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Information security, cybersecurity and privacy protection — User-centric privacy preferences management framework

Sécurité de l'information, cybersécurité et protection de la vie privée — Cadre centré sur l'utilisateur pour le traitement des données à caractère personnel basé sur des préférences relatives au respect de la vie privée

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Foreword

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology,* Subcommittee SC 27, *Information security, cybersecurity and privacy protection.*

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Introduction

This document describes a user-centric framework for handling personally identifiable information (PII), based on privacy preferences and privacy preference administration within information and communication technology (ICT) systems. ICT systems which handle PII implement privacy control mechanisms. To ensure these mechanisms are implemented effectively in ICT systems, PII is controlled using privacy preferences which are set (directly or indirectly) by the relevant PII principal, including consent information. When PII is processed based upon authorities other than consent, ICT systems can, where appropriate, incorporate mechanisms to improve transparency and adjust PII processing in accordance with the preferences of the PII principal. PII principals can make informed use of a system only when they understand the scope of its privacy implications, which is improved when the actionable privacy control options align in an intuitive way with PII processing undertaken in the ICT system.

Mechanisms that incorporate a PII principal's privacy preferences into machine-readable settings for each PII handling system can be useful. Moreover, such collected PII may be shared or transferred among other service providers according to the PII principal's preferences.

The framework is intended to help organizations include user-centric PII handling mechanisms in their systems following privacy-by-design principles and realize PII handling based on privacy preferences of PII principals. The framework includes components designed to manage privacy preference information, and sub-components that are implemented within that component are defined in this document. However, this document does not specify the content and format of privacy preference information.

This document can be used to:

— design and implement ICT systems that handle PII, or transfer PII between organizations;

— develop PII exchange platforms based on privacy preferences;

— provide privacy preference management services.

Information security, cybersecurity and privacy protection — User-centric privacy preferences management framework

1 Scope

This document provides a user-centric framework for handling personally identifiable information (PII), based on privacy preferences.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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
personally identifiable information
PII
information that (a) can be used to identify the *PII principal* (3.2) to whom such information relates, or (b) is or may be directly or indirectly linked to a PII principal

Note 1 to entry: To determine whether a PII principal is identifiable, account should be taken of all the means which can reasonably be used by the privacy stakeholder holding the data, or by any other party, to identify that natural person.

[SOURCE: ISO/IEC 29100:2011, 2.9, modified — The word "any" has been removed, "might" has been replaced by "may".]

3.2
PII principal
natural person to whom the *personally identifiable information* (3.1) relates

Note 1 to entry: Depending on the jurisdiction and the particular data protection and privacy legislation, the synonym "data subject" can also be used instead of the term "PII principal".

[SOURCE: ISO/IEC 29100:2011, 2.11]

3.3
PII controller
privacy stakeholder (or privacy stakeholders) that determines the purposes and means for processing *personally identifiable information* (3.1) other than natural persons who use data for personal purposes

Note 1 to entry: A PII controller sometimes instructs others (e.g. PII processors) to process personally identifiable information on its behalf while the responsibility for the processing remains with the PII controller.

Note 2 to entry: A *PII principal* (3.2) may sometimes be the "controller" of their own information where information and communication technology (ICT) systems are designed to enable direct control by the PII principal. In such cases the ICT system would be the PII processer responding to the PII controller who is also the PII subject.

[SOURCE: ISO/IEC 29100:2011, 2.10 — Note 2 to entry has been added.]

3.4
PII processor
privacy stakeholder that processes *personally identifiable information* (3.1) on behalf of and in accordance with the instructions of a *PII controller* (3.3)

[SOURCE: ISO/IEC 29100:2011, 2.12]

3.5
third party
privacy stakeholder other than the *personally identifiable information (PII) principal* (3.2), the *PII controller* (3.3) and the *PII processor* (3.4), and the natural persons who are authorized to process the data under the direct authority of the PII controller or the PII processor

[SOURCE: ISO/IEC 29100:2011, 2.27]

3.6
privacy stakeholder
natural or legal person, public authority, agency or any other body that can affect, be affected by, or perceive themselves to be affected by a decision or activity related to *personally identifiable information* (3.1) processing

[SOURCE: ISO/IEC 29100:2011, 2.22]

3.7
identifying attribute
attribute in a dataset that is able to contribute to uniquely identifying a *PII principal* (3.2) within a specific operational context

Note 1 to entry: ISO/IEC 20889:2018 uses a term "data principal" that is broader than "PII principal". However, this document focuses on data sets related to PII principals.

[SOURCE: ISO/IEC 20889:2018, 3.14, modified — The word "data principal" has been changed to "PII principal" and Note 1 to entry added.]

3.8
control
measure that is modifying risk

Note 1 to entry: Controls include any process, policy, device, practice, or other actions which modify risk.

Note 2 to entry: It is possible that controls do not always achieve the intended or assumed modifying effect.

[SOURCE: ISO Guide 73:2009, 3.8.1.1, modified — Note 2 to entry has been changed.]

3.9
data transformation
process which creates new data from an original source

EXAMPLE The process of migrating into a different format, or by creating a subset, by selection or query, to create newly derived results, such as for publication.

[SOURCE: ISO 5127:2017, 3.1.11.06]

3.10
de-identification technique
method for transforming a dataset with the objective of reducing the extent to which information is able to be associated with the *PII principal* (3.2)

Note 1 to entry: ISO/IEC 20889:2018 uses a term "data principal" that is broader than "PII principal". However, this document focuses on data sets related to PII principals.

[SOURCE: ISO/IEC 20889:2018, 3.7, modified — The word "data principal" has been changed to "PII principal" and Note 1 to entry added.]

