Privacy as Restrictions on Personal Information Flow

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A covered entity may disclose an individual's protected health information (phi) to law-enforcement officials for the purpose of identifying an individual if the individual made a statement admitting participating in a violent crime that the covered entity believes may have caused serious physical harm to the victim

- **Privacy is beyond simple data access control**
- **Privacy as Restrictions on Personal Information Flow**
  - Restricting direct flow (direct disclosure)
  - Temporal restrictions
  - Restrictions backed by complex semantics
    - Purpose

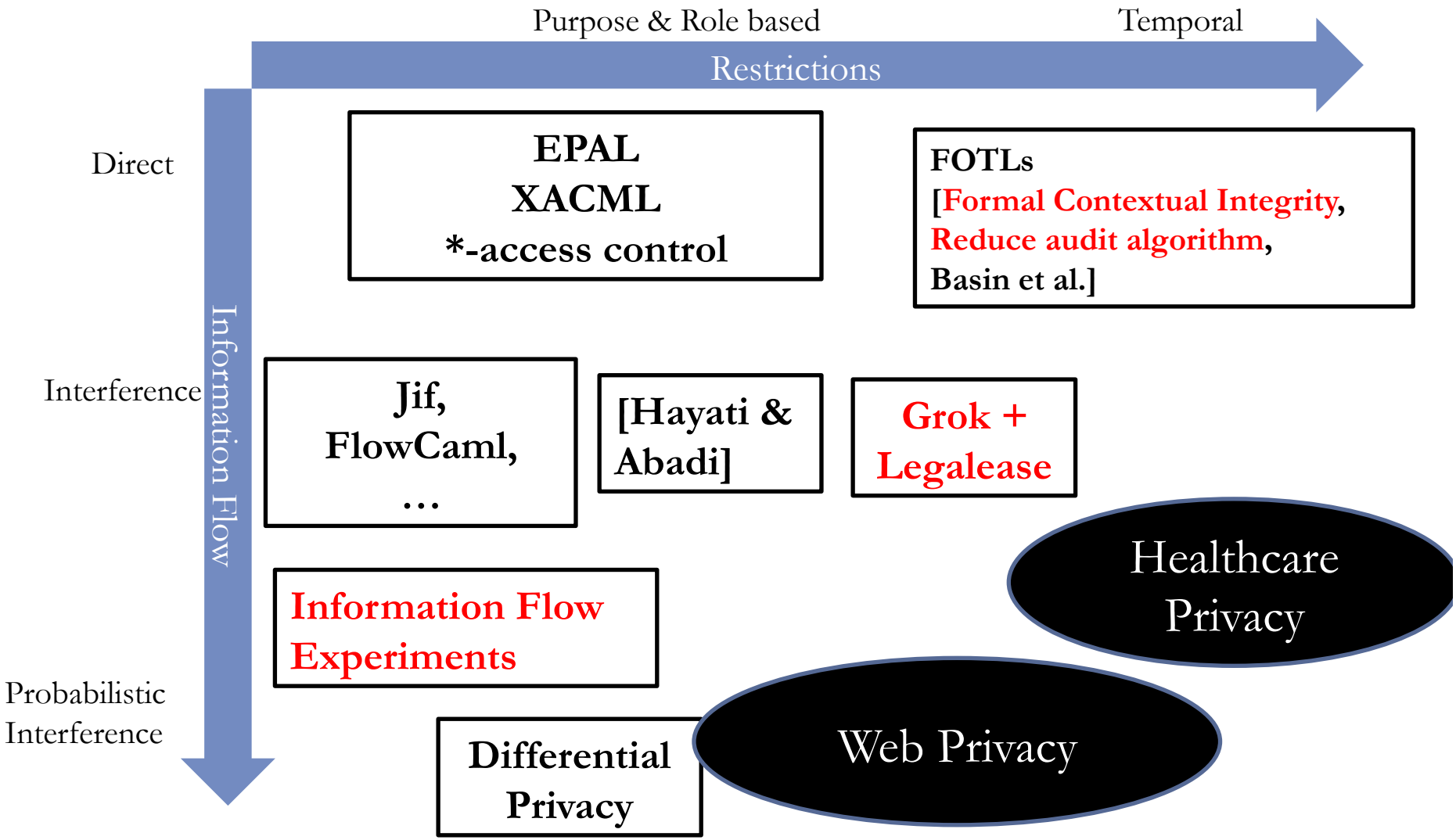
PrivacyLFP [WPES'10]

- **Metric First-order Temporal Logic (MFOTL)**
  - Precise
    - Temporal restrictions are encoded using temporal connectives
  - Expressive
    - **Encoded all of GLBA and HIPAA disclosure related clauses**
  - Usable?

