



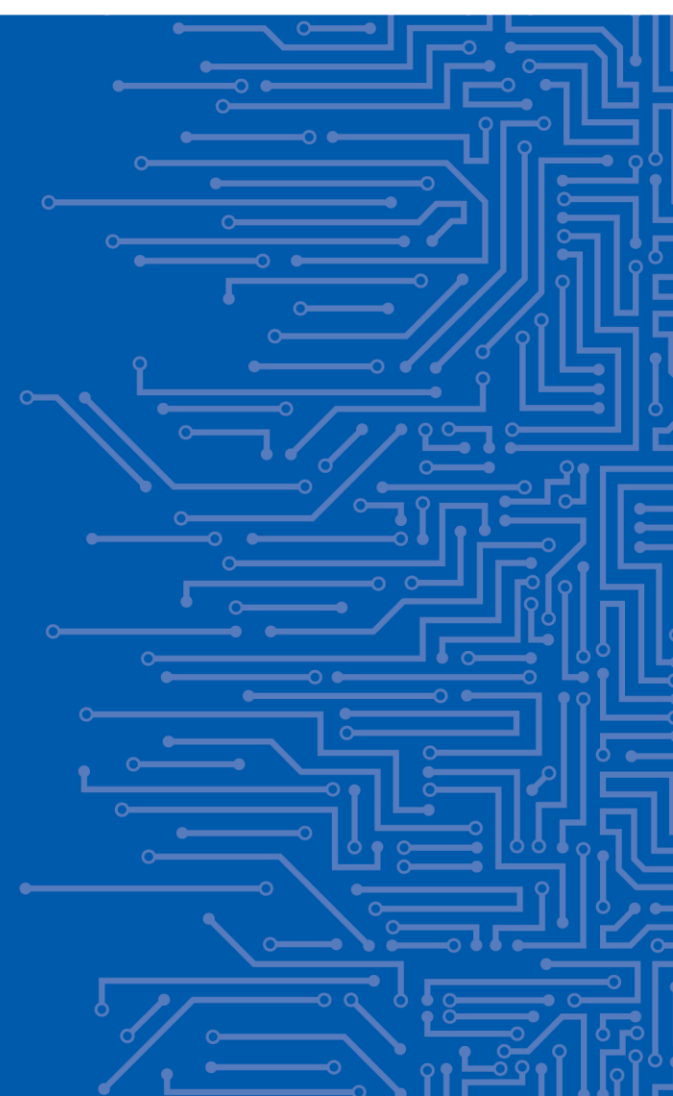
EUROPEAN UNION AGENCY
FOR CYBERSECURITY

ON OVERVIEW OF EXISTING PSEUDONYMISATION TECHNIQUES

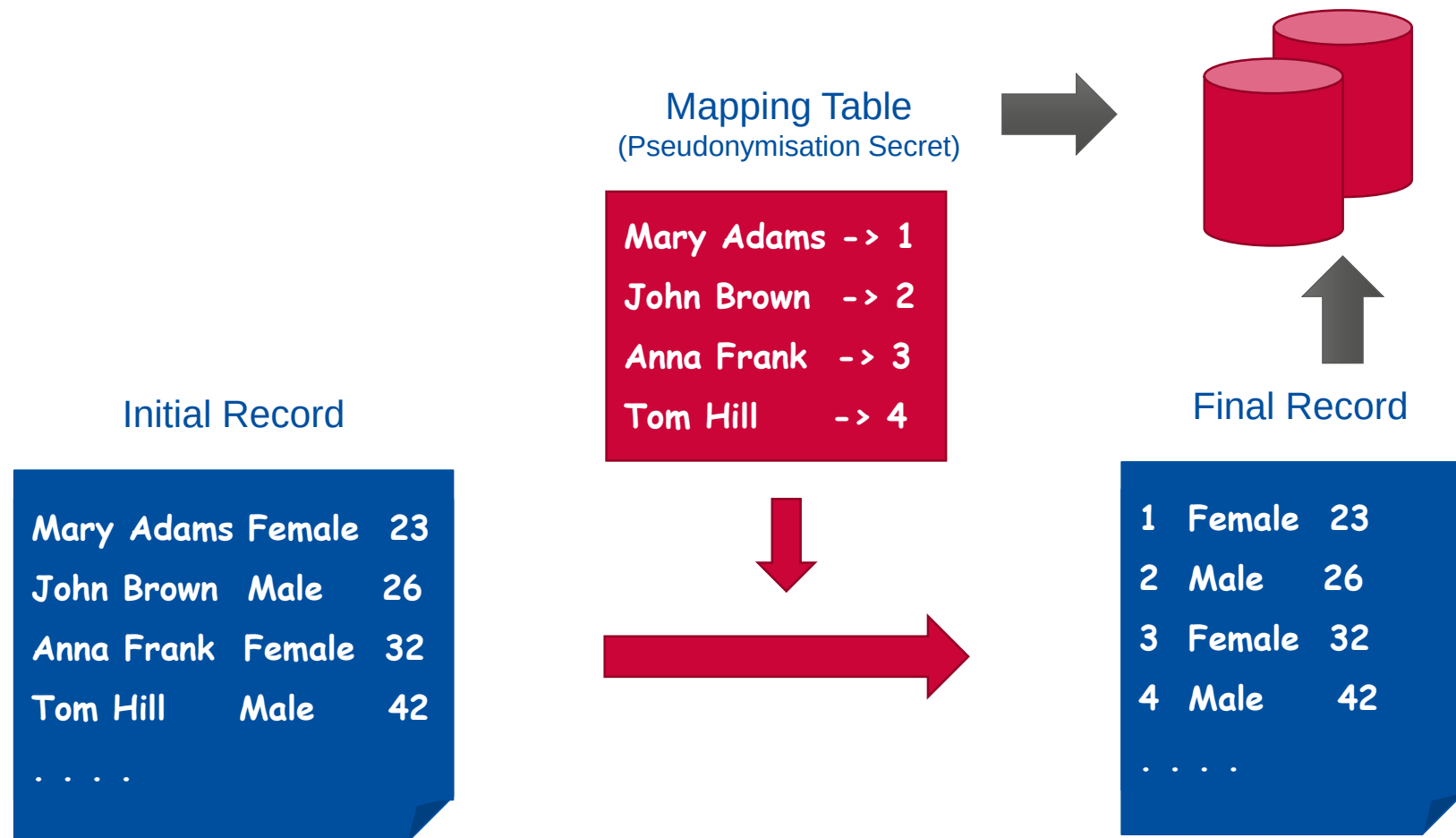
Dr. Prokopios DROGKARIS
Cybersecurity Expert | ENISA

