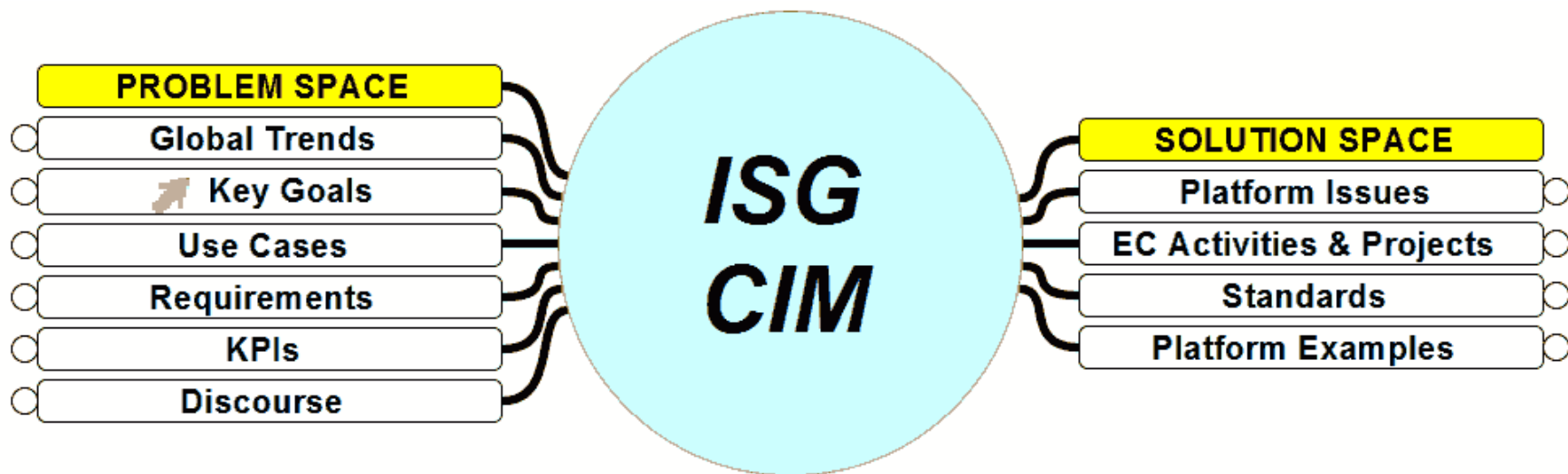
See: <https://portal.etsi.org/tb.aspx?tbid=854&SubTB=854>

- [DMI/CIM-001-AB \(MI \)](#) Annotated Bibliography
- [DGR/CIM-002-UC \(GR CIM 002\)](#) Use Cases
- [DGR/CIM-003-GAP \(GR CIM 003\)](#) Architecture and Gap Analysis
- [DGS/CIM-004-APIprelim \(GS CIM 004\)](#) API
- [DGS/CIM-005-DPP \(GS CIM 005\)](#) Data Publication Platforms
- [DGS/CIM-006-MOD0 \(GS CIM 006\)](#) Information Model
- [DGR/CIM-007-SEC \(GR CIM 007\)](#) Security & Privacy

NOTE: Work Items are being handled in parallel, with frequent cross-checks for consistency, in order to rapidly converge.