3.11
re-identification
process of associating data in a de-identified data set with the *PII principal* (3.2)

Note 1 to entry: A process that establishes the presence of a particular data principal in a dataset is included in this definition.

Note 2 to entry: ISO/IEC 20889:2018 uses a term "data principal" that is broader than "PII principal. However, this document focuses on datasets related to PII principals.

[SOURCE: ISO/IEC 20889:2018, 3.31, modified — The word "data principal" has been changed to "PII principal" and Note 2 to entry added.]

3.12
redaction
removal of a field such that it results in the irreversible and permanent removal of information contained within that field from the message

Note 1 to entry: The removal of a field only removes the information contained within that field. Information that can be derived from other fields of the message or from other sources is not removed.

[SOURCE: ISO/IEC 23264-1:2021, 3.21]

3.13
unlinkability
property that ensures that a *PII principal* (3.2) may make multiple uses of resources or services without others being able to link these uses together

[SOURCE: ISO/IEC TR 27550:2019, 3.25]

3.14
intervenability
property that ensures that *PII principals* (3.2), *PII controllers* (3.3), *PII processors* (3.4) and supervisory authorities can intervene in all privacy-relevant data processing

Note 1 to entry: The extent to which any of these stakeholders can intervene in data processing may be limited by relevant legislation or regulation.

[SOURCE: ISO/IEC TR 27550:2019, 3.6]

3.15
transparency
property that ensures that all privacy-relevant data processing including the legal, technical and organizational setting can be understood and reconstructed

[SOURCE: ISO/IEC TR 27550:2019, 3.24]

3.16
privacy preferences
specific choices made by a *personally identifiable information (PII) principal* (3.2) about how their *PII* (3.1) should be processed for a particular purpose

[SOURCE: ISO/IEC 29100:2011, 2.17]

3.17
privacy preference manager
PPM
component providing a capability allowing *PII principals* (3.2) to express *privacy preferences* (3.16) and a capability to monitor PII processing according to these privacy preferences

3.18
privacy preference administrator
PPA
privacy stakeholder which administrates a *privacy preference manager* (3.17)

4 Symbols and abbreviated terms

For the purposes of this document, the following abbreviations apply:

EHR electronic health record

ICT information and communications technology

PIA privacy impact assessment

PII personally identifiable information

PPA privacy preference administrator

PPM privacy preference manager

5 User-centric framework for handling PII

5.1 General

Privacy preference handling is the key enabler for the construction of a user-centric PII handling framework based on privacy preferences. As shown in Figure 1, such a framework can be used as a technical reference for developers of ICT systems that process PII. Use cases of PII handling based on privacy preferences are introduced in Annex A.

The framework consists of actors and components.

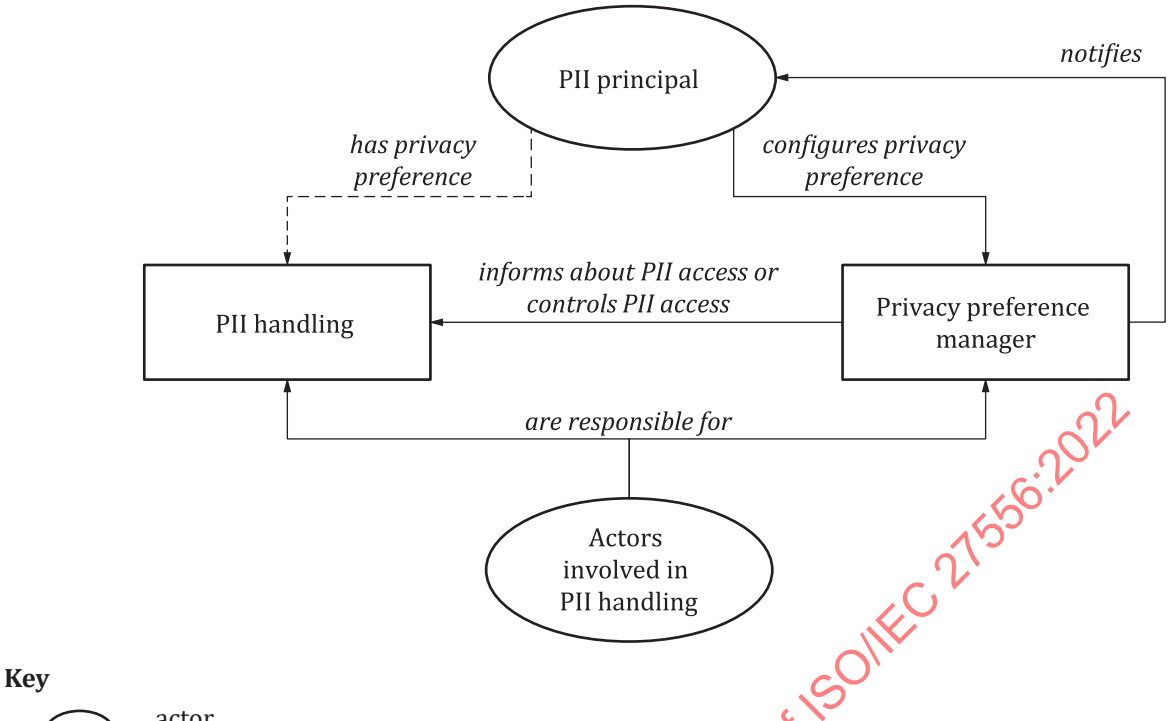

Figure 1 — User-centric framework for handling PII

The privacy preference manager (PPM) provides the following capabilities:

— the management of privacy preferences of PII principals;

— the management of privacy notices;

— the management of consent information where applicable;

— generation of information for handling PII processing in IT systems at a granularity level corresponding to the preferences;

— the implementation of control mechanisms to enforce these preferences during PII processing, including in the case of PII transfer.

