A singular approach to address privacy issues by the Data Protection and Privacy Relationships Model (DAPPREMO®)

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About myself

- Italian Lawyer, Counsel of Italian High Courts, Civil Law Specialist;
- Adjunct Professor at the University of Ostrava (Rome);
- Former President of the San Marino Data Protection Authority;
- Former national expert for the Republic of San Marino to the Consultative Committee of the Council of Europe of the Convention n. 108 and CAHAI (Ad hoc Committee on Artificial Intelligence);
- Member of the Italian National Bar (Consiglio Nazionale Forense - CNF) Privacy Commission;
- Member of the "IEEE SA P7007 Ontological Standard for Ethically Driven Robotics and Automation Systems Working Group";
- Memberships: IEEE - IEEE SA - XSF (XMPP Standards Foundation) - European AI Alliance - AI*IA - AIP
- Certified:
  - *Data Protection Officer - UNI 11697:2017*
  - *Privacy Assessor - UNI 11697:2018*
  - *Security Manager (ICT) - UNI 11506:2017*
  - *Information Security Management System Professional - ISO 27021:2017*
- Author of books, articles, and papers - Winner of several Awards.

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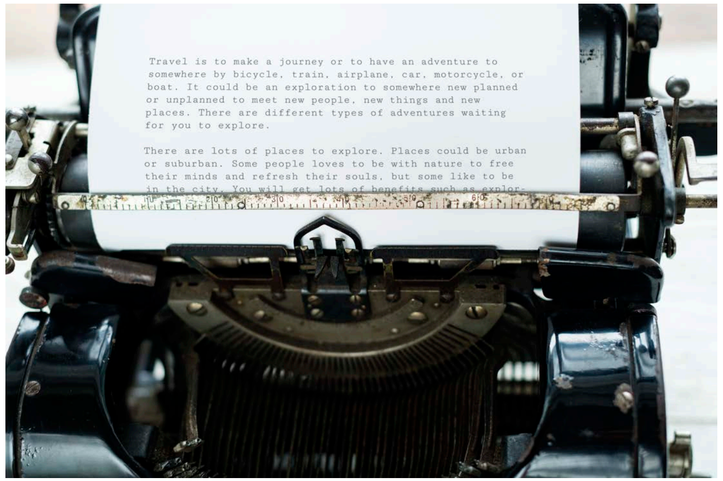
Almost 20 years ago, the transition from analog to digital reached the tipping point (according to research from the University of Southern California in 2007, 295 trillion megabytes - very little analog left today).

Unfortunately, someone doesn't understand yet that what is born analog dies analog; what is born digital dies digital.



Analog

Digital

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Premises

1. We all got into the new data protection and privacy era, and our confrontation with protecting personal data and privacy is a constant note in our daily lives. That entails a change of mentality. We should assess every aspect, situation, or fact of our life almost always regarding its impact on privacy and data protection.
2. We often do not pay attention to some privacy-relevant elements in reality analysis or that they might also impact privacy.
3. ML & AI are the new frontiers and challenges, and data protection and privacy are not exempted. Indeed, in every process, there is privacy bearing, and they are well-known for the privacy issues and risks related to AI (f.e., biases).
4. How can we correctly address real-life aspects (analog and digital) to achieve a proper data protection and privacy approach?