# Privacy Issues and Exploring Solution Space

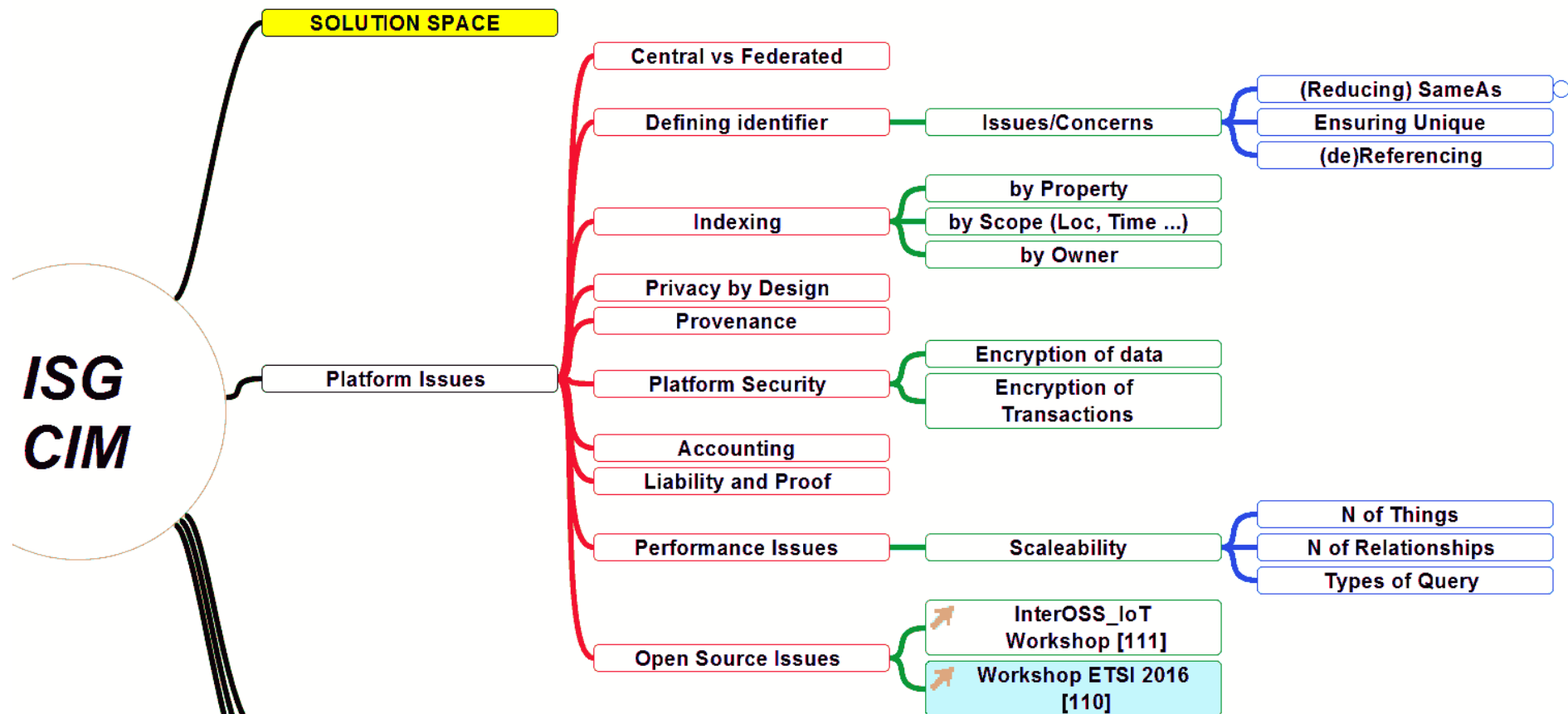
# ETSI ISG CIM: Problem space and solution space



Download at: [goo.gl/1zFPRz](https://goo.gl/1zFPRz)

[→ CONTENTS](#)

