Journey Beyond Full Abstraction:

Exploring Robust Property Preservation for Secure Compilation

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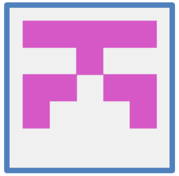

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Inria Paris

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Stanford & CISPA

https://github.com/secure-compilation/exploring-robust-property-preservation

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- structured control flow, procedures, modules, interfaces, correctness and security specifications, ...

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abstractions not enforced when compiling and linking with adversarial low-level code

- all source-level security guarantees are lost
- **linked low-level code can read and write data and code, jump to arbitrary instructions, smash the stack**, ...

Secure compilation chains

- **Protect source-level abstractions**
  even against linked adversarial low-level code

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  - **if source program is secure against all source contexts then compiled program is secure against all target contexts**

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- **Enable source-level security reasoning**
  - **if source program is secure against all source contexts then compiled program is secure against all target contexts**
  - **but what should "is secure" mean?**

What properties should we robustly preserve?

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trace properties
(safety & liveness)

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relational hyperproperties
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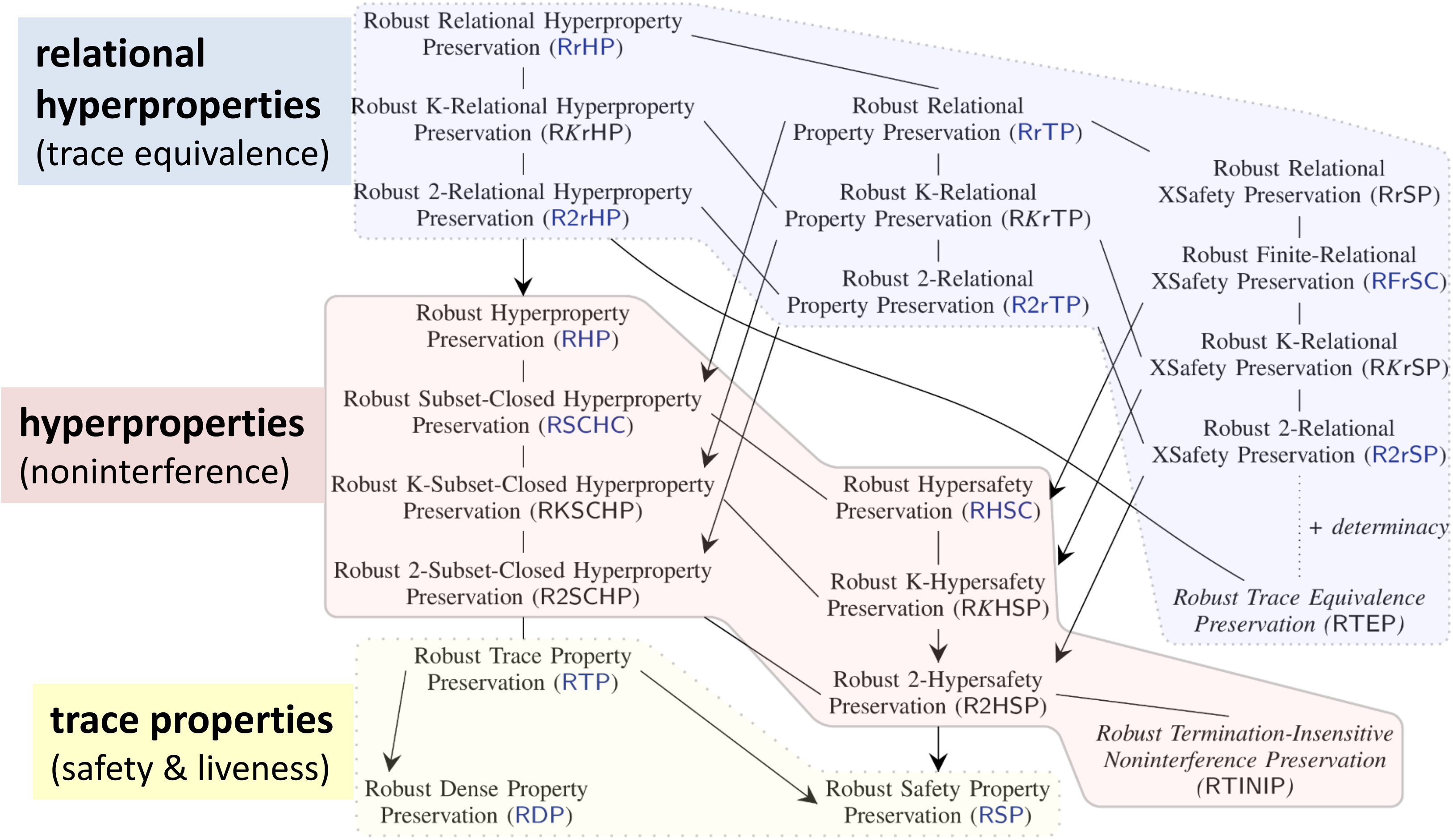