IPEN webinar 2021

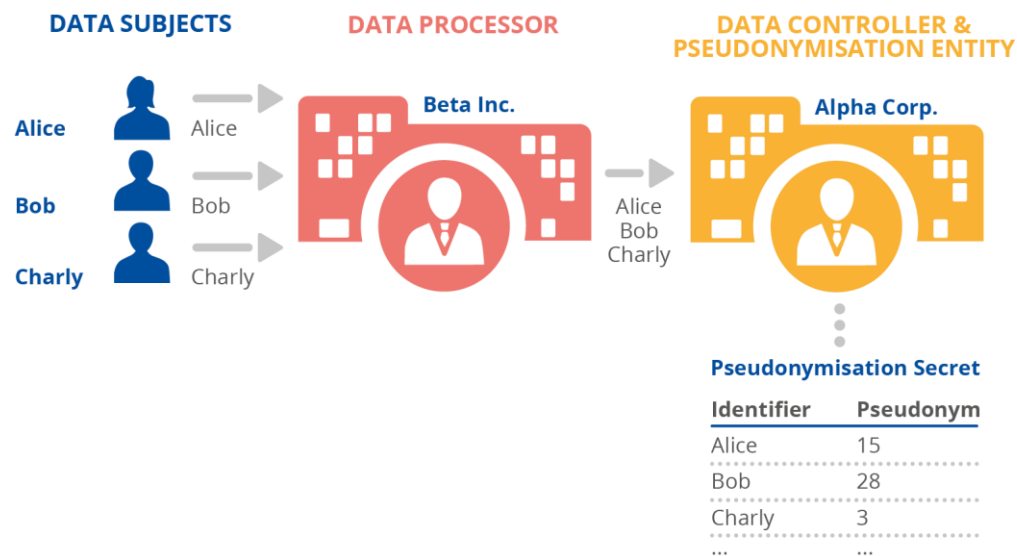
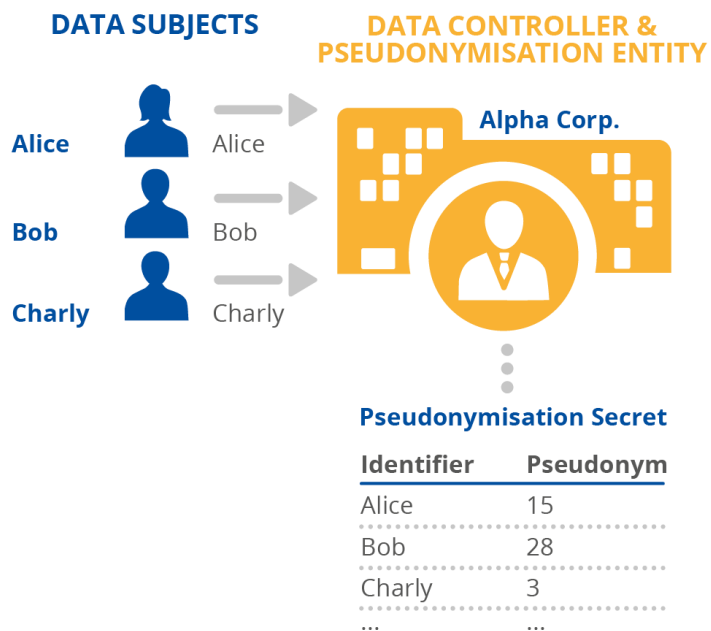
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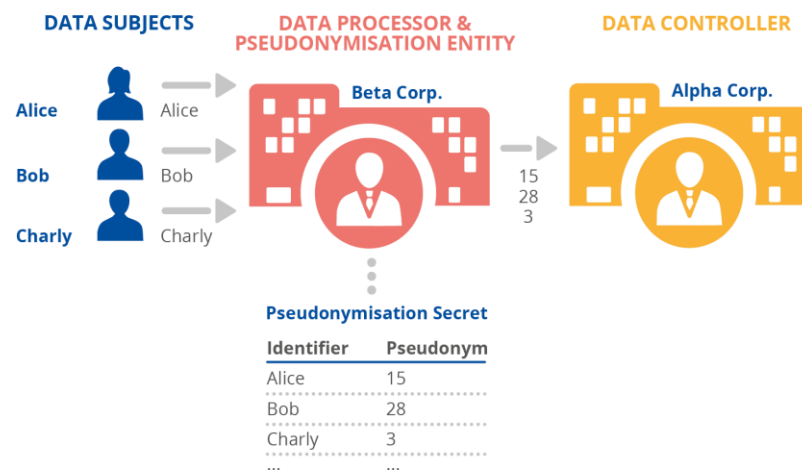
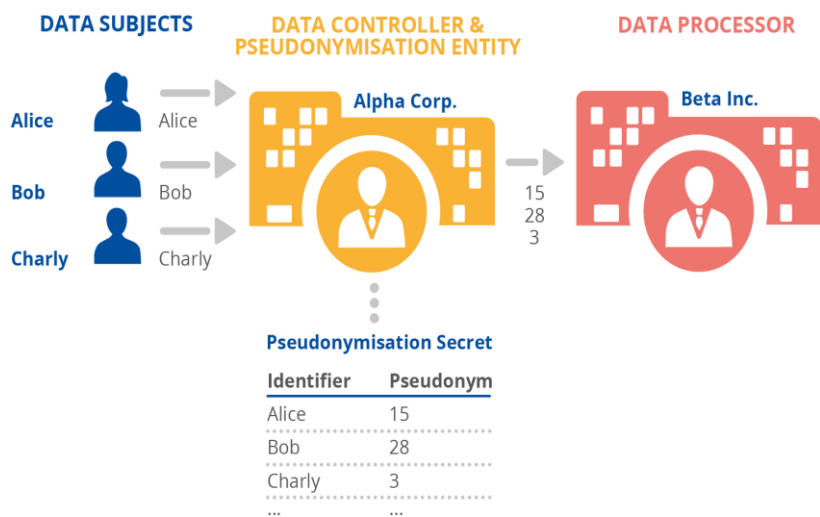
(BASIC) PSEUDONYMISATION