As shown in Figure 1, the privacy preference manager acts as a proxy for the PII principal(s) in order to realize privacy preference-based handling. From the point of view of PII principals, PII should be processed appropriately by service providers (PII controllers or PII processors) based on the PII principal's privacy preferences. In this case, a PII principal should specify their privacy preferences, such as the type of PII that can be collected, how their PII shall and shall not be processed and with which entities, if any, their PII may be shared. In a complex service environment, the preference of PII principals for PII usage should be configured flexibly. To this end, privacy preference handling enables the following functionalities.

— PII principals can configure their PII privacy preferences. These preferences may include the list of PII that a PII principal allows to be collected, and the service providers that the PII principal allows to access the collected PII. A default setting of privacy preferences includes no PII list as a privacy by default setting.

— The delivery of PII to a service provider is controlled by the privacy preferences which are made by the PII principal in the context of a particular operation performed with that service provider.

— PII principals have access to a summary showing when their PII has been shared with other service providers.

NOTE A third party is a recipient of PII, and the third party becomes either PII controller, PII processor, or PII sub-processor once it has received the PII.

5.2 Actors

The actors in the user-centric PII handling framework are the following:

— the PII principals;

— PII controllers (including a third party);

— the PII processors;

— the privacy preference administrators (PPAs).

5.3 Roles of actors in user-centric PII handling frameworks

5.3.1 Roles of PII principals

PII principals give consent, where applicable, and determine their preferences for how their PII should be collected and processed, and provide the privacy preferences to the PPM.

NOTE Consent and preferences can be provided indirectly by an authorized third party, who gives consent and indicates privacy preferences on behalf of other PII principals. Examples of PII providers are employees that provide information on their family members to an employer, or a job applicant that provides a contact number of an ex-employer when applying for a new job.

5.3.2 Roles of PII controllers

A PII controller can, where appropriate:

— implement control mechanisms as required to protect the PII of the PII principal;

— process PII, respecting the preferences of the PII principal, e.g. as recorded in the PPM;

— implement mechanisms to allow the PII principal direct access and/or control to some or all of their own PII;

— decide to have all or part of the processing operations carried out by a different privacy stakeholder on its behalf (using a PII processor) where the PII principal has authorized this implicitly or explicitly, e.g. via a preference stored in the PPM;

— transfer PII to another controller. The PII principal's preferences, e.g. as reflected in the PPM, continue to be respected when the new controller processes the PII.

A PII controller should provide appropriate privacy notices to PII principals.

NOTE ISO/IEC 29184 provides guidance on the structure and content of privacy notices.

5.3.3 Roles of PII processors

A PII processor can:

— implement control mechanisms as required to protect the PII principal's PII, potentially including additional controls as required by the PII controller;

— process PII as instructed by the PII controller, respecting the PII principal's preferences, as recorded in the PPM.

5.3.4 Roles of privacy preference administrators

Privacy preference administrators (PPAs) are privacy stakeholders that administrate the PPM and handle its contents. The purpose is to inform the PII processors and PII controllers on their actions.

NOTE 1 The provision of information can take place in real time.

NOTE 2 The PPA is a controller and processor of privacy preferences. The PPA is a specific role in the organizational structure of a PII controller or a PII processor.

5.4 Components in the user-centric PII handling framework

5.4.1 Overview

Figure 2 shows the components in the user-centric PII handling framework that can have an influence on the privacy preference manager.

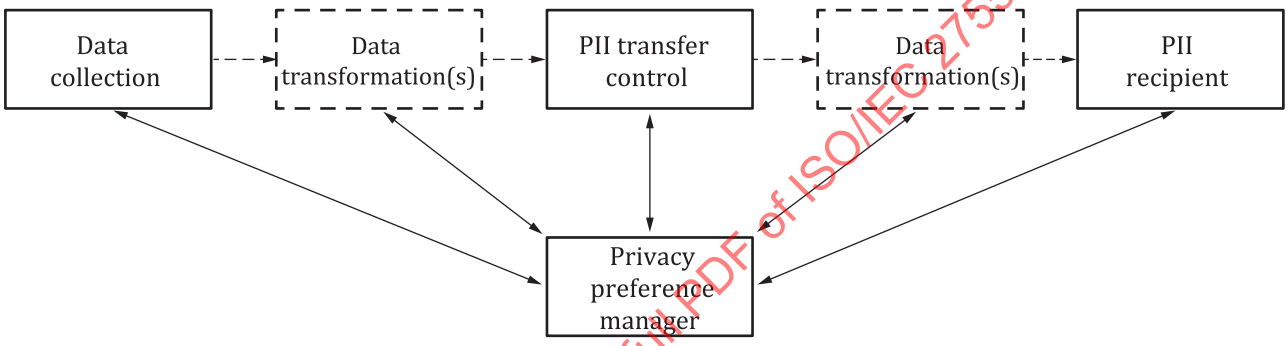

Figure 2 — Components in the user-centric PII handling framework

5.4.2 Data collection

The data collection component collects PII from data sources. Data sources are individuals, devices, databases, or systems that provide information including PII for data processing.

5.4.3 Data transformation(s)

The data transformation component provides an optional process. A typical example of a transformation applied to data are de-identification and redaction. PII may be de-identified before or after PII transfer control according to a privacy preference.

NOTE 1 An additional category of preference is de-identification policies. ISO/IEC 20889 specifies terminology, a classification of de-identification techniques according to their characteristics, and their applicability for reducing the risk of re-identification. These techniques include suppression, generalization, and randomization techniques. Data sets can undergo redaction before or after transfer, which can reduce identifying attributes.

NOTE 2 ISO/IEC 27038 specifies the redaction of digital documents.