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+ *determinacy*

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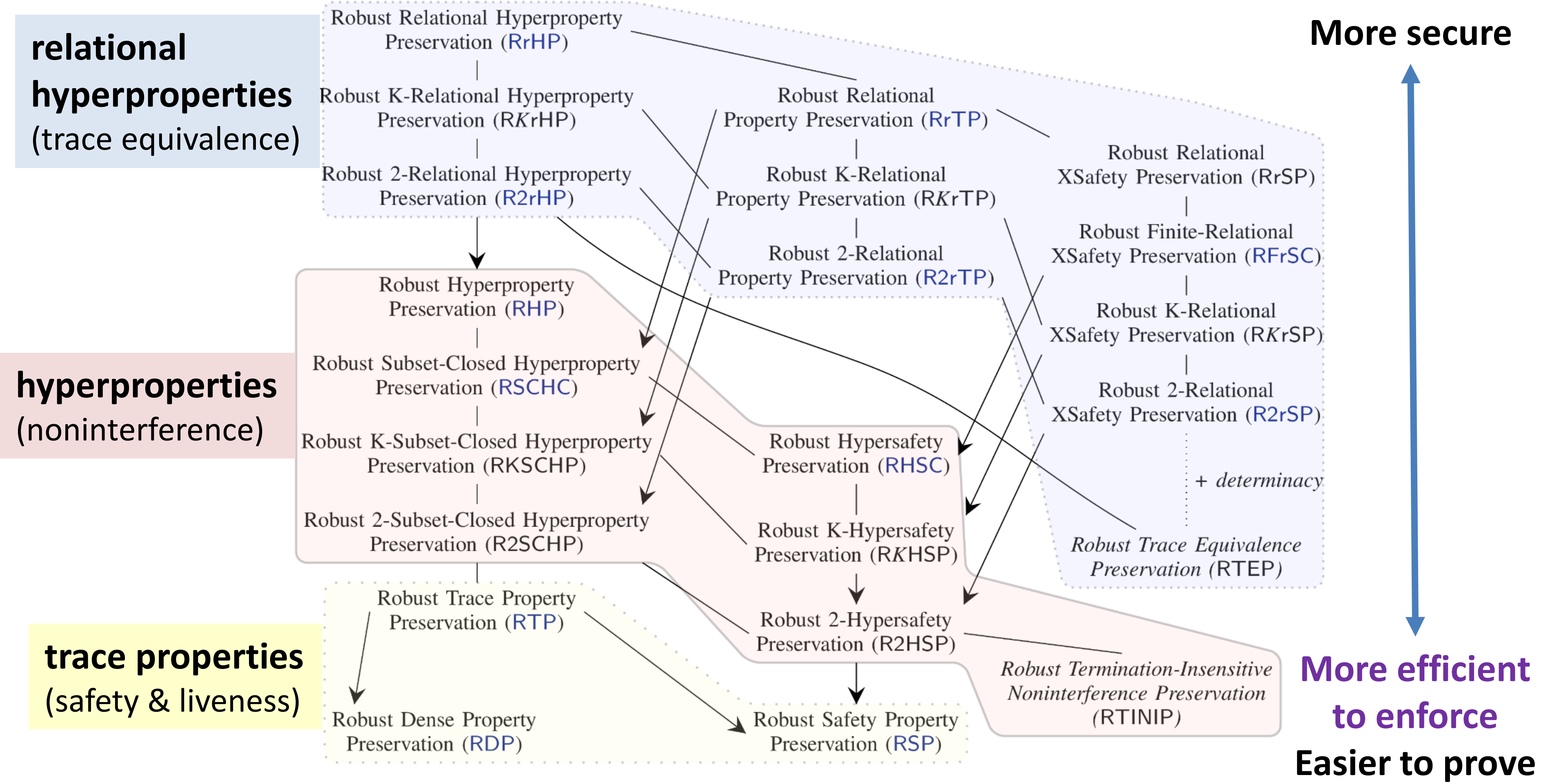