# Context Information Management: Issues

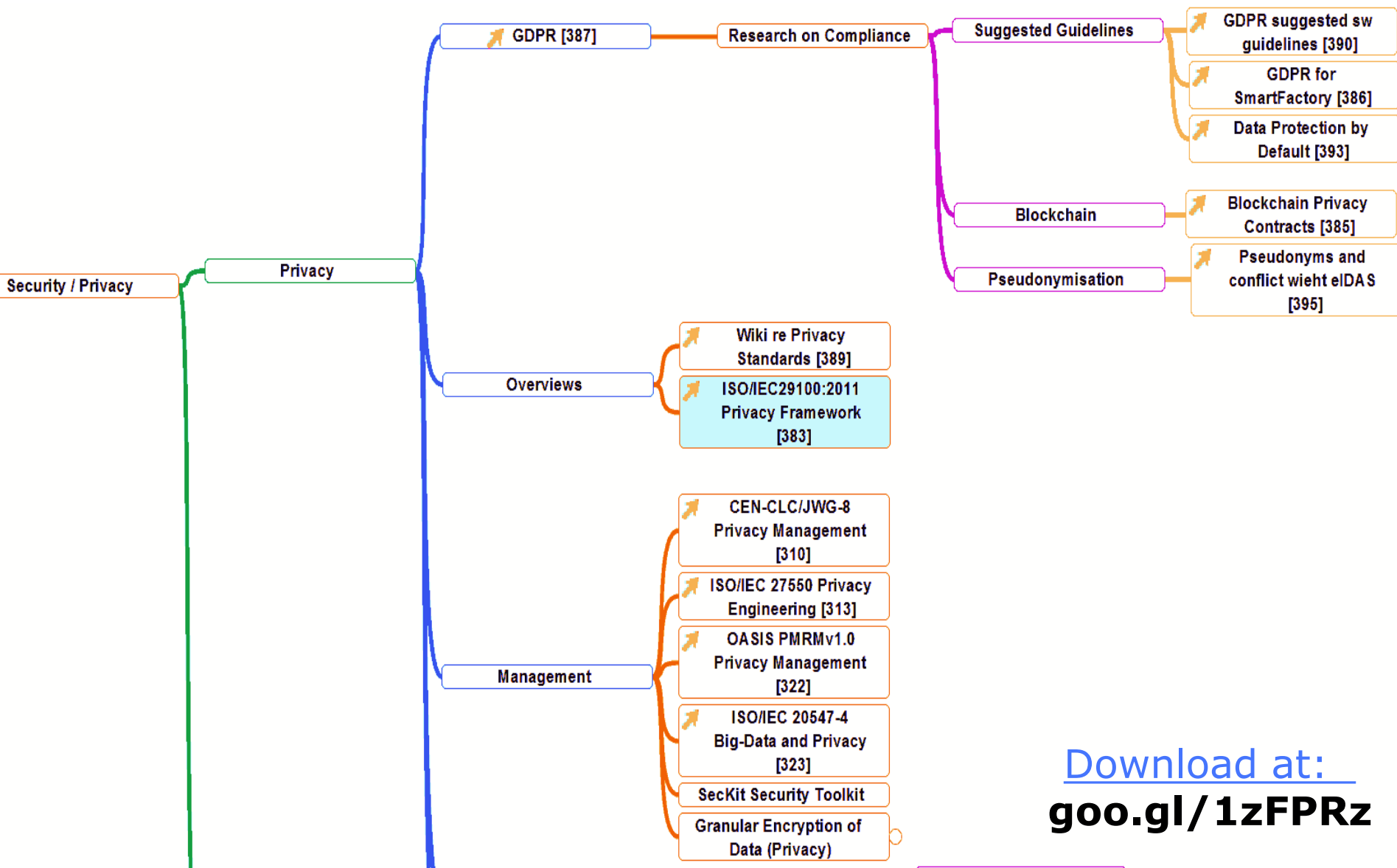


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# Context Information Management: Privacy



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**[goo.gl/1zFPRz](https://goo.gl/1zFPRz)**

[→ CONTENTS](#)

## **GDPR [387]**

- **Research on Compliance**

- **Suggested Guidelines**

- [GDPR suggested sw guidelines \[390\]](#)

- [GDPR for SmartFactory \[386\]](#)

- [Data Protection by Default \[393\]](#)

- **Blockchain**

- [Blockchain Privacy Contracts \[385\]](#)

- **Pseudonymisation**

- [Pseudonyms and conflict with eIDAS \[395\]](#)

## **Overviews**

- [Wiki re Privacy Standards \[389\]](#)

- [ISO/IEC29100:2011 Privacy Framework \[383\]](#)

## **SDOs**

- [WoT IoT Interest Group \[28\]](#)

[→ CONTENTS](#)

## Management of Privacy

- [CEN-CLC/JWG-8 Privacy Management \[310\]](#)
- [ISO/IEC 27550 Privacy Engineering \[313\]](#)
- [OASIS PMRMv1.0 Privacy Management \[322\]](#)
- [ISO/IEC 20547-4 Big-Data and Privacy \[323\]](#)
- **SecKit Security Toolkit**
- **Granular Encryption of Data (Privacy)**
  - [oneM2M \[334\]](#)
  - [ENISA \[324\]](#)
  - [OASIS \[322\]](#)
- **Research**
  - [Pseudonyms and conflict wieht eIDAS \[395\]](#)
  - [\[016\]](#) [\[181\]](#) [\[301\]](#) [\[302\]](#) [\[306\]](#) [\[307\]](#)

Conclusion ... Help!

# Help on ETSI ISG CIM Discussion Issues

1. Requirements for exchange of cross-cutting context information, to be fit for purpose in Smart Cities, Smart Agriculture and Smart Industry use cases (particularly scalability, extensibility, data privacy, security, inclusiveness, openness)
2. How to ensure ISG CIM API is flexible to cope with all desirable types of context data and instance data
3. Requirements for ISG CIM API to express the important kinds of queries for heterogeneous databases of context information for cross-cutting domains
4. Managing the identifier(s) for entities and referencing them in API queries, even across legacy databases
5. Ensuring privacy protection (fine-grained access control, encryption) on specific context data, efficiently!

# How to help

- **Ask an expert on any of the 5 Discussion Issue(s) to contact me**
- **Download the CIM-mindmap [goo.gl/1zFPRz](http://goo.gl/1zFPRz) and suggest to me your additions**
- **Email me about other events/organisations which I should contact**
- **Recommend to your organisation to join ETSI ISG CIM**
  - (nearly) any legal entity can apply
  - Free for contributing/discussing
  - Small "meeting fee" for major face-to-face meetings (free for ETSI members)
- **Comment now 😊 .... or to [CIM@neclab.eu](mailto:CIM@neclab.eu)**



 **Orchestrating** a brighter world

**NEC**