Our proposal: **DAPPREMO®**

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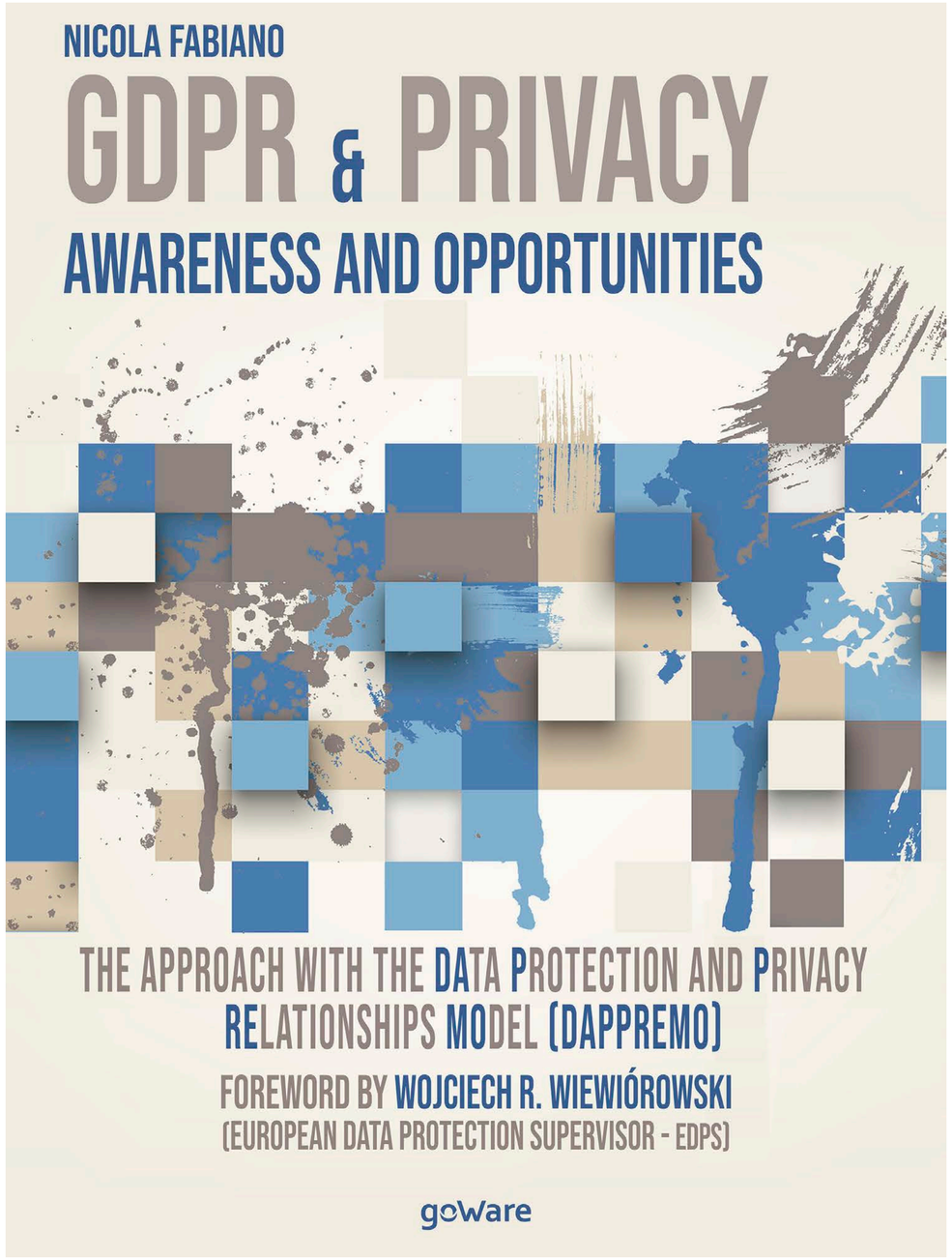

Annual Privacy Forum

GDPR & Privacy Awareness and Opportunities The approach with the Data Protection and Privacy Relationships Model (DAPPREMO)

2020

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The starting points of our investigation

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1. **What do data protection and privacy consist of?**: data protection and privacy do not uniquely consist of respecting and applying rules (this would be a minimal view).
2. **Multidisciplinary approach**: all domains can coexist, and we should address them with a multidisciplinary approach (we use the term “domain” to refer not only to a specific field but also sector, such as, for example, the core business of activity, the complex processes of a Public Administration office, or even a single software development project).
3. **Homogeneous set of objects**: data protection and privacy represent an entire system like a homogeneous set of objects (the single norms) according to a mathematically oriented perspective.
4. **Coexisting objects**: those objects could also coexist with others not present within the normative body of the sector (concerning the protection of personal data, not expressly contained in a legal norm) of different natures (e.g., ethics) to constitute a heterogeneous whole.
5. **Relationships**: to explain our approach, we refer to the mathematical explanation of relationships, especially the set theory, focusing on “one-to-one” or “one-to-many” relationships.

