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Information security, cybersecurity and privacy protection – Privacy enhancing data de-identification framework

Sécurité de l'information, cybersécurité et protection de la vie privée — Cadre pour la dé-identification de données pour la protection de la vie privée

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Foreword

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Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

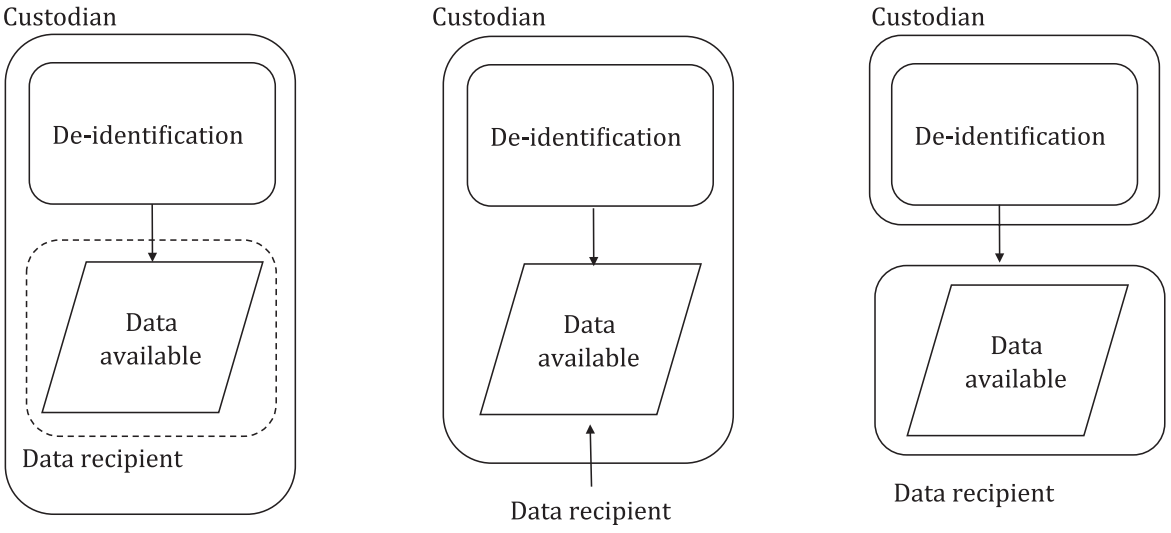
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Introduction

De-identification is one potential means for facilitating the use of personally identifiable information (PII) in a way that does not identify or otherwise compromise the privacy of an individual or a group of individuals. The appropriate use of de-identification techniques can support compliance with regulatory requirements and relevant privacy principles. However, the term "data principal" used in this document is broader than "PII principal" and, for example, includes organizations and computers.

In almost all cases de-identification requires, at the very least, an evaluation of the additional information available to an individual or group that can inappropriately reveal or uncover PII (which is referred to as an adversary, whether a data principal is identified intentionally or not), and how they can combine it to reveal or uncover PII. In short, de-identification requires an assessment of the environment and the circumstances in which the data are made available to data recipients. This considers what additional information is available to an adversary and the possibility of attacks and motivation to re-identify. De-identification also requires an assessment of the data. This determines how the additional information available to an adversary can be used to reveal or uncover PII and the possibility of re-identification, or identity disclosure, by itself or attacks of inference.

This document provides organizations with an implementation framework to govern the appropriate use of data de-identification techniques described in ISO/IEC 20889. This de-identification framework can be applied at any point in the data lifecycle: from designing the means of data collection, the internal reuse of that data, making data available to external partners, or archival. The data recipients can therefore be internal or external to the data custodian that is implementing procedures and practices in accordance with this de-identification framework. As shown in Figure 1 a), use and reuse implies the custodian maintains oversight over the de-identified data while making it available to an internal department or functional group. Figure 1 b) shows external sharing, which implies the custodian maintains oversight over the de-identified data while making it available to an external data recipient (e.g. through a virtual access portal, or a physical data centre). Figure 1 c) shows external release, which implies the custodian transfers oversight over the de-identified data to an external data recipient. In each of these cases, the process of de-identification itself can be transferred to a third party, separate from the custodian or recipient. Written agreements with the recipient determine how data made available after de-identification can be used, in accordance with applicable laws.



a) Use and reuse **b) External sharing** **c) External release**

Figure 1 — Data availability

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Information security, cybersecurity and privacy protection – Privacy enhancing data de-identification framework

1 Scope

This document provides a framework for identifying and mitigating re-identification risks and risks associated with the lifecycle of de-identified data.

