AnoMed

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Analysis of Data Protection Risks

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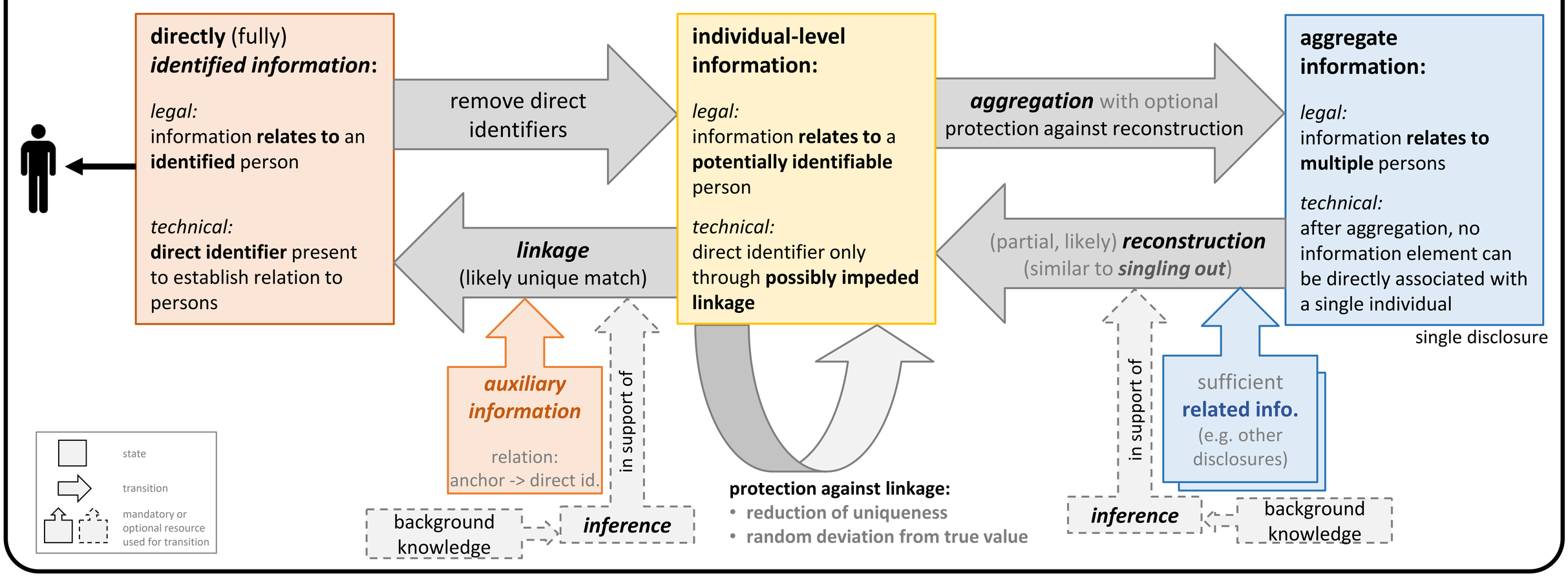
Terminology with Relations between Concepts: State-Transition-Diagram

I



Taxonomy of Possible Claims that Data are Anonymous

II

2: The data is aggregated, and thus direct or indirect identification are only possible after successful (possibly partial) reconstruction	**2.2:** *Fact:* Data **with mathematically guaranteed** reconstruction protection	2.2.2: *Claim*: The privacy budget is managed for both, **own and external disclosures**	
		2.2.1: *Fact*: The privacy budget is managed **for own disclosures,** ..	2.2.1.2: *Claim*: ..**no** significant number of **external disclosures exists**
			2.2.1.1: Claim: ..**no** significant number of **external disclosures** are **accessible** to attackers
	2.1: *Fact:* Data **without mathematically guaranteed** reconstruction protection	2.1.3: *Claim*: Reconstruction is assumed to be impossible based on current **state of the art**, ..	2.1.3.2: *Claim*: Known attacks fail as **verified with own data**
			2.1.3.1: *Claim*: Known attacks fail **based on assumptions** about state of the art
		2.1.2: *Claim*: Reconstruction is assumed to be impossible based on **assumptions about additional disclosures**, ..	2.1.2.2: *Claim*: ..Significant additional disclosures **don't exist**
			2.1.2.1: *Claim*: **..addl. disclosures exist but are not accessible** by potential attackers
		2.1.1: *Claim*: Reconstruction is assumed to be impossible based on **assumptions about potential attackers**:	2.1.1.2: *Claim:* Attackers **lack capability** (skill, resources, ..)
			2.1.1.1: *Claim:* Attackers **lack motivation** (cost/benefit)
1: The **data does not contain direct identifiers** and has been **protected against linkage**	(i) *Facts:* protection of **quasi-identifiers**	1.3: *Claim:* Linkage impossible since **data** provides **no unambiguous link anchors** (any unique combination of attributes; arbitrary auxiliary information) !inference!	1.3.2: *Claim:* **No unique records** contained **in data** (all attributes treated as quasi-identifiers: classes of equal values or clusters of close values) !inference!
			1.3.1: *Claim:* **Modification of** potential **anchors** renders **matches uncertain** and **deniable** (noise, swapping, ..)
		1.2: *Claim:* Linkage impossible based on **assumptions about suitable auxiliary information** !inference!	1.2.2: *Claim:* Suitable auxiliary information **does not exist**
			1.2.1: *Claim:* Suitable auxiliary information exists but is **not accessible to potential attackers**
	(ii) *Facts:* protection of **other attributes:**	1.1: *Claim:* Linkage not possible based on **assumptions about potential attackers**	1.1.2: *Claim:* Attackers **lack capability** (resources, skill)
			1.1.1: *Claim:* Attackers **lack motivation** (cost benefit)

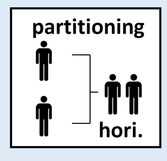
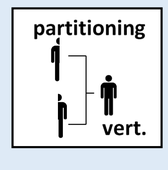
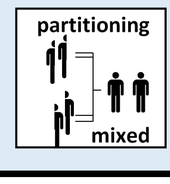
Use Cases for EHDS: required level of identification

III

Relation to GDPR	GDPR terminology	*Type of Data*	Necessary Data Transformation	Effort/Difficulty	*Identification*
Personal data (inside GDPR)		**Directly identified**	none	none	100%
	Pseudonymous data	**Reversibly pseudonymous**	**Separate** & protect direct identifiers	Medium (TOMs to control identification)	Certain but controlled
		Irreversibly pseudonymous	**Remove** direct identifiers	Minimal (fewer TOMs)	Can happen unintentionally
		Aggregated pseudonymous	**Aggregate values** over several persons	Minimal	Requires intentional re-identification
Outside of GDPR	Anonymous data	**Truly anonymous**	Successfully **anonymize**	**Substantial**	Very unlikely
	--	**No data**	**Delete**	Minimal	Impossible

Use Cases for EHDS: partitioning of data

IV

type of partitioning	definition	example	visualization
none	data comes from a **single source**	A single source provides a data set of person's height. The analysis computes and average height.	
horizontal	**Multiple data sources** provide the **same attributes** about **different persons**	A multitude of sources provide data sets of height of persons living in their geographic area of operation. The analysis computes the overall average height over the combined geographic area.	
vertical	**Multiple data sources** provide **different attributes** about the **same persons**	To compute the average Body Mass Index (BMI), two data sources must be combined: one providing height data of a given population; the other providing weight data of the same population.	
mixed	**Multiple data sources** provide **different attributes** about **different persons**	An analysis requires to logically combine data sources both, vertically and horizontally.	

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