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More efficient to enforce

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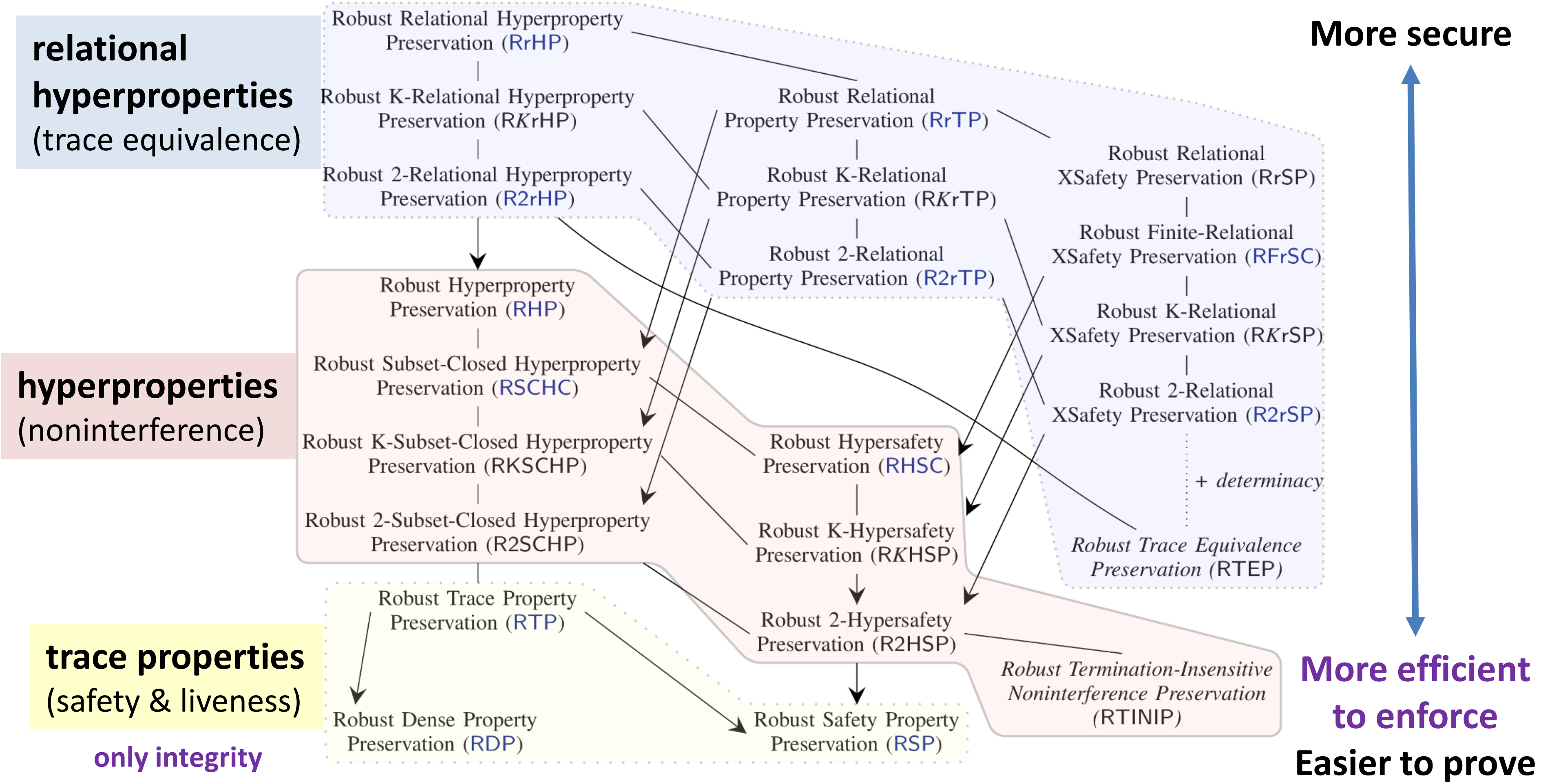