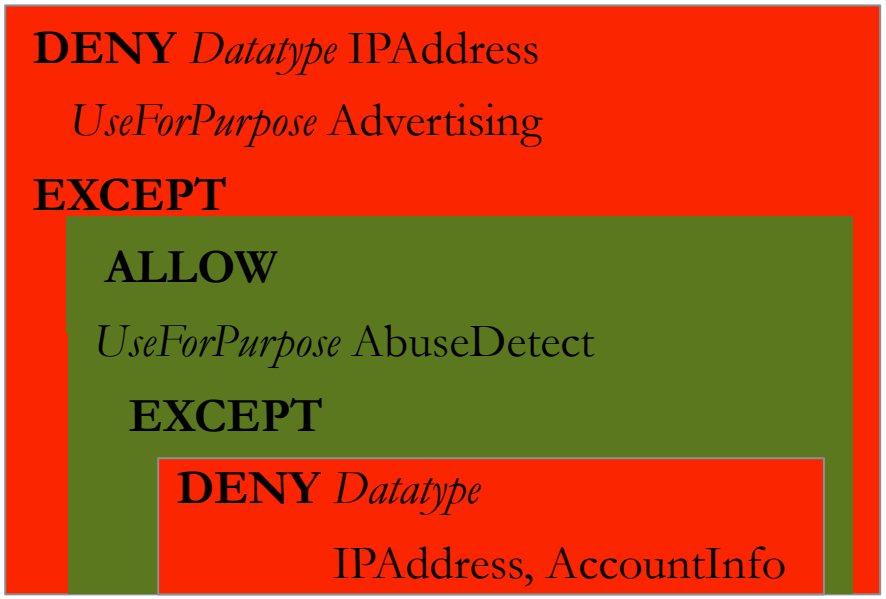
Challenges

- **Precision**
- **Expressiveness**
  - Semantics behind privacy policies is complex
  - Enforcement mechanisms need precise semantics
- **Usability**

Privacy as Restrictions on Personal Information Flow



Legalease: Example Policy [Oakland S&P 2014]



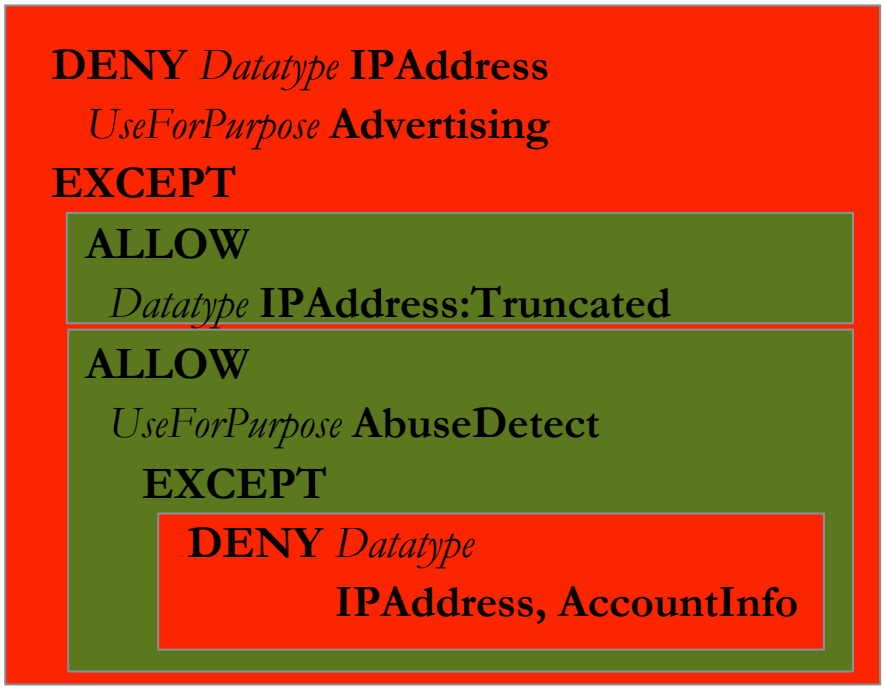
We will **not** use **full IP Address** for **Advertising**.

IP Address may be used for **detecting abuse**.