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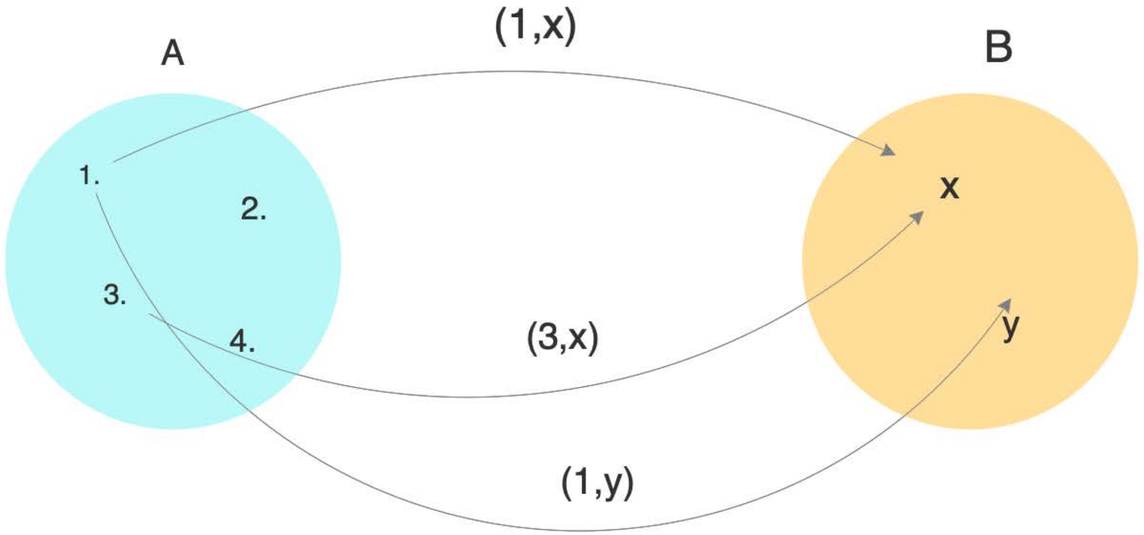
First step 1/2 - one-to-one

Giving A and B as two sets in the example on the right, the relation between A and B mathematically is the following:

R = {(1, x), (1, y), (3, x)}



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First step 2/2 - one-to-many

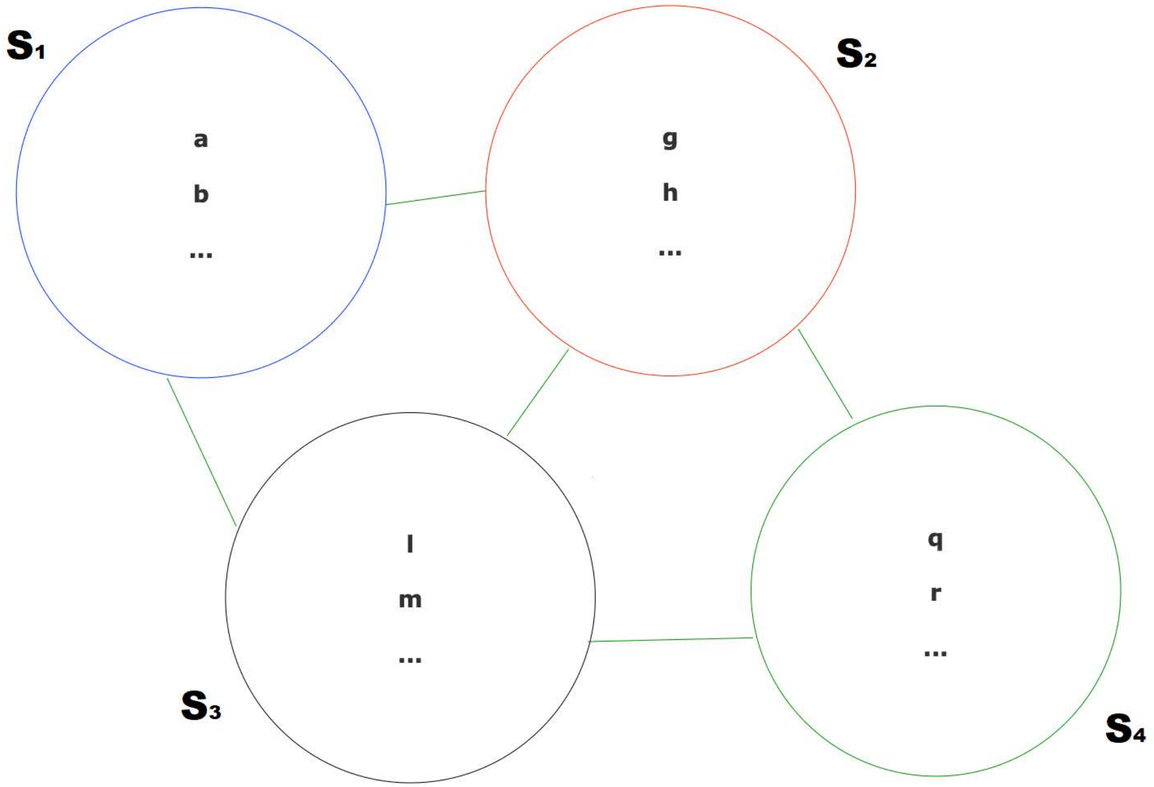
If we have more than two sets, two of them, for example, S_1 and S_2, are connected if there is a relation of any kind between them.

So there exists a relation R such that

$$S_1 R S_2$$

We can describe the context related to data protection as a set of objects that are the legal rules of the sector in addition to other entities, even non-homogeneous (e.g., ethics), closely related to the context in question.