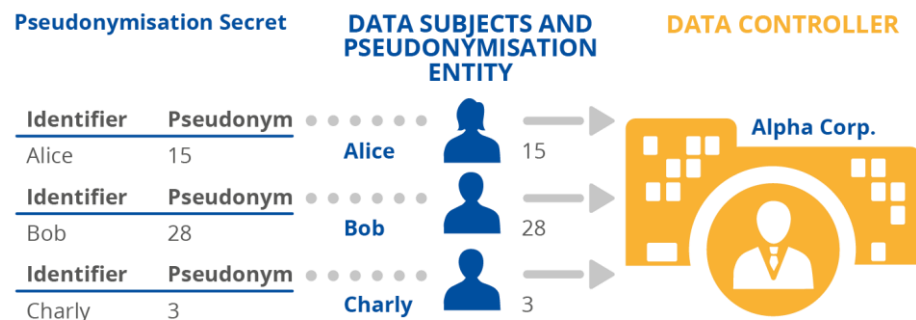
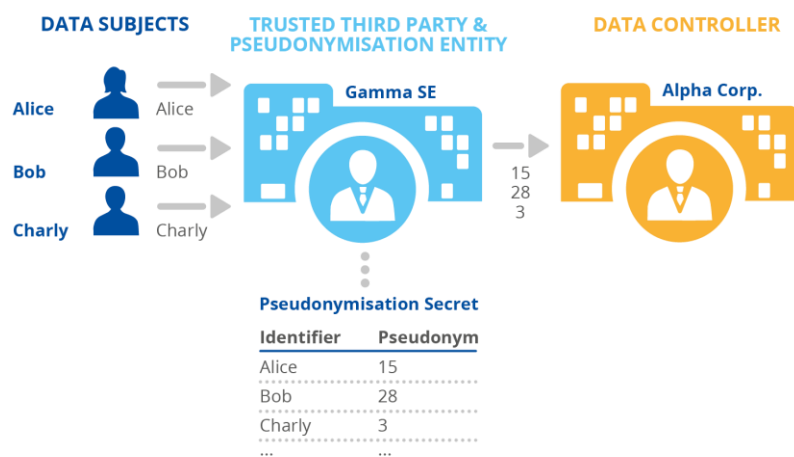
PSEUDONYMISATION SCENARIOS 1/3



PSEUDONYMISATION SCENARIOS 2/3

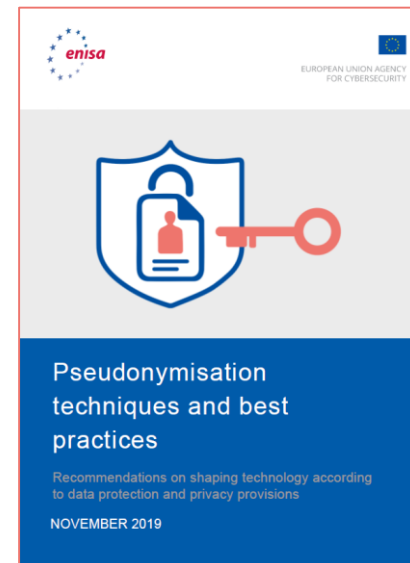


PSEUDONYMISATION SCENARIOS 3/3



(SOME) PSEUDONYMISATION TECHNIQUES

- Counter
- Random Number Generator (RNG)
- Cryptographic hash function (!)
- MAC - HMAC
- Symmetric encryption
- Advanced techniques
 - Asymmetric encryption
 - Ring signatures and group pseudonyms
 - Pseudonyms based on multiple identifiers or attributes
 - Pseudonyms with proof of ownership



