



# Privacy Enhancing Technology: Key Points to Know

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# Agenda

1. What are PETs?
2. Key PETs to Know.
3. How can PETs Help?
4. PETs In Practice.
5. Risk of PETs.
6. PET Resources.



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# What are PETs?

“A broad set of tools and methods aimed at providing ways to build products and functionality while protecting the privacy of users’ data.”

Federal Trade Commission  
Guidance (Feb. 1, 2024)

“Any software or hardware solution, technical process, technique, or other technological means of mitigating privacy risks arising from data processing, including by enhancing predictability, manageability, disassociability, storage, security, and confidentiality.”

Executive Order 14110 on  
*Safe, Secure, and Trustworthy  
Development and Use of  
Artificial Intelligence* (Oct. 30,  
2023).

“Privacy control, consisting of information and communication technology (ICT) measures, products, or services that protect privacy by eliminating or reducing personally identifiable information (PII) or by preventing unnecessary and/or undesired processing of PII, all without losing the functionality of the ICT system.”

ISO/IEC 29100:2024 *Information  
technology — Security  
techniques — Privacy framework*

# Familiar PETs

**End-to-End  
Encryption**

**Virtual Private  
Networks  
(VPNs)**

**Privacy-  
Focused  
Browsers and  
Search  
Engines**

**Two-Factor  
Authentication  
(2FA)**

**Anonymization**

**Secure File  
Storage and  
Sharing**

**Ad Blockers  
and Anti-  
Tracking Tools**

**Secure  
Messaging  
Services**



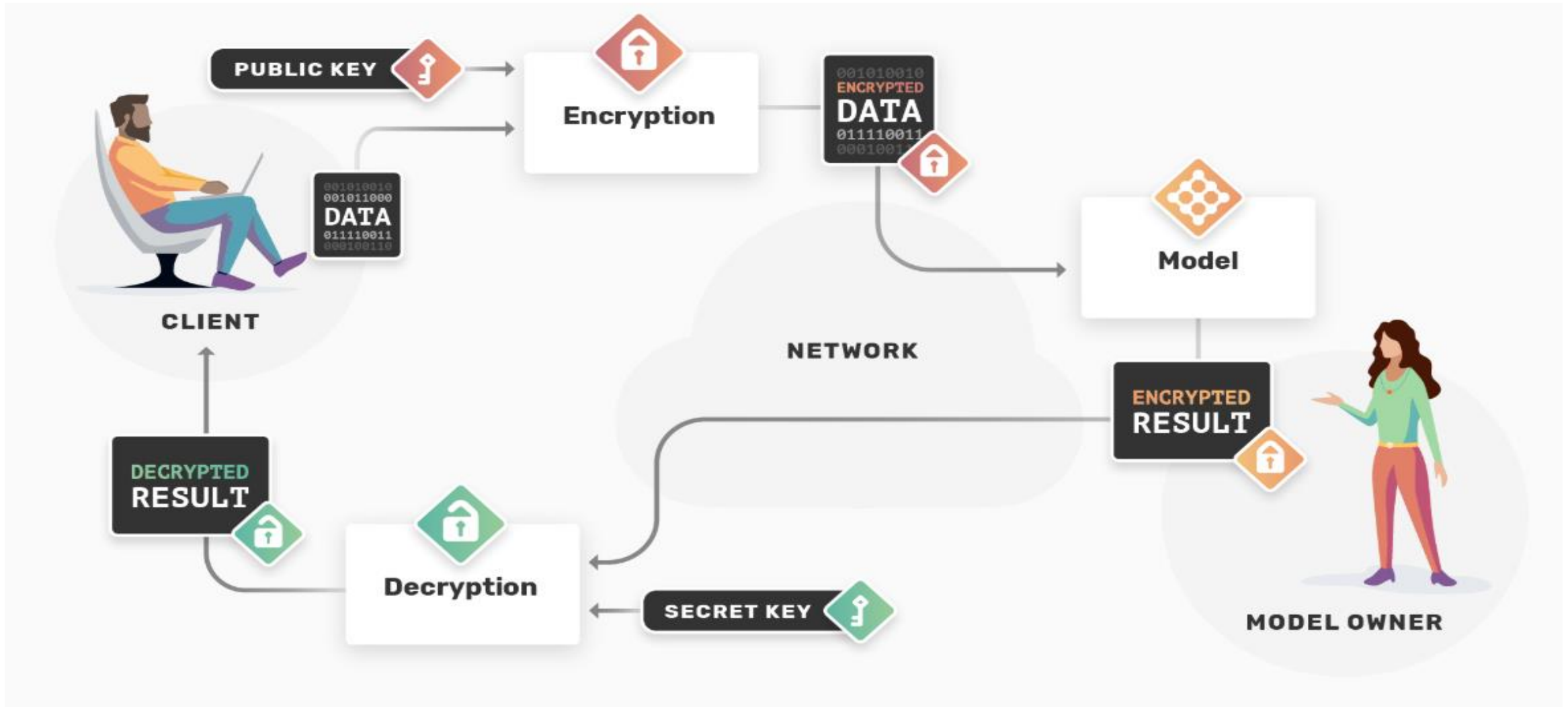
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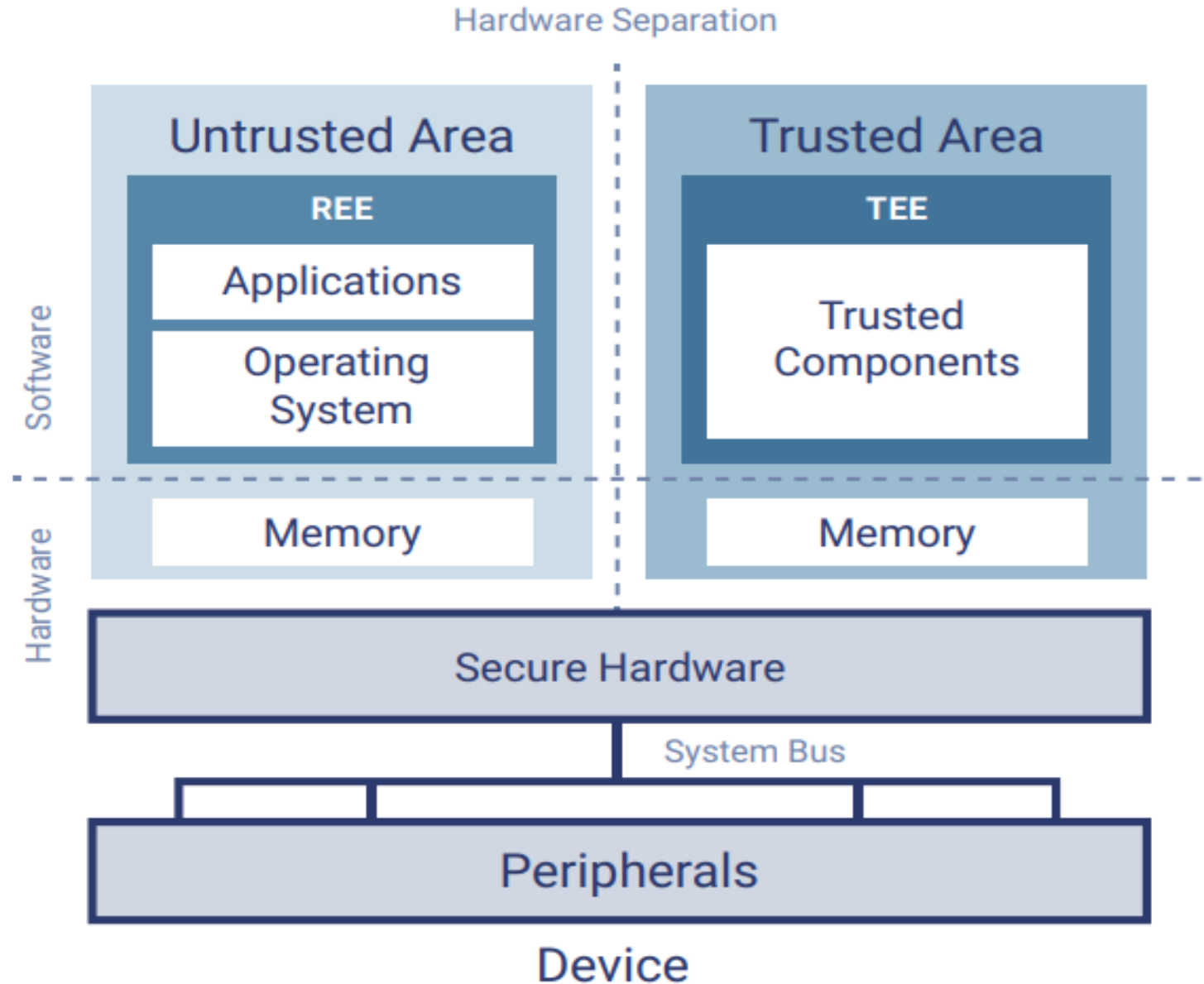
# Taxonomy of PETs