Therefore, the "data protection" set contains the fundamental elements to define the specific area.



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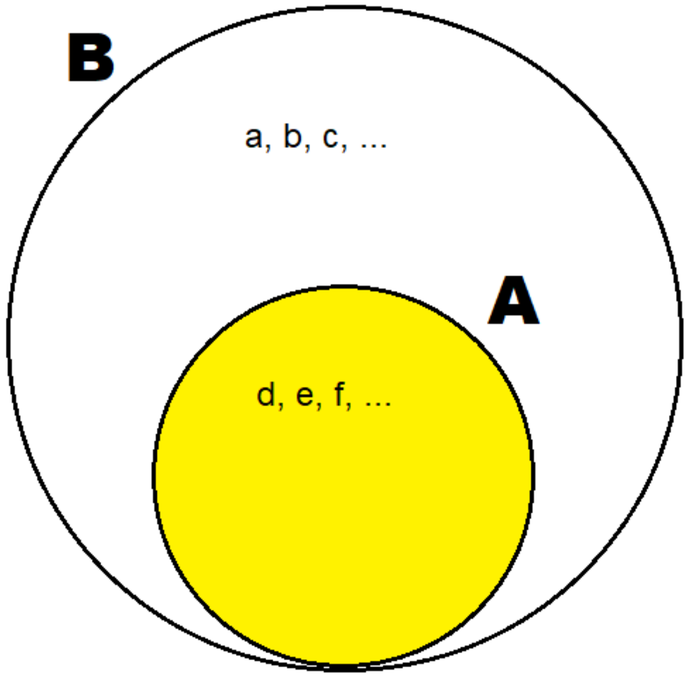
Relationships between objects

Any area generates a relationship with the protection of natural persons with regard to the processing of personal data and privacy.

The mentioned diagram shows the Euler-Venn inclusion report, which can be denoted by

$$A \subset B$$

Set A relates to **privacy (or protection of personal data)** and set B describes a different area (field or sector).



It emerges that set A is always present in the diverse relationships among sets since we cannot dismiss the rules on protecting personal data.

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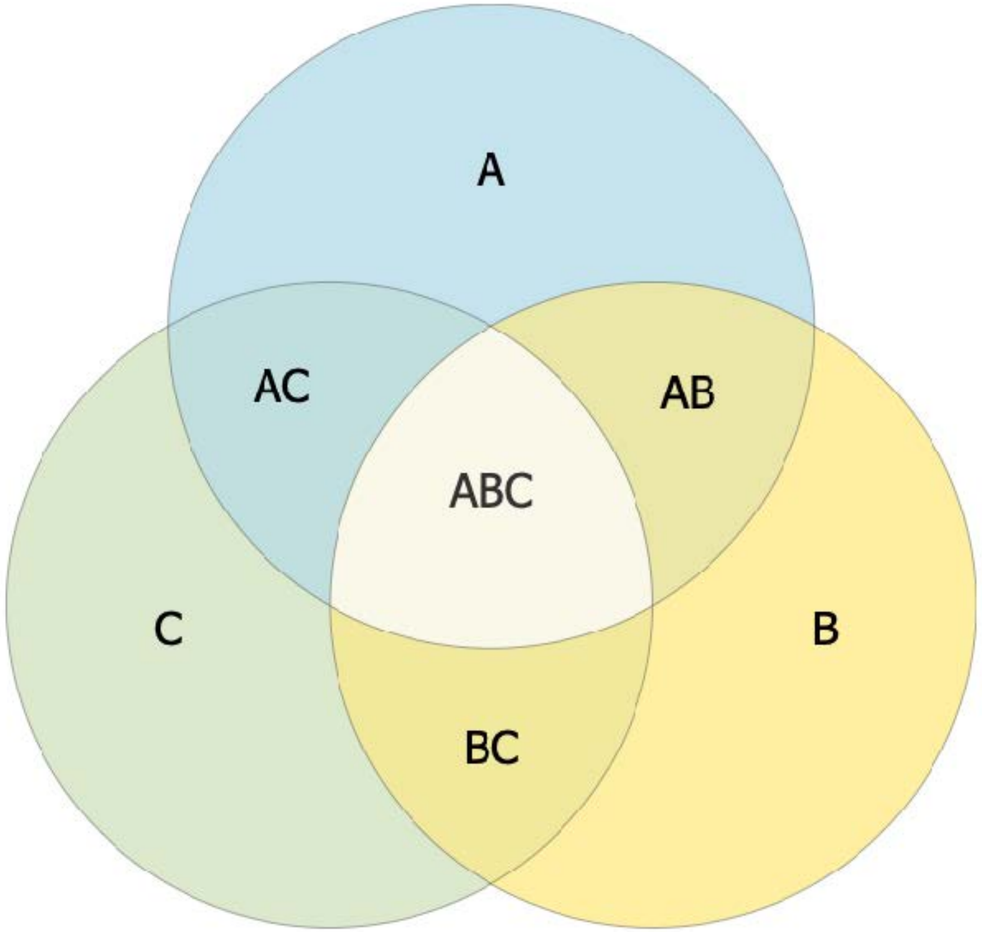
Intersection between domains

