
Privacy Enabling Technology
What do Organizational Security Policies Say about Security?
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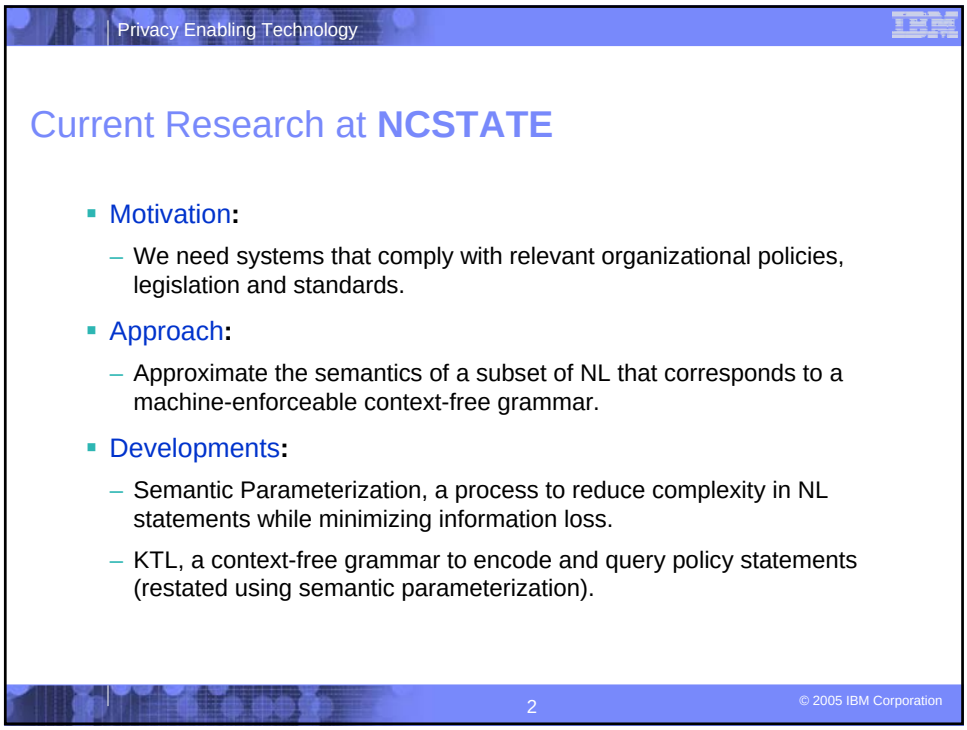
Privacy Enabling Technology
Current Research at NCSTATE
Motivation:
We need systems that comply with relevant organizational policies, legislation and standards.
Approach:
Approximate the semantics of a subset of NL that corresponds to a machine-enforceable context-free grammar.
Developments:
Semantic Parameterization, a process to reduce complexity in NL statements while minimizing information loss.
KTL, a context-free grammar to encode and query policy statements (restated using semantic parameterization).
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SPARCLE: Policy Authoring Workbench at **IBM**

- Motivation**:**
  - Enable privacy policy authors to quickly and accurately specify policies governing information use and disclosure.
  - Generate machine-enforceable rules from structured policy.
- Approach**: Two primary interfaces,**
  - 1) Semi-structured, captures natural language rules.
  - 2) Structured, captures 5 information types: *user*, *action*, *data*, *purpose*, *condition*.
- Challenge**:**
  - Can SPARCLE generalize to security policies?

Can SPARCLE generalize to security policies?

- Begin by examining organizational security policies.
  - What are the important elements conveyed in OSPs?
  - To whom are these elements relevant?
  - How do these people interact with these elements?
  - How do regulations and standards relate to OSPs?
- Approach**:**
  - Interviews with IBM personnel with security experience.
  - Analyze best-of-breed organizational security policies.

Interviews

- Interviews with three IBM experts regarding:
  - MLS and security compliance standards.
  - System security policies including SELinux.
  - Security policy development/ ownership.
- Two often opposing views: system security must be…
  - Formally sound and complete.
  - Usable and driven by workflows.
- The specification of security policies to-date is…
  - Fairly ad-hoc, vulnerability-driven.
  - Generally limited to business-unit and rarely organization-wide.

Analyzing Security Policy Documents

- Acquired best-of-breed OSP documents in three domains:

	Finance	*Government*	*Technology*
Size (Pages)	**400**	**457**	**453**

- Document topics cover broad areas including:
  - Authentification
  - Authorization
  - Confidentiality & Integrity
  - Availability
  - Auditing & Traceability
  - Backup & Recovery
  - Risk Assessment
  - Security Classification

Overview: OSP Composition

Definitions and References.	~15%
Responsibilities: What people do.	~55%
Requirements: What systems do.	~30%

Note: Analysis covers only 10.8% of the entire OSP analyzed.