Types of PETs	Key Technologies
Data obfuscation tools	<ul style="list-style-type: none"><li>• Anonymization / Pseudonymization</li><li>• Synthetic data</li><li>• Zero-knowledge proofs</li><li>• Differential Privacy</li></ul>
Data processing tools	<ul style="list-style-type: none"><li>• Secure multi-party computation</li><li>• Homomorphic encryption</li></ul>
Federated and distributed analytics	<ul style="list-style-type: none"><li>• Distributed analytics</li><li>• Federated learning</li></ul>
Data accountability tools	<ul style="list-style-type: none"><li>• Accountable systems</li><li>• Personal Information Management Systems</li></ul>

# Homomorphic Encryption

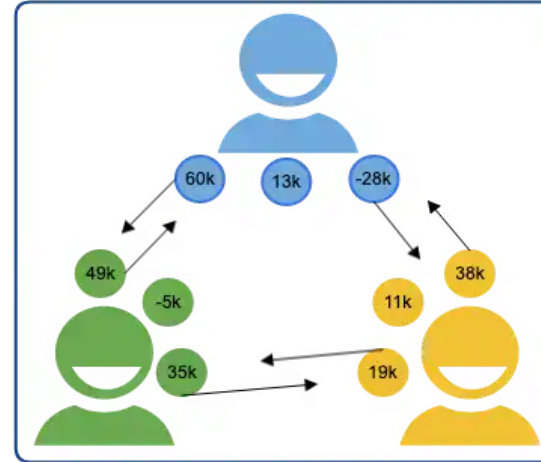


# Trusted Execution Environments



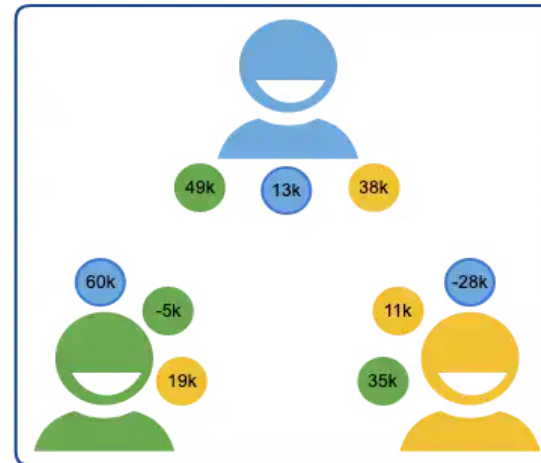
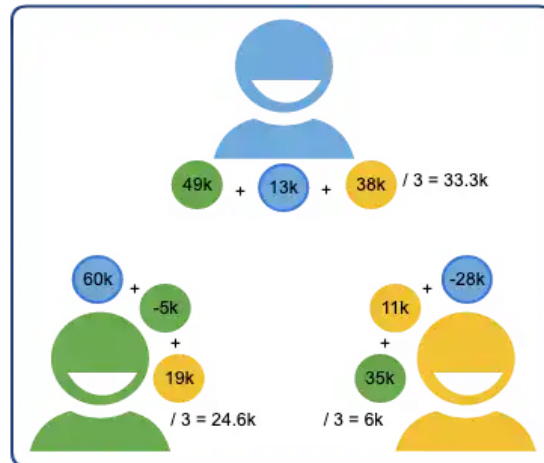
# Secure Multi-party Computation

1. Consider three individuals. The three want to find the average of their salaries without knowing any one salary.



2. Each splits their salary into three shares, which sums up to the value of their salary.

4. Each calculates the average of their shares and reveals their result. The sum of sums will be the same as averaging directly.