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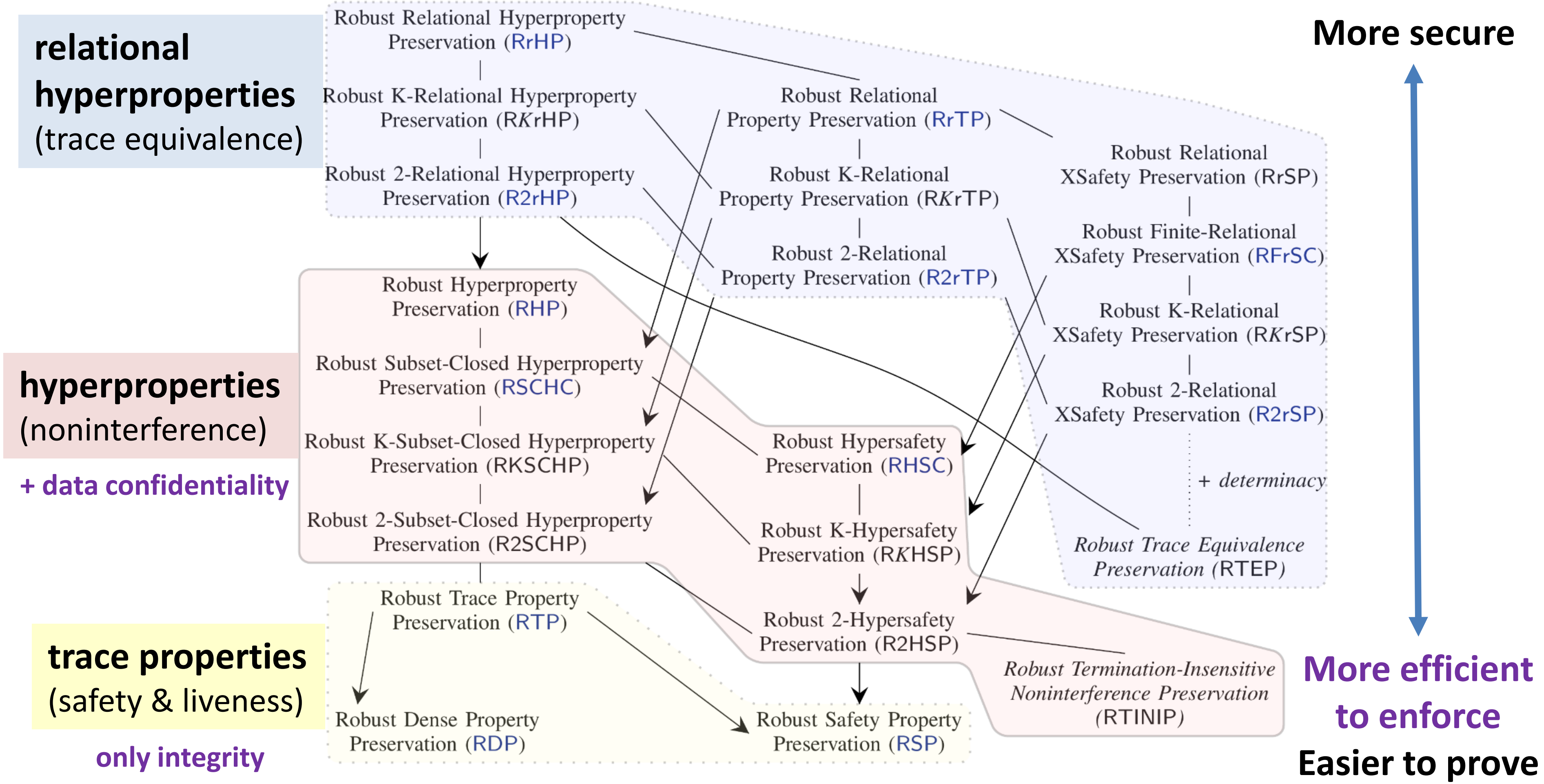

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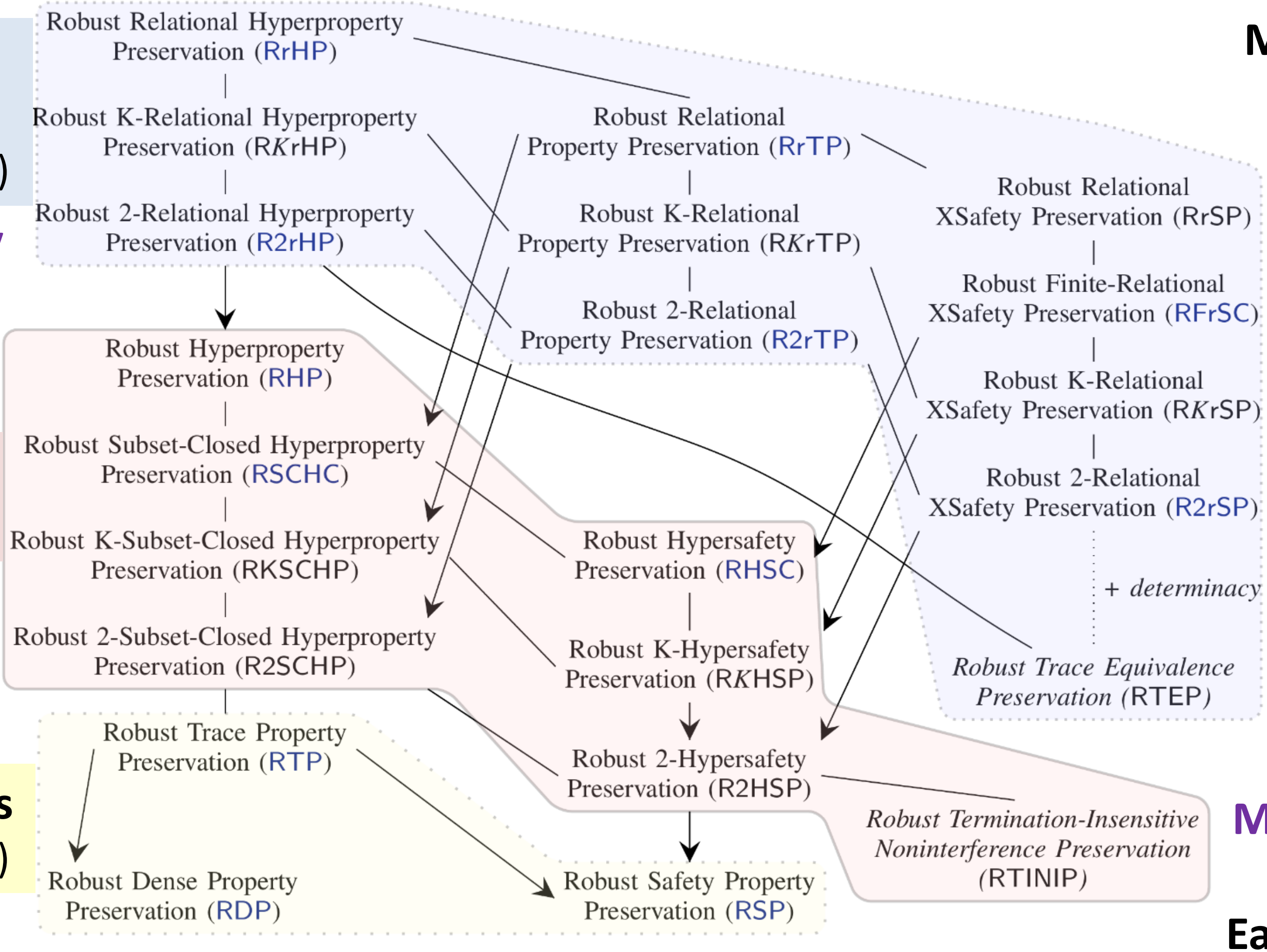