The Figure is the Euler-Venn diagram representing intersections of sets whose intersection relations are expressed mathematically as:

$A \cap B \cap C$, $A \cap C$, $B \cap A$, $C \cap B$

Suppose that one of the three sets, **A, is the data protection (or privacy) set.**

The diagram represents an intersection between domains, one of which is the one related to the protection of personal data (or privacy), and it shows how it is possible to identify common areas constituted precisely by the intersections and, therefore, the relationships between sets and objects of each set or domain.



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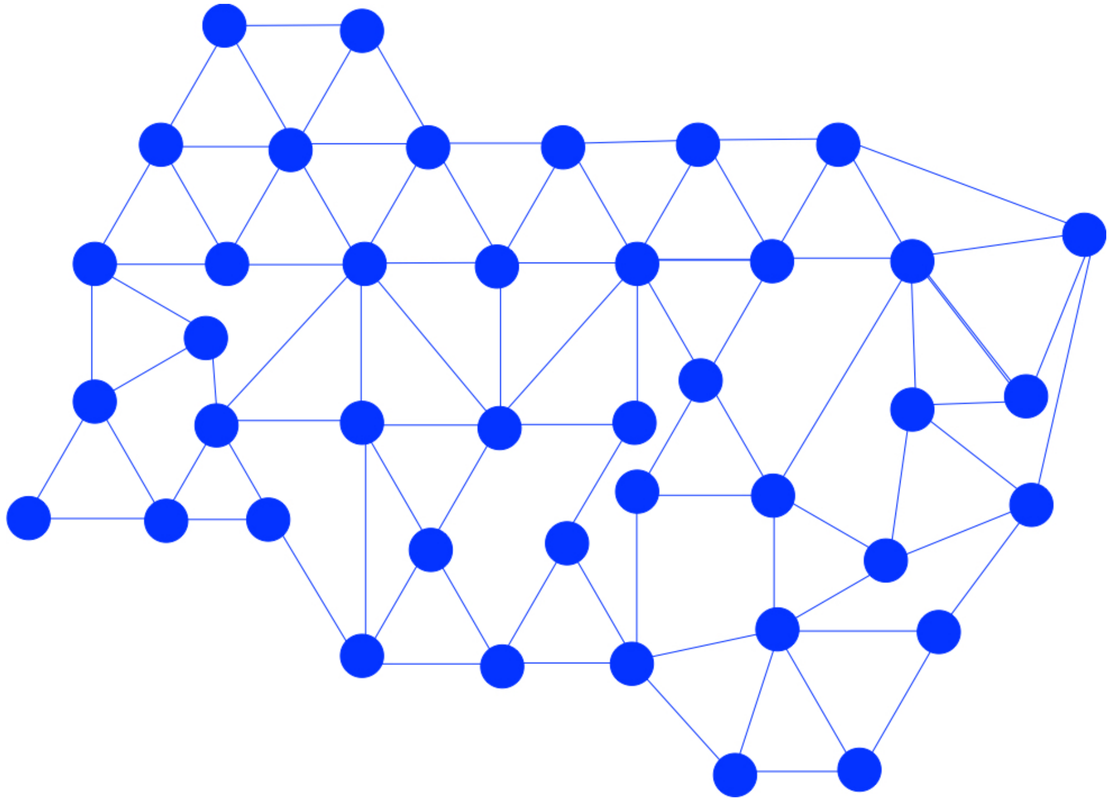
Schema of a distributed network system

In its graphic representation, the model appears very close to that of a **multi-dimensional distributed network system**, where each point of intersection represents a set (a **domain**), and the union of the different points (which represents the sets) is the **relationship**.

We should evaluate the representation on a two-dimensional plane and in multi-dimensional terms as a link between sets.

One of the essential elements is multidimensionality because we imagine different planes in space as if they were layers of a single system.



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What is the reality in our life?

