



The Jurisprudence of Accountability

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2nd International Workshop on Accountability: Science, Technology and Policy
MIT Computer Science and Artificial Intelligence Laboratory
January 30, 2014

Law is an accountability institution, at least in democratic countries. It sets expectations about behavior of social actors and aims to have those expectations met by the actions of members of society. Laws directed at controlling organizational behavior adopt various strategies for expressing and enforcing legal expectation on these entities. By extension, these organizational entities develop administrative and cultural mechanisms to create conditions under which individuals in those institutions actually comply with the stated rules. Previous work by Lampson, Feigenbaum and this author have offered general definitions of accountability and shown specific implementations in operational prototypes. By examining several different United States laws governing information-intensive activities and reflecting on work designing accountable systems, we can go one step further to identify key architectural features of accountable information systems. In general, accountable systems must have at least these features: 1) formal rules expression, 2) evaluation of the actions recorded in the system against relevant rules, and 3) transparent documentation of relevant actions and compliance analysis over transactions for which accountability is required. Accountable systems with these features will enable organizations using large amounts of data to reduce their risk of violating rules, help enforcement and oversight bodies to investigate compliance with rules, increase public confidence that 'big data' techniques can be applied to personal data while respecting privacy and other rules, and allow maximum flexibility of the use of data while remaining within the bounds of the law and best practice. Yet, to achieve this level of confidence with machine-assisted accountability, we must develop systems that can apply rules with provably correct results as to the accountability questions being posed.

Consider key provisions of two rules sets applied to information intensive activity in the United States today. First, the Fair Credit Reporting Act (FCRA) [1970] regulates the behavior of consumer credit bureaus producing reports on the credit-worthiness of individuals. A key requirement of the FCRA is that credit information may only be used for a specified list of purposes. When the data is used to make a decision that is 'adverse' to the consumer, such as denial of credit or rejection of an employment application, then the consumer must be given an opportunity to assure that the information is accurate and complete. Accountability to these rules is maintained by providing notices of adverse actions, to enable consumers to check that the data is used properly. Second, a recent code of conduct developed through negotiation between the US Federal Trade Commission and the Digital Advertising Alliance (DAA), a trade association of behavior advertising companies, shows another example of how rules are expressed and enforced. The DAA code allows ad

networks to develop profiles of Internet user preferences based on their browsing habits but prohibits certain uses of those profiles considered to be harmful, including use of profiles for health insurance eligibility or employment offers.

Legal administration ->	Measurable Expectations	Detection of nature and source of violation	Action based on detection
Fair Credit Reporting Act (selected provisions)	Credit information may only be used for employment or credit and insurance underwriting purposes (with appropriate notice, correction and redress rights for consumers)	Adverse action notice issued upon denial of credit, employment or insurance based on credit information.	Consumer can challenge accuracy of information used to make decision
Digital Advertising Alliance Behavioral Targeting Code of Conduct	May not use profile for decisions about health insurance, employment or credit	Manual sampling audit	Audit violations and compliants investigated by Better Business Bureau and the referred to FTC if unresolved.
Accountable System Features ->	Rules expression language	Evaluation of documented actions against rules	Transparent documentation of relevant actions and analysis

Today, assuring accountability to rules depends on considerable manual effort and is already facing scaling challenges as the volume and complexity of data usage increases. Manual audits are time consuming and may miss important events as they can only be done on a sampling basis. What's more, much of the data that one would want to analyze may not be available for public review either because of proprietary commercial interests or national security classification. To achieve the necessary level of trust in complex information systems, we must develop a computational mechanism with these functions:

- rules expression,
- evaluation of the actions against relevant rules
- transparent documentation of relevant actions and compliance analysis over which accountability is required

providing provably correct results over the data being analyzed. This way it should be possible to trust the result of an accountable system run over data even it is not possible to observe the operation of the system or view the raw data.

Financial accounting standards offer an example of how information systems can give the public confidence in the behavior of institutions bound by specific rules without having to fully disclose proprietary information. The public, the markets, and regulators generally trust financial statements such as balance sheets and profit and loss tables because they are prepared according to a known set of rules that, if followed, produce consistent and reliable results. The integrity of this system depends not just on clear rules, but also on regular audits by trusted and independent professionals. Of course, inaccuracy can emerge due to either mistake or fraud. But on the whole, the financial accounting system has produced an enviable level of trust and confidence in a fast-moving, highly decentralized market system, in which each participating institution places a very high value on preserving the secrecy of core operating data. The task of accountable systems research is to achieve a similar degree of confidence in the operation of large systems analyzing personal data.