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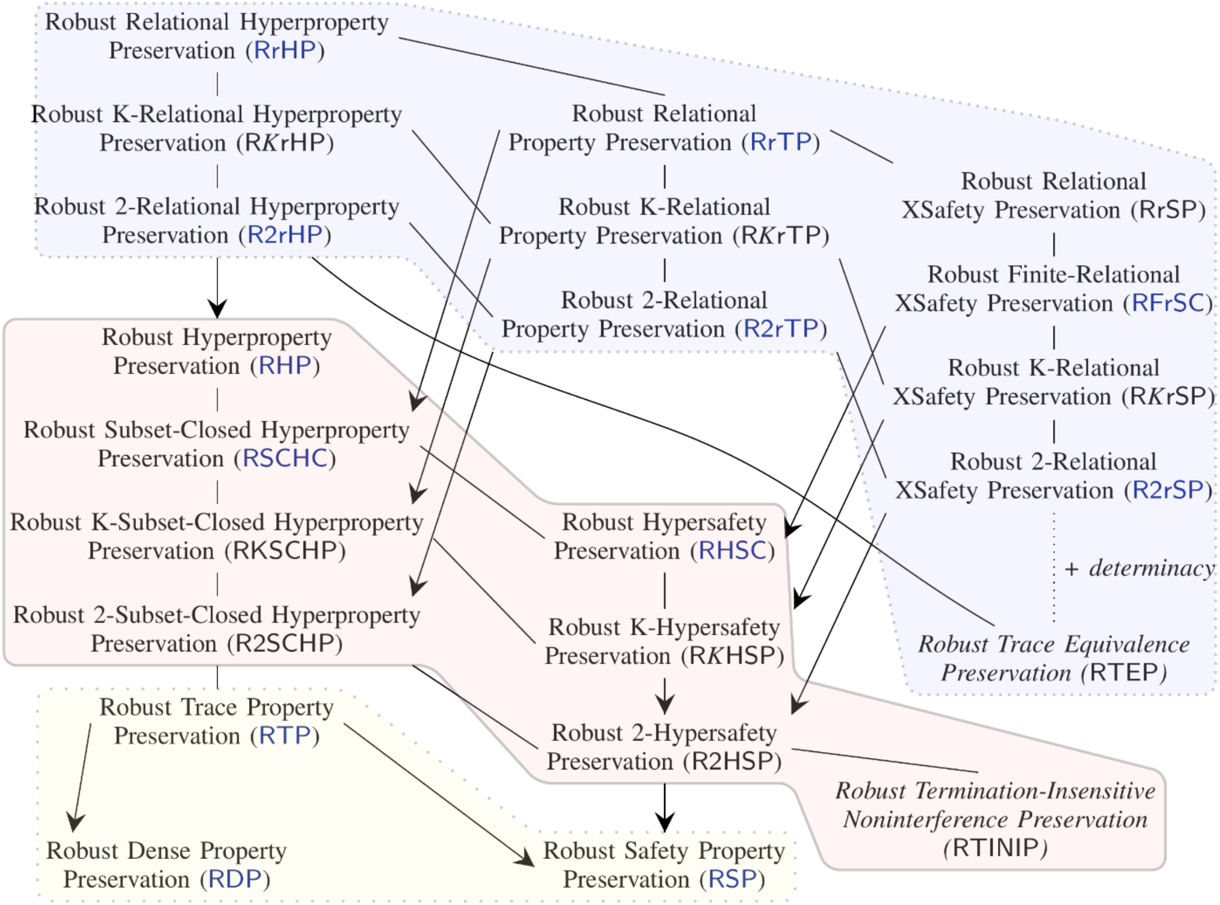