NOTE 3 ISO/IEC 23264-1 specifies properties of cryptographic mechanisms to redact authentic data (i.e. data with associated attestations).

5.4.4 PII transfer control

The PII transfer control component handles PII transfer from data source(s) to PII recipient(s). The PII transfer control component involves the use of control mechanisms to enforce privacy preferences.

NOTE 1 ISO/IEC 27701 can be used as guidance on controls that can be used by PII controllers and PII processors.

NOTE 2 PII transfer is allowed only into controlled and authorized processors' systems.

5.4.5 PII recipient

The PII recipient component receives PII and executes operations according to the PII principal's privacy preferences.

5.4.6 Privacy preference manager

The privacy preference manager (PPM) component includes the following sub-components, as shown in Figure 3.

— Consent information administration: this sub-component is optional. It provides an interface for storing, updating and accessing consent information, and securely maintains the stored consent information (providing confidentiality, integrity and availability). A receipt of consent can be provided to PII principals based on the stored consent information. The consent information administration sub-component may also provide a mechanism for obtaining the consent of the PII principal.

— Privacy preference administration: this sub-component securely collects privacy preference information and provides a mechanism for input, modification and deletion of privacy preferences related to actions performed on a service provider. Privacy preferences should be configured so that all choices are disabled by default and it should be able to be updated or modified by the PII principals at any time. Annex C provides examples on the configuration of privacy preferences.

— Control rule generation: this sub-component provides data flow control rules to the PII transfer control component. Data flow control rules are generated according to consent information and privacy preferences chosen by PII principals. The rules are used for access control to PII by the PII transfer control component.

— Transparency administration: this sub-component provides for logging and log inspection; the logging involves logging PII transfer receipts and the associated transfer times. The log inspection allows each PII principal to check the logs, where appropriate, using the log inspection.

NOTE 1 The PPM, itself being operated by a data controller or processor, can maintain records of processing.

NOTE 2 This subcomponent can also include mechanisms for collecting, holding, and displaying consent and data use receipts.

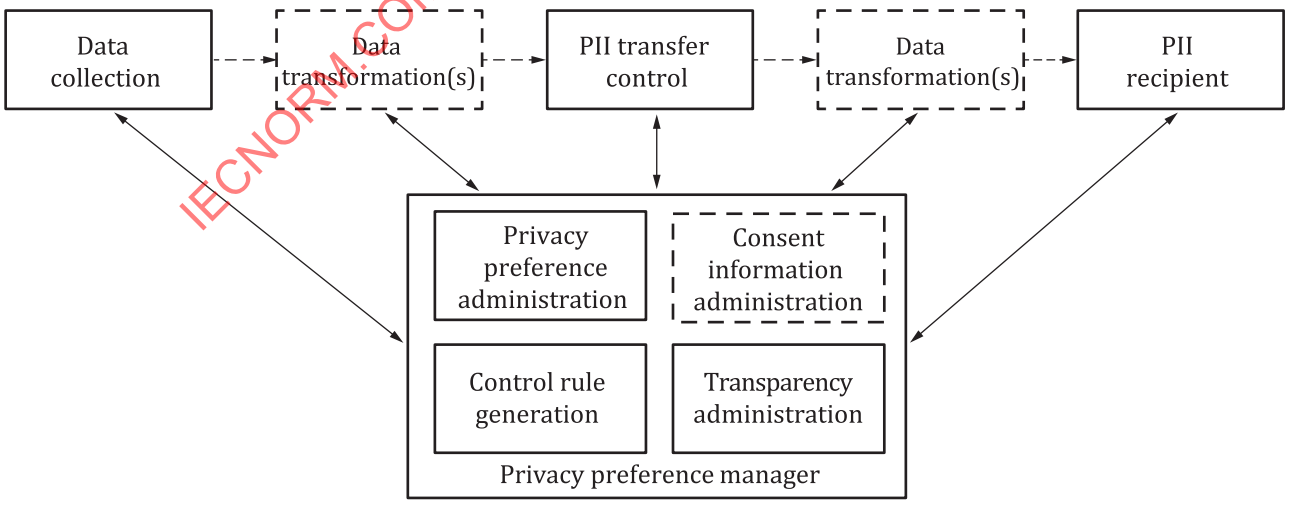

Figure 3 — Structure of the privacy preference manager

5.5 Relationship between actors and components

Figure 4 illustrates the relationships between the actors and the components:

— the PII principal interacts with the PPM;

— the privacy preference administrator operates the PPM;

— the PII controllers and PII processors handle PII.