- Types of Responsibilities
  - Classification
  - Notification
  - Review/ Audit
  - Documentation
- Types of Requirements
  - Configuration
  - Access Control
  - Constraints

Definitions

- For security terminology:
  - In **Public Key Infrastructure** (PKI), one key is kept private while the other, the public key, can be generally known and even published and circulated.
  - In authentification, **unique identifiers** include: something a person *is* (fingerprint, voice), something a person *has* (smart card), something a person *knows* (reusable password).
- For elements in responsibility/ requirement descriptions:
  - **Time limits** for applying security patches are specified in the IT security patch publication and commence from the publication date.

Personnel Responsibilities

- Classification:
  - Application owners must identify criteria for permitted business needs.
  - Administrators must classify vulnerabilities by risk: low, medium, high.
- Notification:
  - Notify the system administrator of the security incident and report: the time of discovery, resources affected, discontinuity of service.
- Review/ Audit:
  - Security components must be annually reviewed for effectiveness.
- Documentation:
  - Evidence from user revalidation process is retained for one year.

System Requirements

- Configuration:
  - Anti-virus software must be installed and updated regularly.
  - All mandatory access control options are set in accordance with platform specifications.
- Access Control Rule:
  - General users may not update operating system resources.
- Constraints:
  - All mail servers must have port-level encryption using SSL.
  - All passwords must have a minimum 8 character length.
  - The minimum key length required for RSA encryption is 1024-bit.

Platform-specific Policies

- System policies are individually developed for…
  - Operating systems (MS Windows, AIX, Linux)
  - Applications and services (apache, mail, samba, ssh)
  - Network routers and firewalls
- System policies are implemented by…
  - Installing libraries, modifying compilation directives, recompiling components.
  - Modifying runtime configuration files.
  - Updating database tables.
  - Executing programs with specific arguments.
  - Users interacting with unscripted administrative tools.

Bridging the Gap

- Three degrees of policy abstraction:
  - **Goals** – describe high-level objectives to be achieved independent of people. Goals justify implementations.
  - **Responsibilities** – require personnel to implement processes to achieve goals.
  - **Requirements** – describe what systems do to support processes to achieve goals.
- These elements are *owned* and *implemented* by different stakeholders: lawyers, managers, analysts, system developers and administrators.
- Traceability between corresponding policy elements and individuals is a *significant challenge*.

Connecting OSPs to System Policies: The How and Why?

- Reusable passwords must not be transmitted over a network in clear-text form.

Why?

- Mail applications must use TLS for encrypted communications.

How?

Why?

- Install OpenSSL libraries.
- Compile Sendmail with TLS support.
- Configure Sendmail for TLS support.
- Generate X.509 Certificates for Sendmail.

How?

Influences from Law, Regulations, and Standards.

		Security Policy Scopes		
		Program	Business	System
Laws and Regulations	FISMA	✓		
	SOX	✓	✓	
	GLBA	✓	✓	
	HIPAA	✓	✓	✓
Standards	ISO 15408/CC			✓
	ISO 17799	✓		
	NIST 800-12	✓		
	NIST 800-27			✓

Final Observations

- Security is expensive.
  - Requirements establish baseline or minimal security.
  - Increased flexibility through guidelines or recommendations lower costs and enable workflow but increase risk to known vulnerabilities.
    - Security should be commensurate with risk.
  - Legacy systems dictate policies to administrators.
- Security has multiple viewpoints.
  - Different motivations for stakeholder compliance.
  - Different strategies for implementing security goals.
- Security must be dynamic.

Publications

- T. D. Breaux, A. I. Antón. “Deriving Semantic Models from Privacy Policies” In Proc. *IEEE 6th Int’l Workshop on Policies for Distributed Systems and Networks (POLICY’05),* June 2005.
- T. D. Breaux, A. I. Antón. “Analyzing Goal Semantics for Rights, Permissions and Obligations” In Proc. *IEEE 13th Int’l Conf. on Requirements Engineering (RE’05),* August 2005.
- T.D. Breaux, A. I. Antón. “Mining Rule Semantics to Understand Legislative Compliance” Submitted to: *Workshop on Privacy in the Electronic Society (WPES’05),* November 2005.

- In the Fall, expect to see access control rules (that meet RBAC specification) derived from the HIPAA Privacy Rule.