COUNTER & RANDOM NUMBER GENERATOR (RNG)

E-mail address	Pseudonym (Random number generator)	Pseudonym (counter generator)
alice@abc.eu	328@abc.eu	10@abc.eu
bob@wxyz.com	105@wxyz.com	11@wxyz.com
eve@abc.eu	209@abc.eu	12@abc.eu
john@qed.edu	83@qed.edu	13@qed.edu
alice@wxyz.com	512@wxyz.com	14@wxyz.com
mary@clm.eu	289@clm.eu	15@clm.eu

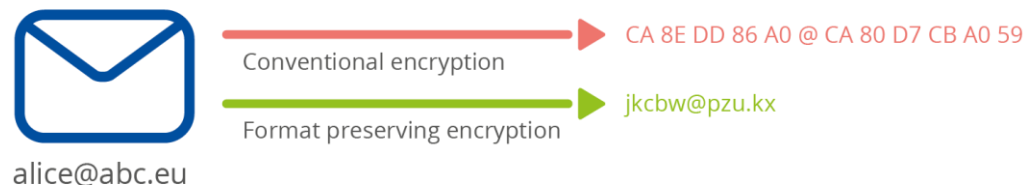
E-mail address	Pseudonym (RNG) retaining the info on identical domains	Pseudonym (RNG) retaining also the info on identical country/extension
alice@abc.eu	328@1051	328@1051.3
bob@wxyz.com	105@833	105@833.7
eve@abc.eu	209@1051	209@1051.3
john@qed.edu	83@420	83@420.8
alice@wxyz.com	512@833	512@833.7
mary@clm.eu	289@2105	289@2105.3