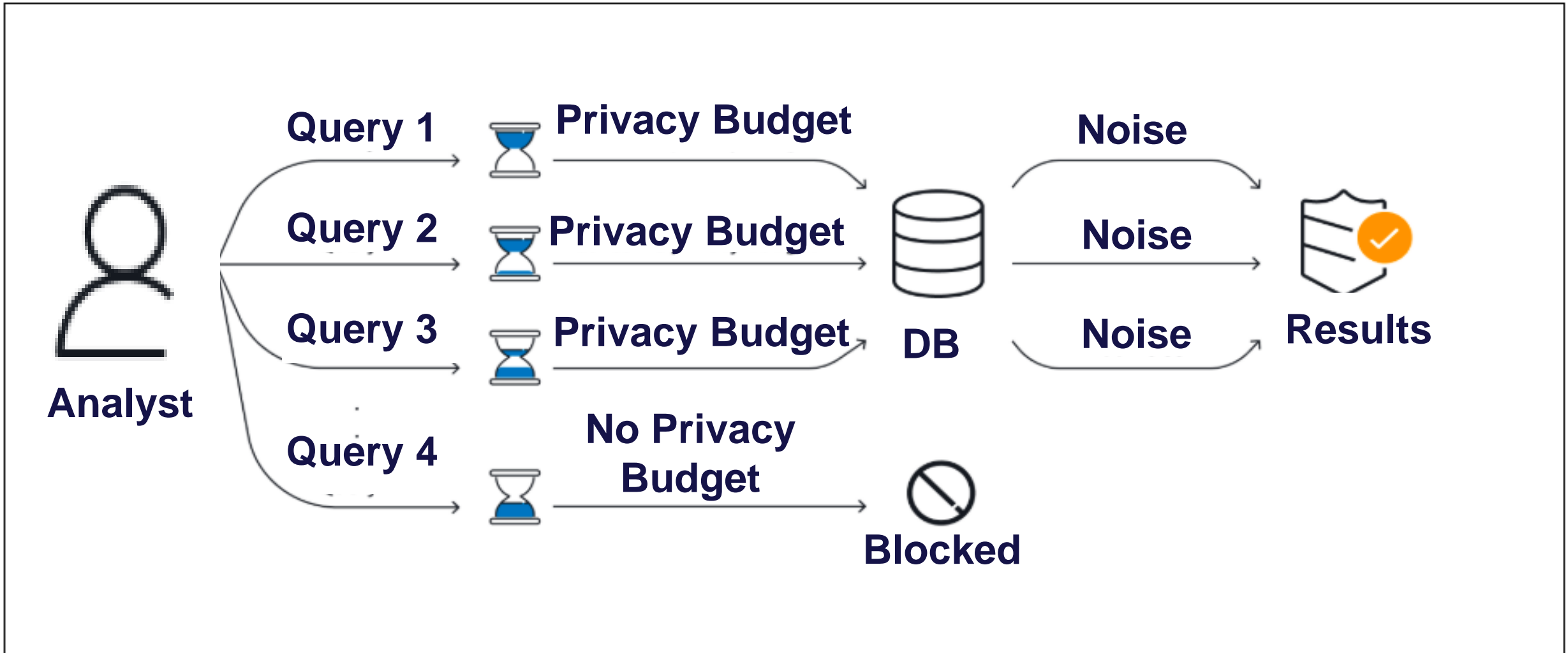


3. Shares are exchanged between individuals.

# Zero-Knowledge Proofs



# Differential Privacy





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# PETs and Compliance

PETs may help to comply with privacy laws (e.g., GDPR, CCPA, etc.), but use of one or more PETs does not ensure privacy or compliance.

Close factual analysis is still required for the data inputs, processing, and outputs.