This document is applicable to all types and sizes of organizations, including public and private companies, government entities, and not-for-profit organizations, that are PII controllers or PII processors acting on a controller's behalf, implementing data de-identification processes for privacy enhancing purposes.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 27000, *Information technology — Security techniques — Information security management systems — Overview and vocabulary*

ISO/IEC 29100, *Information technology — Security techniques — Privacy framework*

ISO/IEC 20889, *Privacy enhancing data de-identification terminology and classification of techniques*

ISO 31000, *Risk Management — Guidelines*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 27000, ISO/IEC 29100, ISO/IEC 20889, ISO 31000 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
custodian
person or entity that has custody, control or possession of electronically stored information

[SOURCE: ISO/IEC 27050-1:2019, 3.2]

3.2
data recipient
person or organization by, with or to whom data is accessed, shared or released

3.3
adversary
individual or unit that can, whether intentionally or not, exploit potential vulnerabilities

Note 1 to entry: Adversary, attacker, intruder, snooper, and other similar terms are often used interchangeably in the de-identification literature.

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3.4
threat modelling
systematic exploration technique to expose any circumstance or event having the potential to cause harm to a system in the form of destruction, *disclosure* (3.8), modification of data, or denial of service

[SOURCE: ISO/IEC/IEEE 24765:2017, 3.4290, modified — Note 1 to entry has been deleted.]

3.5
privacy impact assessment
PIA
overall process of identifying, analysing, evaluating, consulting, communicating and planning the treatment of potential privacy impacts with regard to the processing of personally identifiable information, framed within an organization's broader risk management framework

[SOURCE: ISO/IEC 29134:2017, 3.7, modified — Note 1 to entry has been deleted.]

3.6
defined population
set of elements that a dataset is drawn from that contributes to the *adversary's* (3.3) ability to identify a data principal

3.7
sample
dataset that is only a proportion of the *defined population* (3.6), such that an *adversary* (3.3) cannot be certain that any particular entity was in it

3.8
disclosure
revealing confidential or personally identifiable information from a dataset based on a vulnerability that is found or exploited

3.9
shared data
dataset in which a fixed set of entities have been granted access to the data by the custodian

3.10
released data
dataset in which the custodian no longer directly controls who has access to the data

3.11
data privacy model
approach to the application of data de-identification techniques that enables the calculation of identifiability

[SOURCE: ISO/IEC 20889:2018, 3.3, modified — The word "formal" and "measurement" have been deleted from the term and "data" added, and "re-identification risk" has been replaced by "identifiability" in the definition.]

3.12
written agreement
data sharing agreement, memorandum of understanding, data access request, contract and any other formally documented agreement

3.13
data transformation
modification of the data

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3.14
de-identification governance
system of directing and controlling the de-identification process

[SOURCE: ISO/IEC 38500:2015, 2.8, modified — "the de-identification process" has been added to the definition.]

4 Symbols and abbreviated terms

PIA privacy impact assessment

PII personally identifiable information

P probability function

5 Overview

The goal of this document is to provide a principles-based framework to approach de-identification, which considers procedures, risks, and harms. A principles-based approach to de-identification is intended to be neutral on the specifics of implementation and technologies. The framework is presented in four main parts:

— Context (Clause 6): An assessment of the environment and circumstances in which the data are made available to data recipients, to determine what external information can be available to an adversary. This implies that risk can be managed through contextual controls as well (meaning the IT security controls, obligations described in written agreements, and policy and governance measures).

— Data (Clause 7): An assessment of the data, to determine how the additional information available to an adversary can be used to reveal or uncover PII. Risk can be managed by limiting what data are made available, and in what form that data will be made available (by transforming the data).

— Identifiability (Clause 8): The method of assessing identifiability is a function of context risk (the probability of an attack) and data risk (the probability of disclosure given that there is an attack). An appropriate tolerance shall be defined to ensure the identifiability is below a pre-defined tolerance level.

— Governance (Clause 9): Documented procedures and practices for the custodian to ensure the above are done consistently and effectively, now and in the future, and the preparations that are required before, during, and after de-identified data are made available.

It can be necessary to repeat the process if the resulting de-identified data does not meet acceptance criteria (by the custodian or intended data recipient), in an effort to find solutions that are acceptable to both parties. For example, the privacy and security practices for the data environment can be improved in an effort to reduce threats and improve the utility of data that are made available to the data recipients based on their operational context. The entire approach can be thought of in a somewhat linear fashion, with de-identification governance by the custodian embodying the overall processes of context assessment, data assessment, identifiability assessment and mitigation, and acceptance criteria, as shown in Figure 2. It is, however, possible to reorder elements based on implementation needs (e.g. improving efficiency and scalability for specific data flows). ISO 31000 contains guidelines on managing risk faced by organizations.

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