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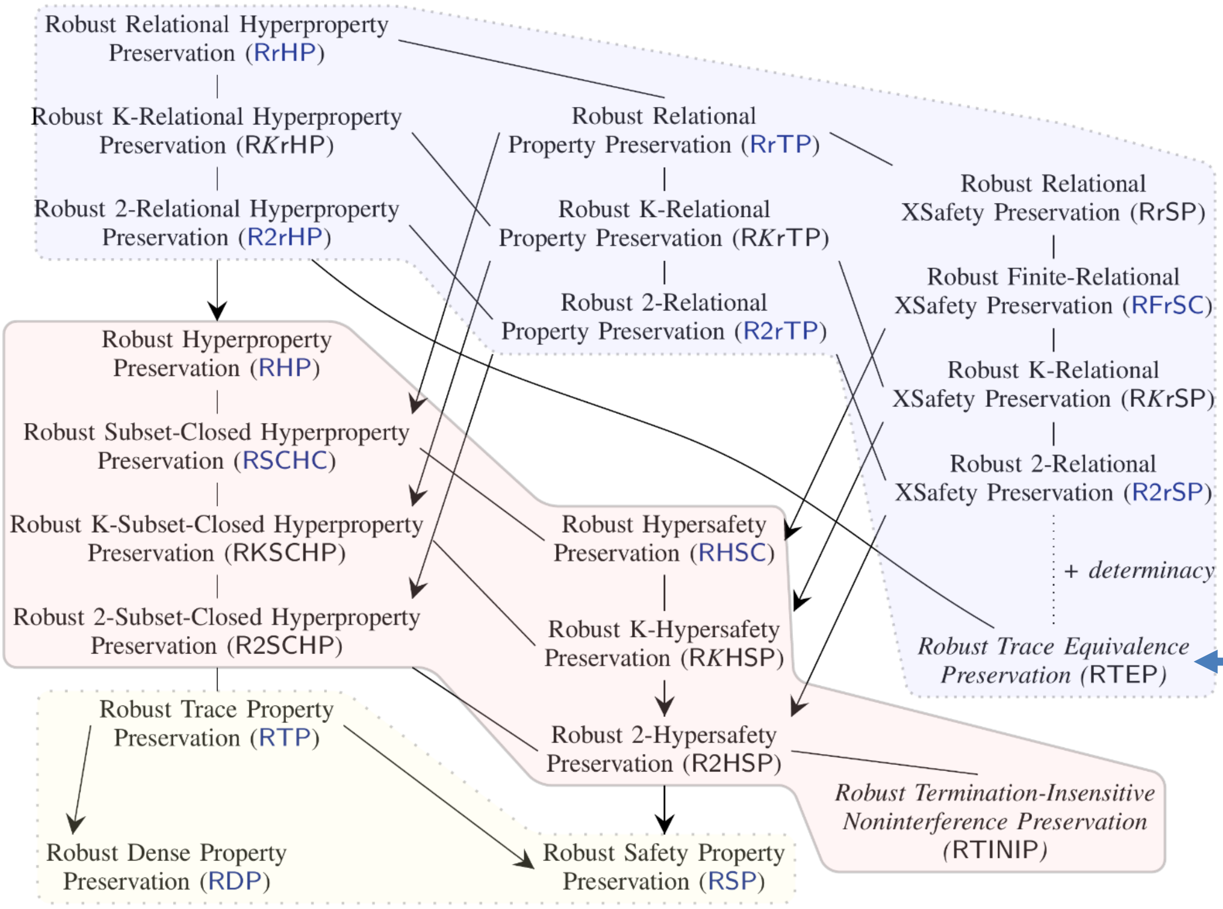

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without internal nondeterminism,
full abstraction is here