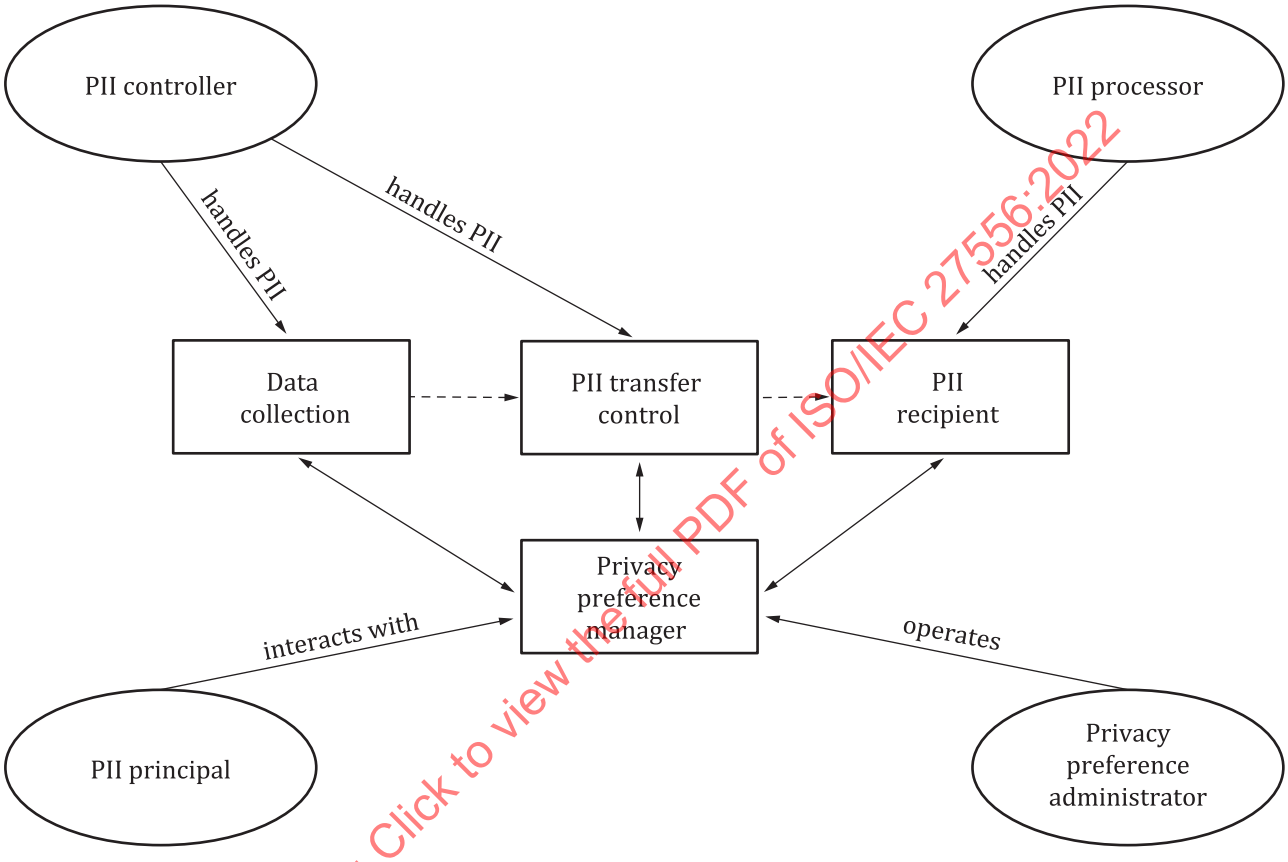

Figure 4 — Relationships between the actors and the components

Figure 5 shows an example of a PII controller managing a platform involving the distribution of PII:

— the PII controller provides a privacy notice to PII principals;

— the PII principal provides consent information and privacy preferences to the PPM;

— the privacy preference administrators may provide a privacy notice to PII principals;

— the privacy preference administrators define data flow control rules and distribute them to PII controllers;

— the PII controllers handle PII in data collection and PII recipient components, and PII processors handle PII in the PII recipient component;

— the PII processors receive PII via the platform managed by a PII controller;

— the PII controller/processor processes PII;

— the PII controller/processor can issue a receipt for the collection or use of the PII.