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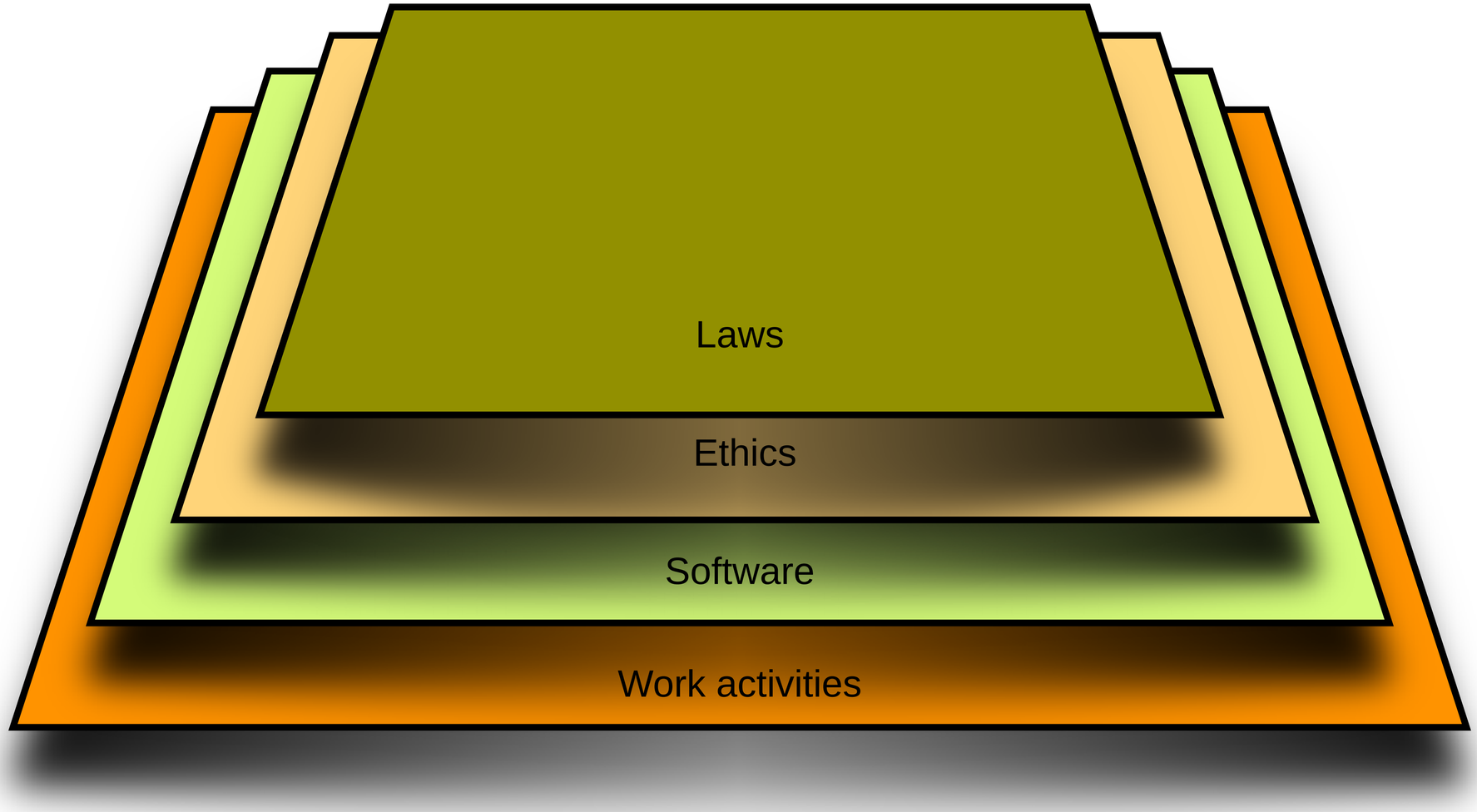
Schema of reality exemplification as a 3D multilayer image



