

DaPIS, an ontology-based Data Protection Icon Set

The **CIRSFID**¹ (University of Bologna, IT), in collaboration with the Academy of Fine Arts of Bologna and Società Italiana Informatica Giuridica (SIIG)², has developed DaPIS,³ a Data Protection Icon Set representing: (1) data processing operations and processed data (e.g., anonymized data, encrypted data), (2) purposes of the processing (e.g., marketing purposes, scientific purposes), (3) legal bases for the processing (e.g., legal obligation, consent), (4) agents and roles (e.g., data subject, data controller, supervisory authority), (5) rights of data subjects (e.g., right to access, right to erasure, right to data portability).

Function: companion icons

DaPIS' icons have been conceived as companion icons, meaning that they are displayed **in combination with the textual elements they illustrate**. They can attract readers' attention, help them to search and find relevant information quickly (especially in long texts), and support memorization. They can also highlight and quickly communicate key aspects of the privacy practices of an organization, and be therefore used in consent managements.

Selection of concepts

DaPIS' concepts have been selected following Artt. 13-14 GDPR and have been integrated with additional important concepts, formalized in the **computational ontology PrOnto**.⁴ The ontological foundation was instrumental for the creation of a machine-readable icon set (as provided by the GDPR), namely an iconic language whose elements have computer-interpretable meanings that are explicitly and formally defined in the ontology. With the provision of XML mark-up⁵ to the linguistic expressions in documents, applications can semi-automatically retrieve and display the icons encoded in the ontology next to the relevant chunks of text in the document.

Participatory design

DaPIS was created through participatory design. A series of workshops was held between July 2017 and July 2018 (at Stanford University and at the University of Bologna) and involved **various stakeholders**: a heterogeneous group of graphic designers, lawyers and legal scholars, computer scientists, communications professionals, interested laypeople and representatives of the business world. This allowed for the expression of different values and priorities belonging to the stakeholders that might be impacted by the icon set, while avoiding overlooking any fundamental aspect of legal icon design. The workshops followed the (legal) design process which involves a series of steps through which the participants develop, test and refine one or more solutions to specific problems in an iterative cycle. Thus, DaPIS has evolved over time, from a prototypical version to the actual version, to reflect the feedbacks gathered during the workshops and the evaluation phases.

Contacts:

Prof. Monica Palmirani: monica.palmirani@unibo.it

Arianna Rossi: arianna.rossi@uni.lu

¹ <http://www.cirsfid.unibo.it/>

² The Legal Design Lab (Stanford Law School, US, <http://www.legaltechdesign.com/>) and the University of Luxembourg are also gratefully acknowledged.

³ DaPIS is available at: <http://gdprbydesign.cirsfid.unibo.it/dapis-2/> (Last accessed: May 7, 2019). Under a Creative Commons Attribution-ShareAlike 4.0 International License.

⁴ PrOnto is an ontology of the GDPR:

https://www.w3.org/community/dpvcg/wiki/PrOnto:_Privacy_Ontology_for_Legal_Reasoning (Last accessed: May 7, 2019).

⁵ Specifically, Akoma Ntoso: a legal open XML standard for legislative, judiciary and legal documents.

Relevant publications:

- Rossi, A., and Palmirani, M., (2020). Can Visual Design Provide Legal Transparency? The Challenges for Successful Implementation of Icons for Data Protection. *Design Issues* Volume 36 | Issue 3 | Summer 2020 (p.82-96).
- Rossi, A., and Palmirani, M., (2020). What's in an Icon? Promises and Pitfalls of Data Protection Iconography. In: R. Leenes, D. Hallinan, S. Gutwirth and P. De Hert (Eds.), *Data Protection and Privacy: Data Protection and Democracy*. Hart Publishing (p.59-91).
- Rossi, A., and Palmirani, M., (2019). [DaPIS: an Ontology-Based Data Protection Icon Set](#). In G. Peruginelli & S. Faro (Eds.): *Knowledge of the Law in the Big Data Age. Frontiers in Artificial Intelligence and Applications*. Vol. 317. IOS Press. ISBN: 978-1-61499-984-3 (print) | 978-1-61499-985-0 (online).
- Rossi, A., (2019). [Legal Design for the General Data Protection Regulation. A Methodology for the Visualization and the Communication of Legal Concepts](#). Alma Mater Studiorum Università di Bologna. Dottorato di Ricerca in Law Science and Technology, 31 ciclo.
- Palmirani, M., Bartolini, C., Martoni, M., Robaldo, L., & Rossi, A., (2018). [Legal Ontology for Modelling GDPR Concepts and Norms](#). In *Legal Knowledge and Information Systems: JURIX 2018: The Thirty-first Annual Conference* (Vol. 313, p. 91). IOS Press.
- Rossi, A. and Palmirani, M., [From Words to Pictures Through Legal Visualizations](#) (2018). In Ugo Pagallo et al. (Eds.): *AI Approaches to the Complexity of Legal Systems: AICOL International Workshops 2015–2017: AICOL-VI@ JURIX 2015, AICOL-VII@ EKAW 2016, AICOL-VIII@ JURIX 2016, AICOL-IX@ ICAIL 2017, and AICOL-X@ JURIX 2017, Revised Selected Papers*. Springer, 2018, pp. 72-85. DOI: https://doi.org/10.1007/978-3-030-00178-0_5.
- Palmirani, M., Martoni, M., Rossi, A., Bartolini, C., & Robaldo, L., (2018). PrOnto: Privacy Ontology for Legal Compliance. *Proceedings of the 18th European Conference on Digital Government ECDG 2018*. Academic Conferences and Publishing International Limited, UK, pp. 142-151.
- Palmirani, M., Martoni, M., Rossi, A., Bartolini, C., & Robaldo, L., (2018). [PrOnto: Privacy Ontology for Legal Reasoning](#). *International Conference on Electronic Government and the Information Systems Perspective*. Springer, Cham, pp. 139-152.
- Palmirani, M., Rossi, A., Martoni, M. and Hagan, M., [A Methodological Framework to Design a Machine-Readable Privacy Icon Set](#) (2018). In Erich Schweighofer et al. (Eds.), *Data Protection / LegalTech. Proceedings of the 21th International Legal Informatics Symposium IRIS 2018*. Editions Weblaw, Bern 2018, pp. 451–454 (ISBN 978-3-906940-21-2) and in Jusletter IT, 22 February 2018.
- Rossi, A. and Palmirani, M., [A Visualization Approach for Adaptive Consent in the European Data Protection Framework](#) (2017). In: 2017 International Conference for E-Democracy and Open Government (CeDEM), Krems, Austria, 2017, pp. 159-170. DOI: [10.1109/CeDEM.2017.23](https://doi.org/10.1109/CeDEM.2017.23)

!Write to arianna.rossi@uni.lu to receive a copy of the articles that are not freely accessible!