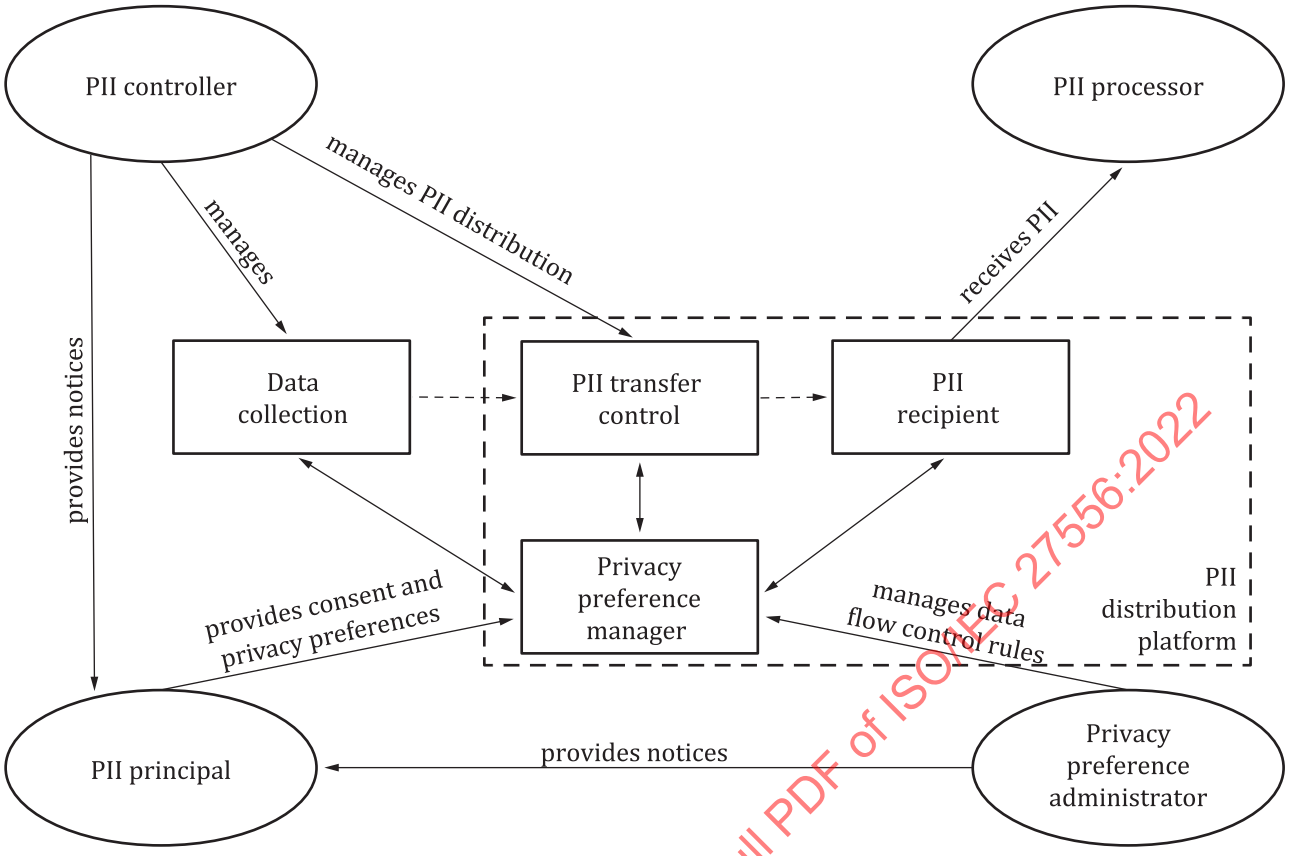

Figure 5 — Example of a platform involving the distribution of PII

The roles of actors in use-cases are introduced in Annex B.

6 Requirements and recommendations for the privacy preference manager

6.1 Overview

The PPM acts as a proxy system for PII principals. It is a useful function for user-centric PII handling based on privacy preferences. In order to realize data flow control based on consent information and privacy preferences, a PPM managing them should be implemented in the system, and a mechanism, for example a user interface, allowing PII principals to input their consent information and privacy preferences should be provided as a part of the component. The PPM shall be designed and operated according to the following requirements and recommendations.

6.2 Privacy impact assessment

A privacy impact assessment (PIA) shall be carried out on the platform (see Figure 5 and 5.5).

NOTE An example of a PIA is described in ISO/IEC 29134.

6.3 Functional recommendations

The PPM should meet the following functional recommendations.

a) Protection of privacy preferences and, where present, consent information: Data protection should be considered, including any risks identified through the privacy impact assessment. Regulatory requirements can be applicable. For example, all privacy preferences and consent information in the PPM should be securely collected, including use of encryption at rest and in transit.

b) Access control: The PPM should be operated with proper access controls. All PII principals and administrators of the PPM should be identified and authenticated, and all their operations should be performed under proper access control policies.

c) Interaction with PII principals: They should be periodically reminded that privacy preferences can be updated, to reflect their current preferences for handling PII.

d) Logging: Operations on the PPM should be recorded in a log including creator, date, type of information, type of operation, and operators.

6.4 Requirements for life cycle management of privacy preferences

Privacy preferences shall be managed according to the following requirements.

a) Generation: Privacy preferences shall be collected, stored and applied to PII handling in a timely manner, once PII principals define them.

b) Update: The privacy preferences shall be collected, stored and applied to PII handling in a timely manner, once they are updated. They can be manually updated by the PPA or automatically updated, whenever the PII principal modifies them. The PPM records the revision history of privacy preferences.

c) Removal: Privacy preferences of a PII principal shall be removed from the PPM in accordance with a principled deletion process (e.g. see ISO/IEC 27555), when the PII principal terminates use of the PPM.

d) Retention: Privacy preferences of a PII principal shall have a retention period after which they are automatically deleted or removed from the PPM (e.g. see ISO/IEC 27555).

7 Further considerations for the PPM in a privacy information management system

When the PPM is used in the context of a privacy information management system (PIMS) for processing PII concerning multiple PII principals, the principles of ISO/IEC 29100 are followed:

— consent and choice;

— purpose legitimacy and specification;

— collection limitation;

— data minimization;

— use, retention and disclosure limitation;

— accuracy and quality;

— openness, transparency and access;

— accountability;

— information security;

— privacy compliance.

To this end, the following properties may be of interest:

— confidentiality of privacy preference data;

— integrity of privacy preference data;

— availability of privacy preference data;

— unlinkability of privacy preference data;

— transparency of privacy preference management;

— intervenability of privacy preference management.

Proportionality of privacy preference management efforts should be balanced against the potential privacy implications of the product and service functionality.

Annex D provides examples of PPM capabilities that help meet these properties.

Annex A
(informative)

Use cases of PII handling based on privacy preferences

A.1 Internet-of-Things use case with multiple service providers

This Internet-of-Things (IoT) use case is described in Recommendation ITU-T X.1363[12].

Figure A.1 shows a technical framework in which an IoT service platform that is composed of multiple service providers uses the user preferences stored in privacy preference manager (PPM).

In this case, the common user preferences for any services are stored in a PPM that is accessible through a privacy preference management portal. Specific preferences for each service are stored in another PPM managed by each data service provider. When a user starts to subscribe to a service, data service provider's PPM retrieves common user preferences with the PPM on the privacy preference management portal. The components in the service, such as IoT devices, data storage, and application/service, control the PII based on the preferences in the PPM.