PETs can help to demonstrate a  
*“data protection by design and by default”*  
approach to legal compliance by:

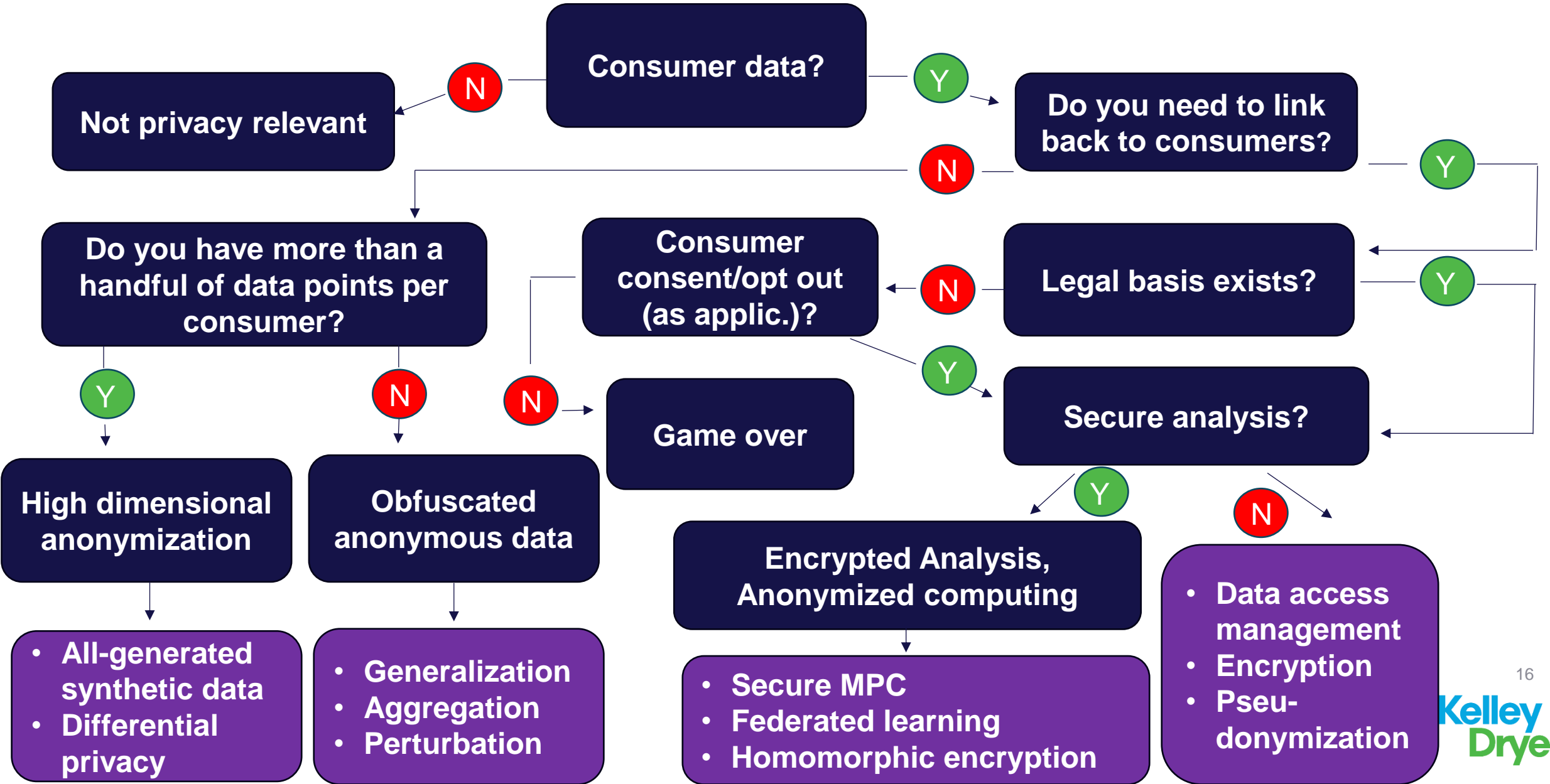
Complying with  
the principle of  
data minimization

Providing an  
appropriate level  
of data security

Implementing  
anonymization or  
pseudonymization  
solutions

Minimizing the  
risk that arises  
from personal  
data breaches

# When Might a PET be Helpful?





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# Analytics

**/LiveRamp**



**Uber**

LiveRamp data clean rooms provide different PETs for customers to meet privacy needs, such as TEEs, Differential Privacy, and Secure Multi-party Computation.

Sensitive Data Protection allows Google Cloud users to de-identify sensitive data inside and outside Google Cloud, including calculation of k-anonymity.

Uber employs differential privacy when analyzing its own rider and driver data to identify trends.

# Marketing and Advertising



Meta's Variance Reduction System (VRS), designed to ensure sensitive ads (e.g., for credit) are distributed equally to users across sensitive categories (e.g., race), rely on PETs, including differential privacy.