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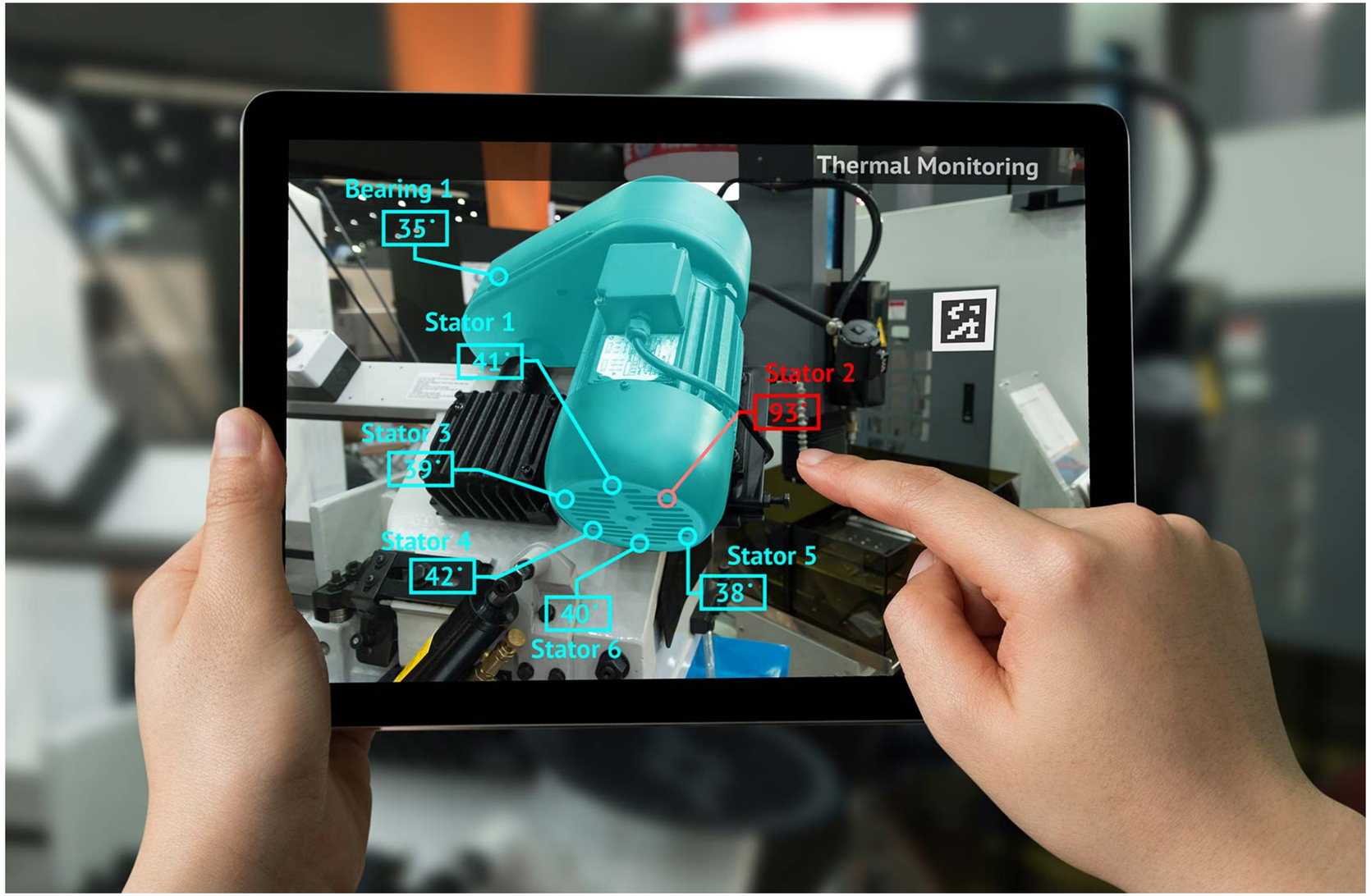
We should see any object as in the augmented reality



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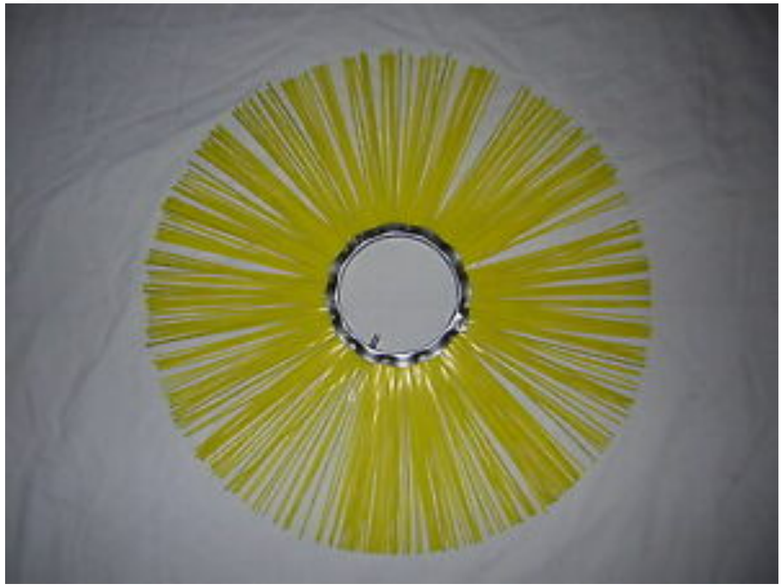
DAPPREMO® and further relationships

The presented relations system could find similarities with a complex structure borrowed from advanced mathematics called the "**fiber bundle set**."