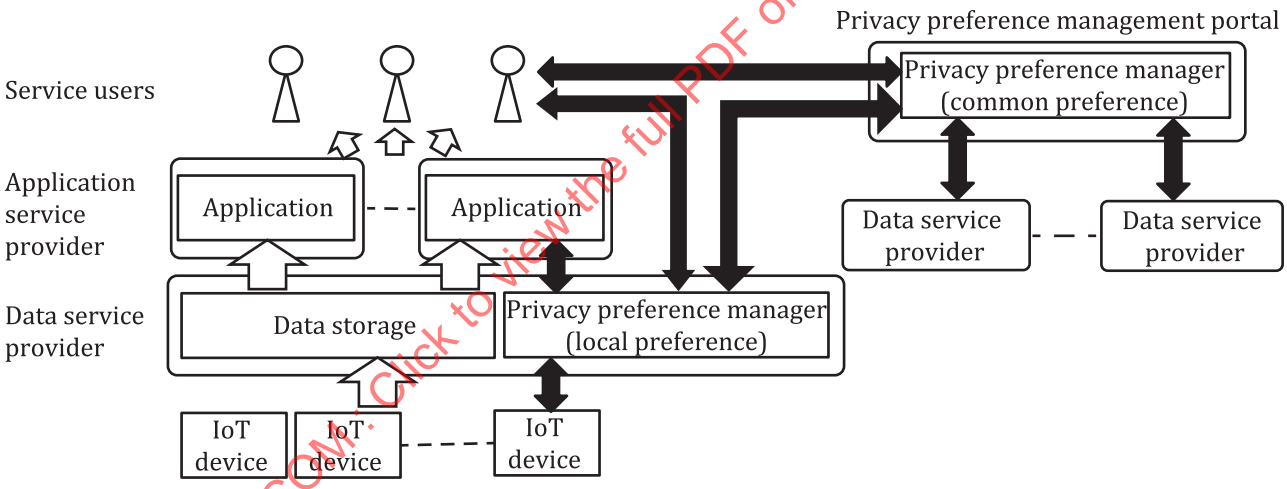

Figure A.1 — Technical framework for handling PII on IoT services by multiple providers with a common privacy preference

A.2 Handling of electronic healthcare records

The electronic health record (EHR) is a set of digital data and documents originated from the interaction of the patients with the healthcare system and generated by present and past clinical events, relating to the patient.

Patients have full control over their data (i.e. patient privacy centric). They have the freedom and rights to decide clinical events, documents and specific data that should be accessed only by concerned/specific health professionals who are directly related with the treatment of the concerned patient. Patients can also decide which data are accessible to other health professionals (e.g. general practitioners, paediatricians, pharmacists, doctors, physicians).

The health professionals who care for the patient can access the clinical data archived in the EHR, except for those data that are subject to obscuration. Health professionals are not expected to be aware of the fact that the patient has obscured such data (i.e. ignorance of data obscuration by patients).

The PPM should be installed to the healthcare system in order to user-centric EHRs handling as Figure A.2.

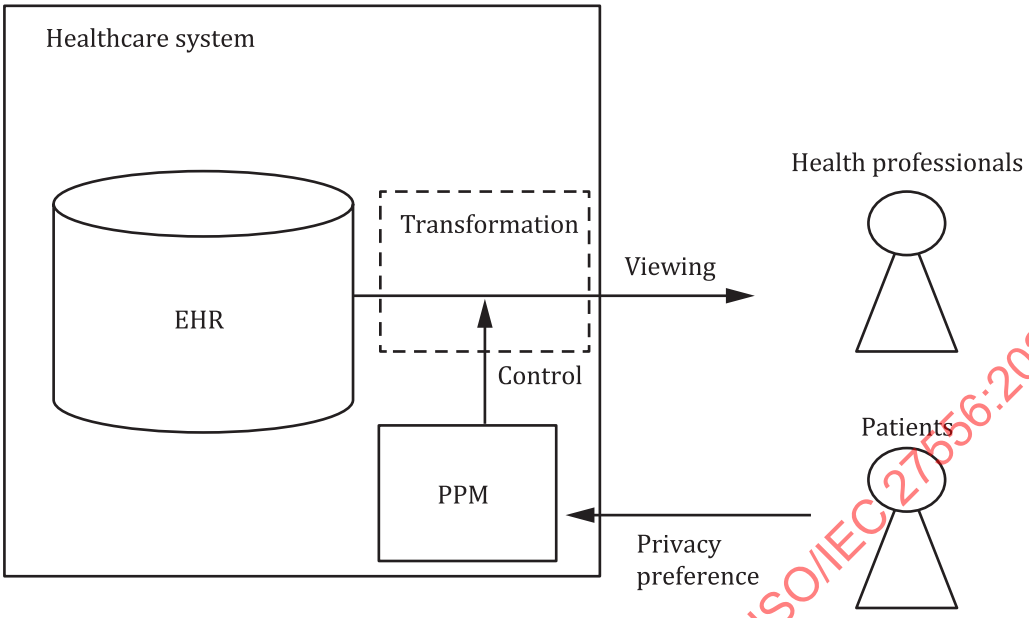

Figure A.2 — Handling of EHR

A.3 Handling of financial data

The financial data sharing platform based on PPM, MyData service, is designed to share financial data of PII principals from different organizations. This is a new, innovative financial business model that offers integrated management of financial data such as banking transactions or credit card records.

For example, the credit rating company receives the financial data as a data receiver to provide a credit rating of a PII principal. The PPM should be installed to the MyData sharing platform to meet a user-centric financial data handling[13].

The purpose of the MyData service is to empower PII principals with the means for improving their right to self-determination regarding their financial data. The objective of the MyData service is to provide innovative, data-driven financial services and bring new benefits to consumers' financial portfolios, including credit and asset management, spending as well as savings.

Figure A.3 describes the concept of a financial data sharing platform of financial data according to PPM configured by the PII principals:

— PII principals provide consent information and configure their privacy preferences in the PPM;

— PII processors receive financial data via the platform;

— the shared data are processed in the data recipient as a PII processor;

— the PII controller/processor provides the custom service, such as the credit rating service of the PII principals.