HASH FUNCTIONS & (SYMMETRIC) ENCRYPTION PSEUDONYMISATION

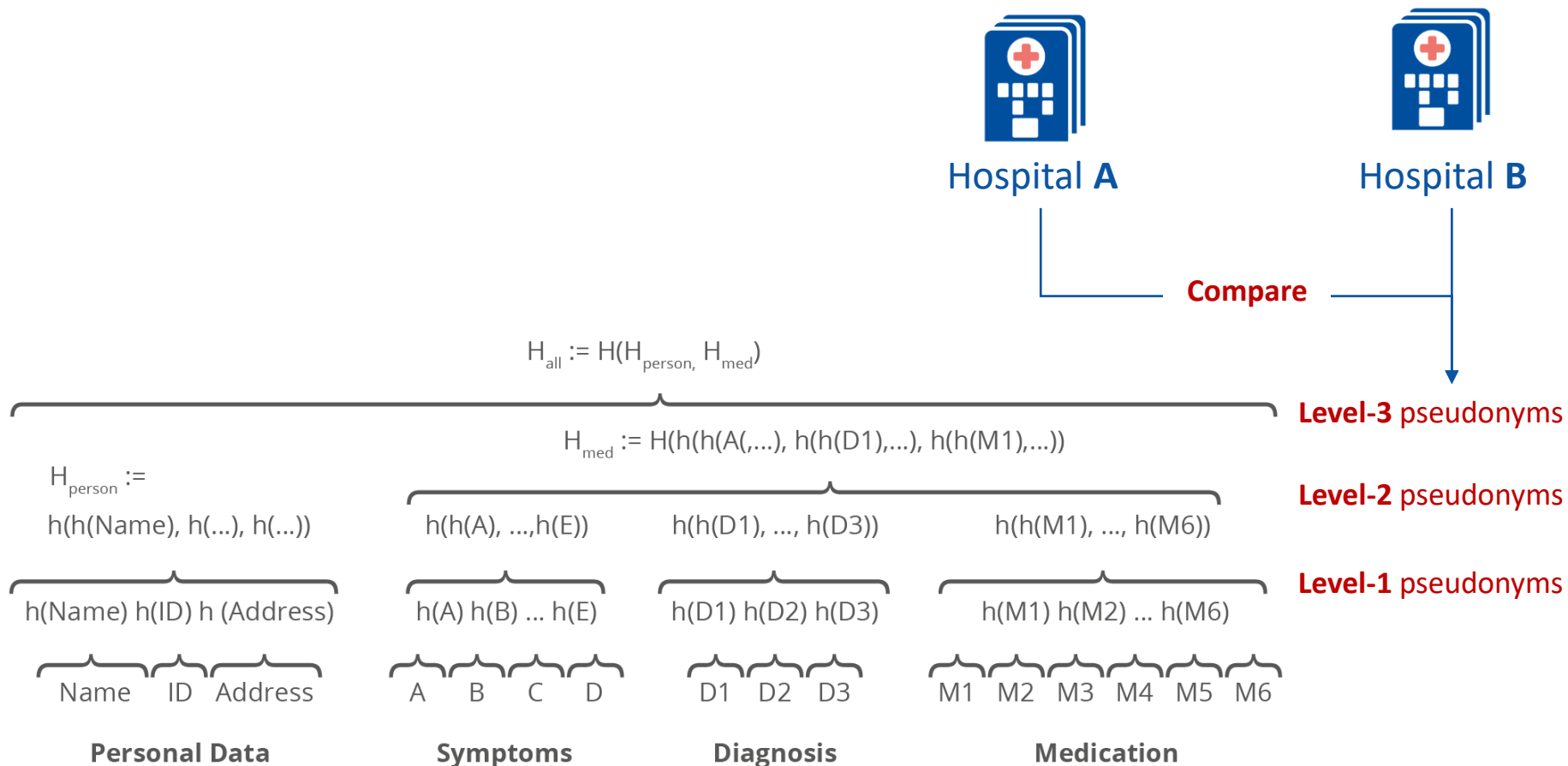
Hash Value Pseudonyms