In such cases, it will not be combined with **account information.**

Encoded the entirety of Google's privacy policies and Bing's privacy

Designed for Usability



Exceptions

How legal texts are structured

One-to one correspondence

Local Reasoning

Each exception refines its immediate parent

Formally proven property

Independent of Code

Legalease

Usable. Expressive. Precise.	Usable by lawyers and privacy champs.	Expressive enough for real-world policies.	Precise semantics for local reasoning.

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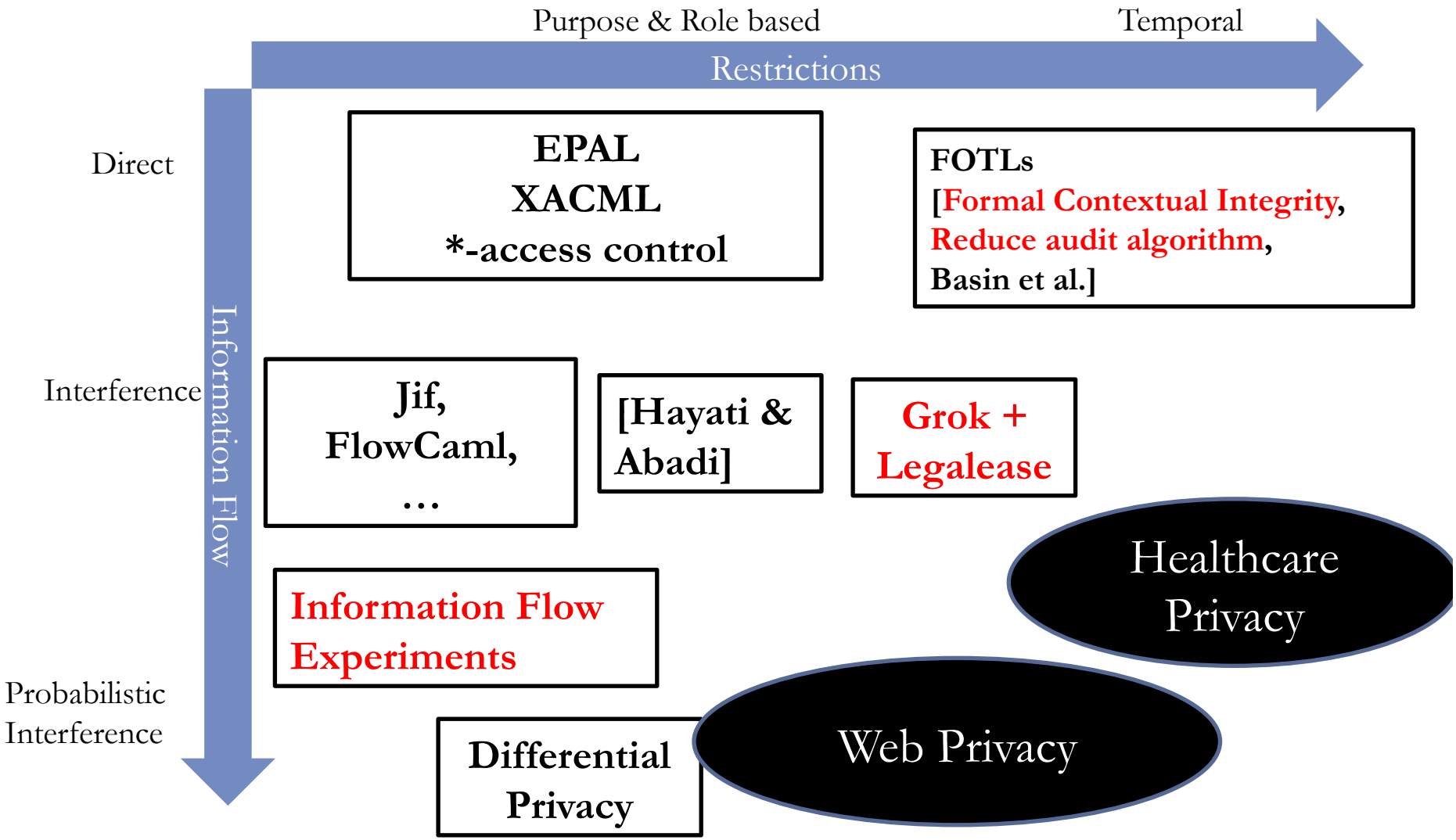

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- **Bootstrapping Privacy Compliance in Big Data Systems. In *Oakland S&P* 2014.**
- **Equivalence-based Security for Querying Encrypted Databases: Theory and Application to Privacy Policy Audits. In *CCS* 2015.**
- **http://www.andrew.cmu.edu/user/danupam/privacy.html**