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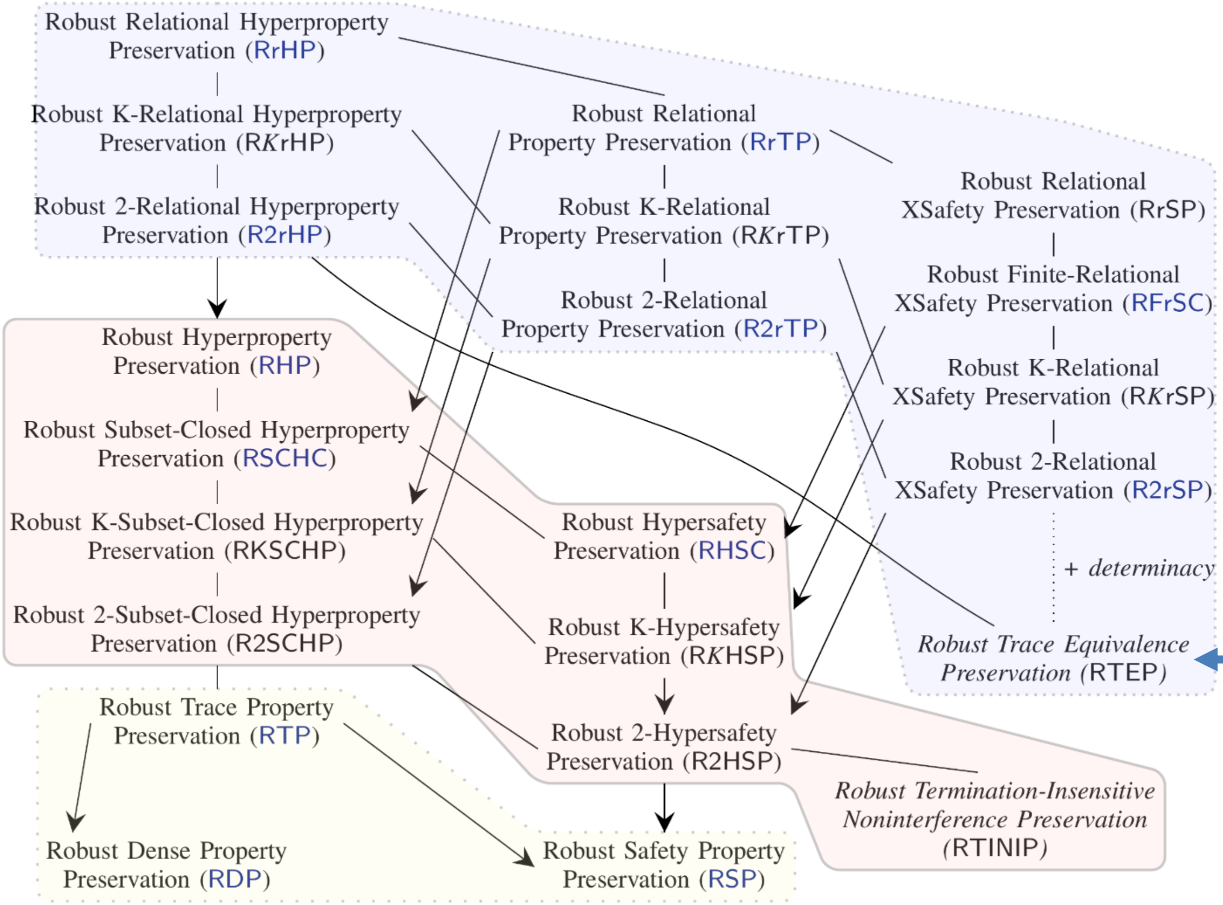

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without internal nondeterminism, **full abstraction is here**