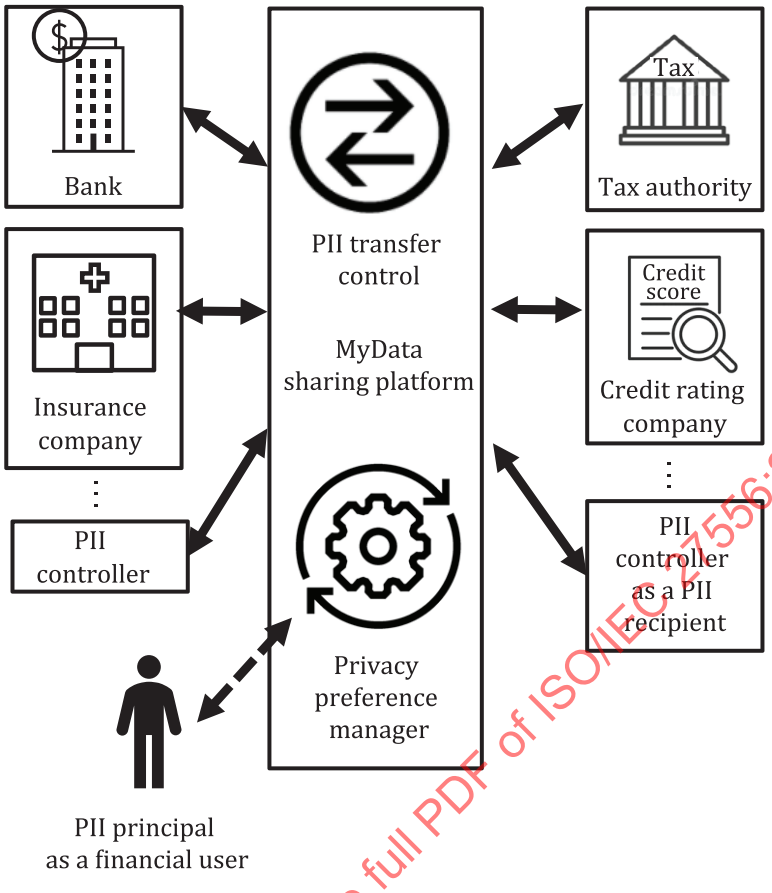

Figure A.3 — Handling of financial data

Annex B
(informative)

Identifying an actor serving as a component for each example service

Table B.1 explains roles between actors and components in some use-cases.

Table B.1 — Roles between actors and components

Example services	Data collection	Privacy preference manager	PII transfer Control	PII recipient	Data transformation(s)	References
Internet of Things (IoT)	IoT devices	Privacy preference management portal	Data service provider	Application service provider /data service provider	Data service provider	A.1
EHR	Health professional	Healthcare system	Healthcare system	Health professionals/ healthcare system	Healthcare system	A.2
Financial data (MyData)	PII principal	MyData	MyData	Service provider	MyData	A.3

Annex C
(informative)

Guidance on configuration of privacy preferences management

C.1 Principles for user interfaces

Annex C provides guidance on the configuration of privacy preferences including design criteria of user interfaces.

User interfaces should be configured to ensure the following:

— ease of access for PII principals;

EXAMPLE The first screen of a personalized web-based service includes a link to the privacy preference user interface.

— comprehensive and clear interface design;

EXAMPLE Example criteria of user interface design are provided in C.2.

— identifiable by each PII principal;

EXAMPLE The PPM provides information about user account of accessing the PII principal on the interface.

— common formats are followed.

EXAMPLE The PPM can provide consent record information following a common format.

C.2 Example criteria of user interface design

Example criteria of the user interface design include:

— The PPM provides an interface through which the PII principal configures common privacy preferences for all PII handling cases. The common privacy preference is used as initial settings of individual privacy preferences for each PII handling case.

— The PPM provides an interface through which the PII principal customizes individual privacy preferences for each PII handling case.

— PII handling cases are categorized into groups and sub-groups. The PPM provide an interface through which PII principal configures individual privacy preferences for each group and each sub-group, in order to reduce PII principal's burden of the configuration for all PII handling cases.

— Differences between common privacy preferences and PII handling cases (use of PII) are indicated on the interface for configuring individual privacy preferences. This information is helpful to configure each individual privacy preference.

— All interfaces are designed as clear and plain descriptions in order to avoid misunderstanding or misconfiguration of privacy preference settings.

C.3 Privacy preference configuration

Table C.1 shows an example scenario for the configuration of privacy preferences. It assumes two capabilities:

— the presentation of privacy preference options, and

— the provision, modification and removal of privacy preference parameters.

Table C.1 — Example of privacy preference scenario

Agents in scenario	User (PII principal), client, e.g. a smart phone, and server, e.g. a cloud server.
Objective of scenario	User requests a function to the server, using the client. This function may involve the use of different PII (attributes or identifying attributes) by the server.
Scenario for privacy preference configuration	Action 1: Client requests a function to the server. Action 2: Server determines the PII attributes that are needed to allow the function to be performed. Server provides the user with information about the PII controller's policies, procedures and practices with respect to the processing of PII. Action 3: Server indicates to the client which attributes are needed to allow the function to be performed, the location where these attributes may be obtained as well as other conditions, if they exist, that may apply to the transfer of these attributes to third parties. Client displays that information to the user. Action 4: Client indicates to the user which attributes are needed to allow the function to be performed and other conditions that may apply to the transfer of these attributes to third parties. Action 5: User indicates to the client whether the client accepts or denies the provision of these attributes to server. If case of acceptance, the client determines from which locations these attributes may be obtained and then fetches these attributes. Action 6: Client releases these attributes to the server. Action 7: Server receives these attributes and check whether they conform to its request and whether they are valid. If the server has indicated that the received attributes are transferred to a third party, it can inform the user by returning a message to the client ("third party receives privacy information").
Scenario for distributed configuration	User (PII principal) has already expressed preferences. User would like this to remembered so that the next time he/she can just confirm. If a cache of the previous preferences is maintained on a laptop or a smart phone, that cache should be synchronized with authoritative records maintained by PPM. Since these choices are PII, they should not be shared with any third party. As the copy in the cache is maintained by a third party, that copy is encrypted.