We can illustrate it as a **brush** where the **shaft** represents, in our case, the data protection set, and **the individual bristles** constitute the relationships and connections between sets and objects of each other set.



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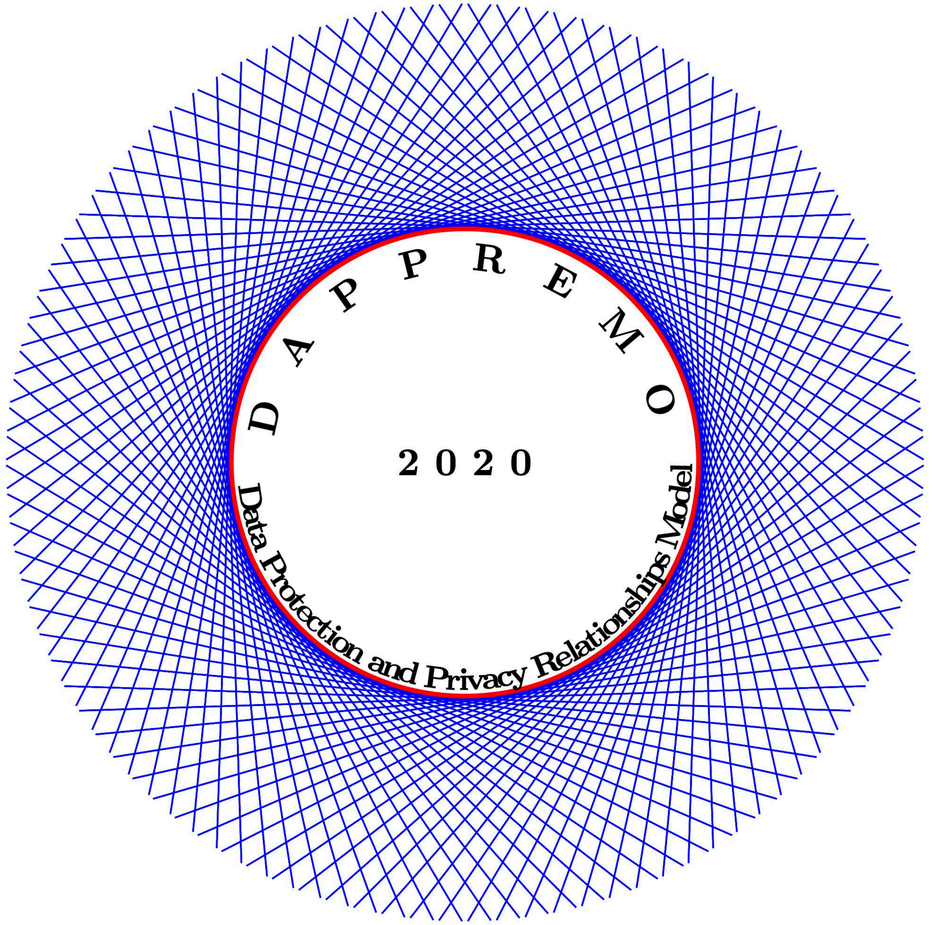
DAPPREMO®

DAPPREMO® includes Ethics, and it can be expressed mathematically through the concept of **equivalence relationships**.

The image, personalized and hence chosen for the DAPPREMO logo, is a "**fiber bundle set**," which would seem to account for the interactions and connections between individual elements and sets of elements.



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DAPPREMO® and the “agents”

The application of the model (DAPPREMO®) makes it possible to identify the entire data protection context precisely.

In this way, it is possible to identify the roles of the "agents" clearly:

- Individuals
  - ➡ DAPPREMO® enables them to have much more transparent data protection processes so that the entire context is more precise concerning the rights of data subjects.
- Organizations
  - ➡ DAPPREMO® allows any Institution (as a controller or Supervisory Authority) or professionals (as a Data Protection Officer - DPO, or advisors) to carry out an assessment more accurately in identifying "objects" strictly relevant to the analyzed case or context.

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DAPPREMO®, AI and future developments

We are improving DAPPREMO® (2020) by working on DAPPREMO® 2 (the evolution) and refining it with artificial intelligence instruments (Machine Learning and Deep Learning).

Our goals are to boost DAPPREMO® and make its practical application more effective.

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Conclusions

We hope for a radical change in thinking about data protection and privacy, being aware that we have long since entered a new era.

We propose everyone change their approach to data protection and privacy by the application of DAPPREMO® to analyze every process of reality, guarantee data subjects' rights, and become more performing the Organizations' activities.

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Thank you for your attention!

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