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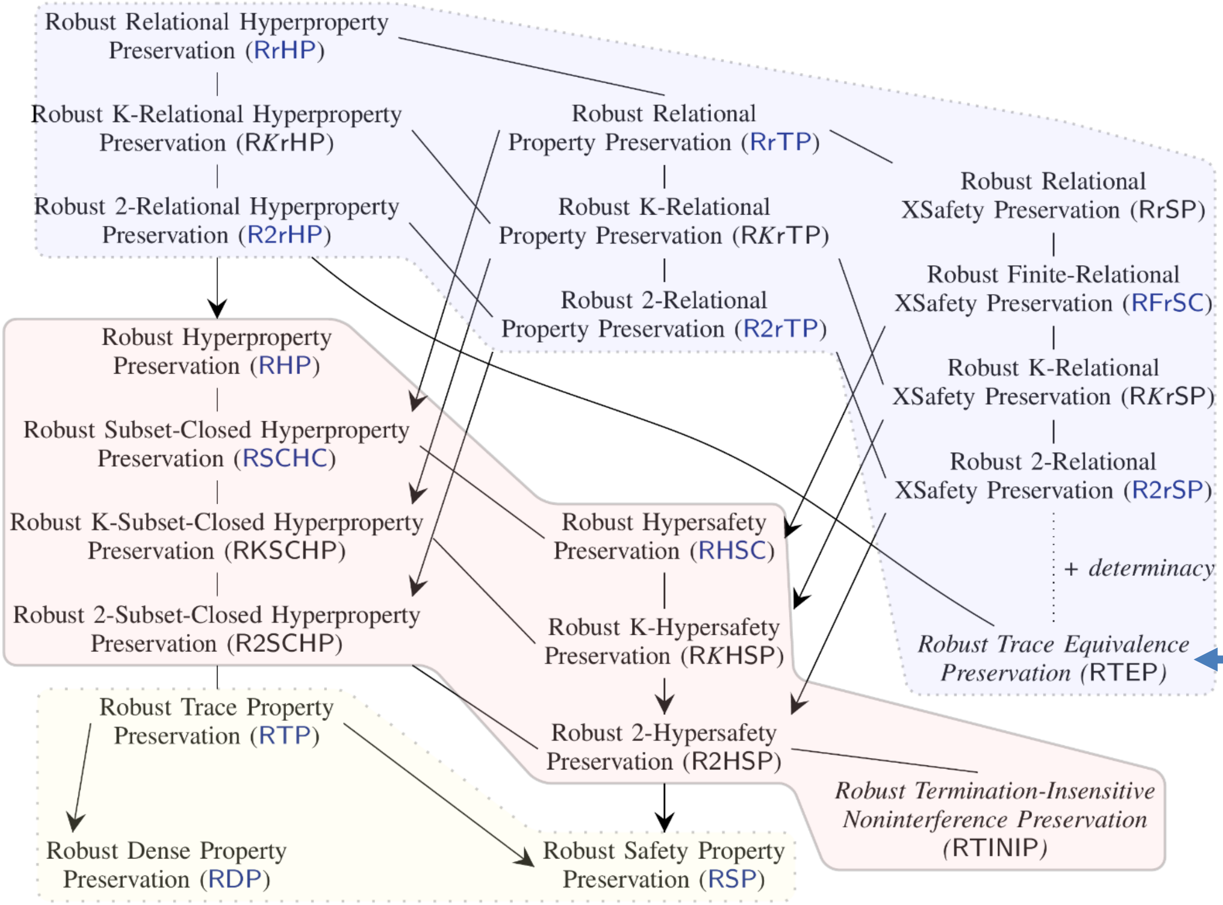
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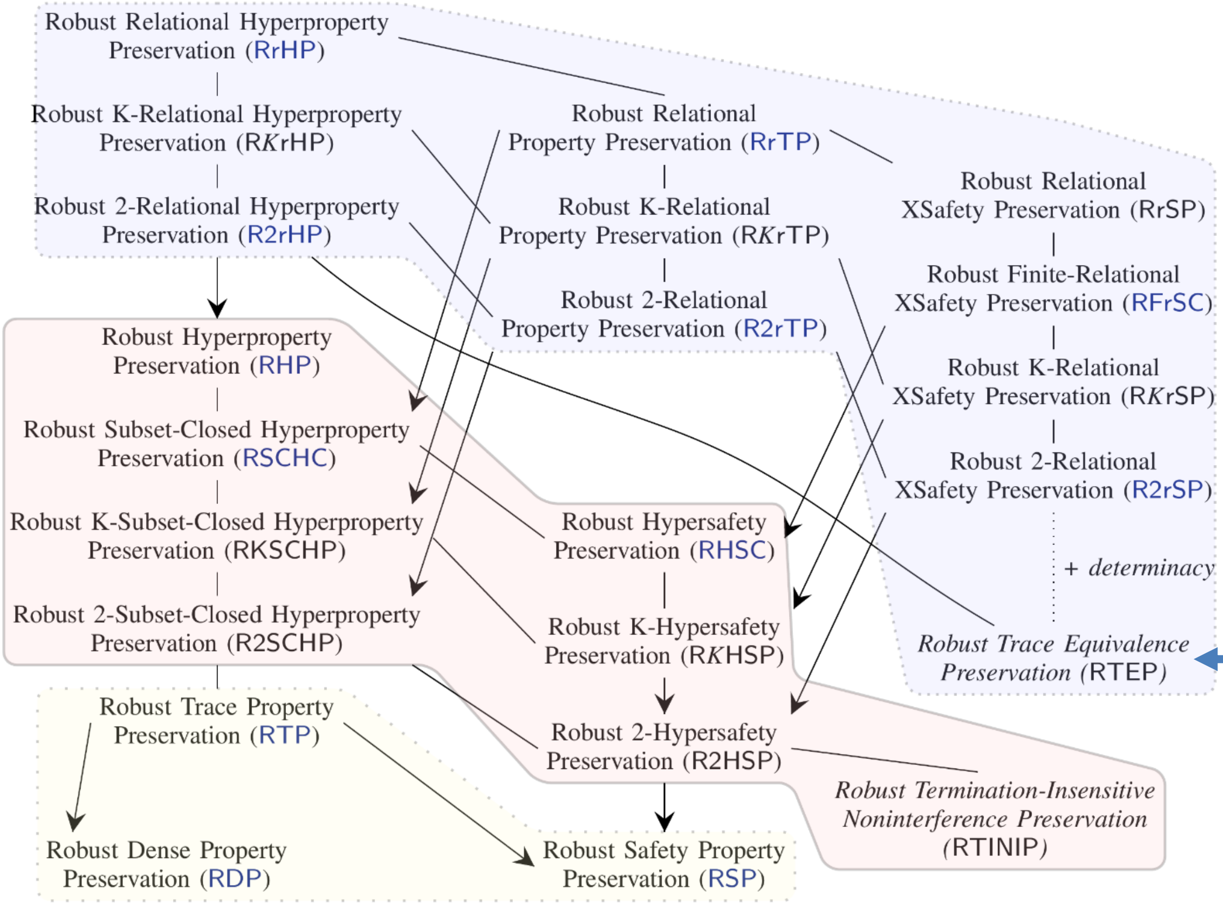

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PostDocs &
Starting Researchers
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