Publisher Advertiser Identity Reconciliation (PAIR) enables advertisers and publishers to match their first-party data for marketing using advanced cryptography.

## Use Case 3: Measurement



SKAdNetwork includes anonymization and aggregation PETs to allow marketers running ad campaigns on iOS-powered devices to generate insights into campaign attribution while preserving Apple's privacy commitments.



Meta's Private Lift allows advertisers to measure ad effectiveness through the use of Secure Multi-party computation and K-Anonymity, without the need for either party to see the other's datasets.

# Secure Data Sharing and Cross Border Transfers



Mastercard has developed a product based on homomorphic encryption for sharing financial crime intelligence across international borders while complying with applicable regulations.



The European Data Protection Board has recognized MPC systems as a supplementary technical measure for international personal data transfers from Europe to jurisdictions that do not offer an adequate level of data protection.



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# Risks of PETs Implementation

1. Lack of maturity
2. Lack of expertise to set up and use appropriately
3. Mistakes in implementation or maintenance
4. Public statements about PETs not supported by the technology
5. Lack of appropriate organizational measures
6. Regulatory uncertainty around using PETs for compliance



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# PETs Resources – From Regulators

- US: Federal Trade Commission, Blog Post: Keeping Your Privacy Enhancing Technology (PET) Promises, <https://www.ftc.gov/policy/advocacy-research/tech-at-ftc/2024/02/keeping-your-privacy-enhancing-technology-pet-promises>
- CANADA: OPC (2017), *Privacy Enhancing Technologies – A Review of Tools and Techniques*, Office of the Privacy Commissioner of Canada, Ottawa, [https://www.priv.gc.ca/en/opc-actions-and-decisions/research/explore-privacy-research/2017/pet\\_201711/](https://www.priv.gc.ca/en/opc-actions-and-decisions/research/explore-privacy-research/2017/pet_201711/).
- EUROPEAN DATA PROTECTION BOARD: *Guidelines 4/2019 on Article 25 Data Protection by Design and by Default*, [https://www.edpb.europa.eu/our-work-tools/our-documents/guidelines/guidelines-42019-article-25-data-protection-design-and\\_en](https://www.edpb.europa.eu/our-work-tools/our-documents/guidelines/guidelines-42019-article-25-data-protection-design-and_en).
- UK: Information Commissioner's Office (ICO), Privacy-enhancing technologies (PETs), <https://ico.org.uk/media/for-organisations/uk-gdpr-guidance-and-resources/data-sharing/privacy-enhancing-technologies-1-0.pdf>

# PETs Resources – From Governmental Organizations

- OECD, *Emerging privacy-enhancing technologies* (March 2023), [https://www.oecd.org/en/publications/emerging-privacy-enhancing-technologies\\_bf121be4-en.html](https://www.oecd.org/en/publications/emerging-privacy-enhancing-technologies_bf121be4-en.html)
- United Nations, *Guide on Privacy-Enhancing Technologies for Official Statistics* (2023), <https://unstats.un.org/bigdata/task-teams/privacy/guide/>

# PETs Resources – From Industry

- ISACA, *Exploring Practical Considerations and Applications for Privacy Enhancing Technologies* (May 2024), <https://www.isaca.org/resources/white-papers/2024/exploring-practical-considerations-and-applications-for-privacy-enhancing-technologies>
- Centre for Information Policy Leadership, *Understanding the Role of PETs and PPTs in the Digital Age*, <https://www.informationpolicycentre.com/uploads/5/7/1/0/57104281/cipl-understanding-pets-and-ppts-dec2023.pdf>
- Centre for Data Ethics and Innovation, *PETs Adoption Guide*, <https://cdeiuk.github.io/pets-adoption-guide/what-are-pets/>
- Deloitte Digital, *A Marketer's Guide to Privacy-Enhancing Technologies*, <https://www2.deloitte.com/us/en/pages/chief-marketing-officer/articles/a-marketers-guide-to-privacy-enhancing-technologies.html>
- IAB Tech Lab, *Addressability and PETs Standards*, <https://iabtechlab.com/standards/addressability-and-pets/>

# Questions?



New York  
Washington, DC  
Chicago  
Houston

Los Angeles  
San Diego  
New Jersey  
Stamford