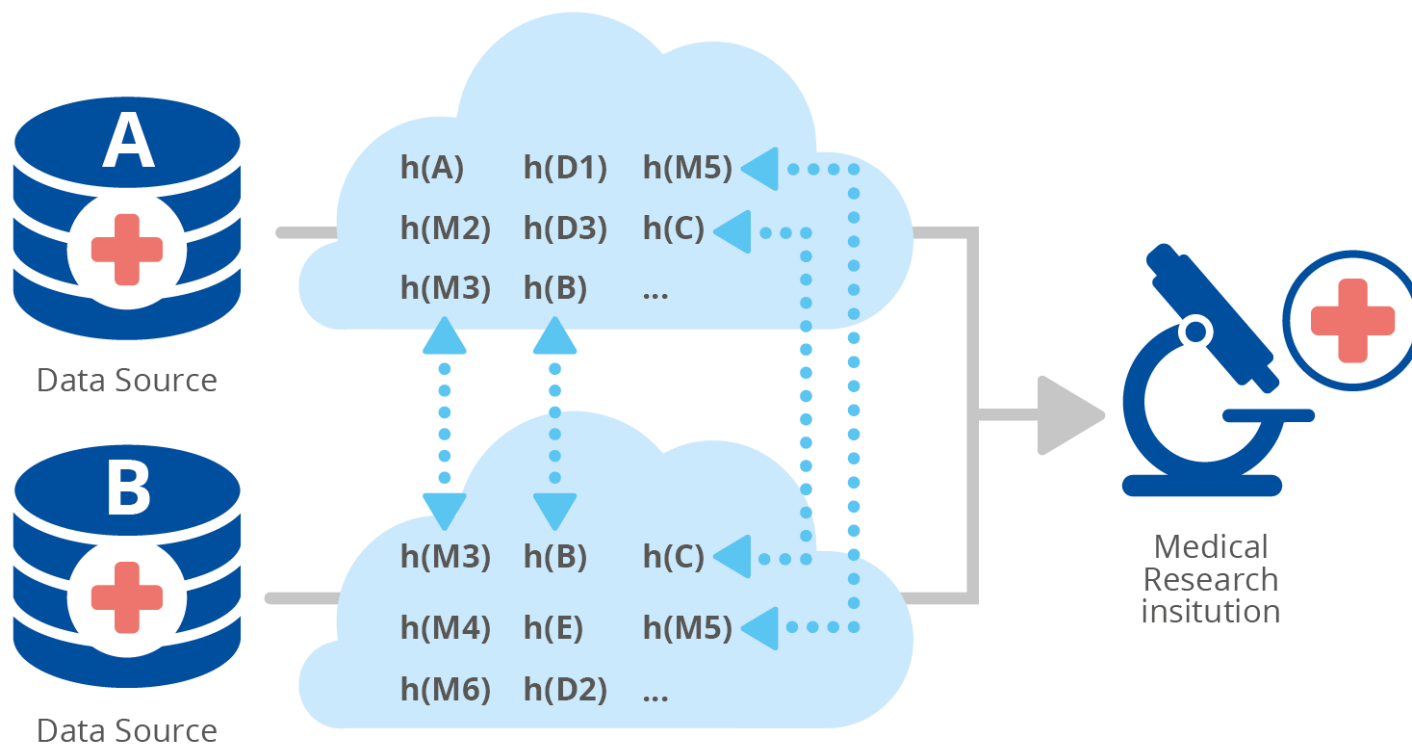
Conventional vs. Format Preserving Encryption Pseudonyms



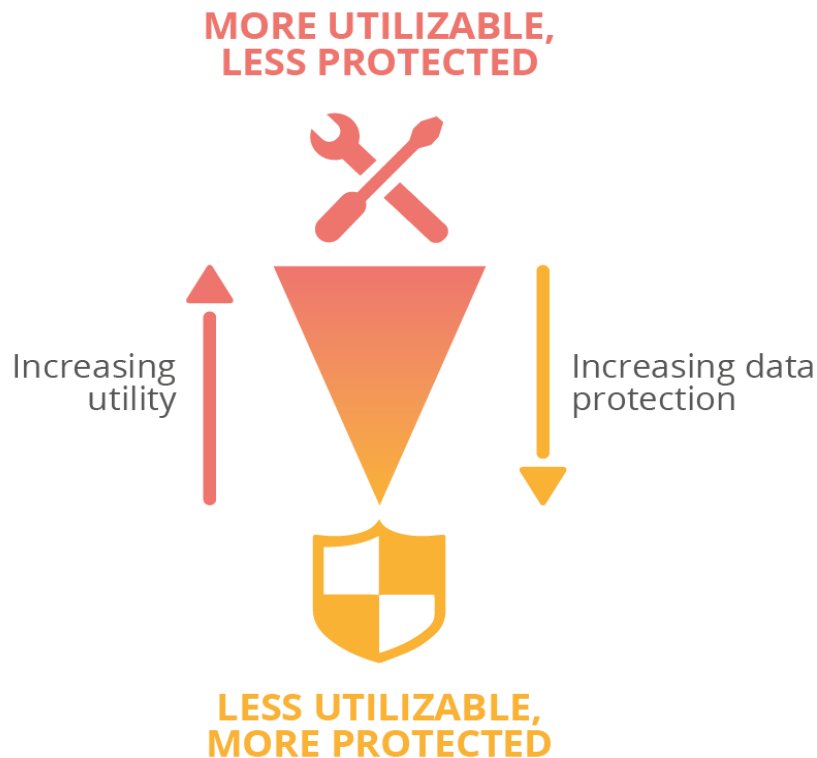
TREE-BASED PSEUDONYMISATION



TREE-BASED PSEUDONYMISATION



UTILITY AND DATA PROTECTION



- No “one size fits all” solution
- Each pseudonym carries the **risk of being subject to a re-identification attack**
- Pseudonymisation should be performed following **a risk based approach**
- Clear definition of the personal data **processing operation**
- Selecting **what and how to pseudonymise**

THANK YOU FOR YOUR ATTENTION

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