Background

- Automated systems are now used in hospitals, aircraft, nuclear power plants, and other complex systems as teammates to human operators.
- Four main categories of automated systems:
  - Information acquisition (e.g., radar).
  - Information analysis (e.g., combat identification systems).
  - Decision selection (e.g., flight planning).
  - Action implementation (e.g., unmanned aircrafts, robots).
- Common problems associated with automation are overreliance (misuse) and underreliance (disuse).
- Trust is a major factor that influences operators’ reliance on automation.
  - Too much trust leads to misuse; insufficient trust leads to disuse.
- Many studies have looked at the various design factors that can influence both trust and reliance in automated systems.
  - Optimally, an operator should only trust an automated decision aid when the system performs better than the operator would manually (see graph to the right).
- In addition to its role in automation reliance, trust also influences purchase intent in electronic commerce (e-commerce) transactions.
- Designing websites to appear trustworthy is key to attracting and maintaining online customers.
- Security and privacy are the primary concerns in e-commerce.
- Privacy and security assurances, transaction integrity seals, money-back guarantees, reputation systems, customer reviews, third-party seals of approval, and brand affiliations are some of the methods companies use to address security and privacy concerns in online marketplaces.

Research Plan

- Examined Trust in Technology literature for trust definitions and measurement scales.
- Analyzed the role and importance of trust in automation and e-commerce.
- Determined the design aspects that are most important to developing trust in e-commerce and automation.
- Reviewed literature on interpersonal trust and applied findings to trust in automation and e-commerce.

Fundamental Questions/Challenges

- To what extent do people respond socially to technology?
- How can knowledge gained from the study of interpersonal trust be applied to trust in technology?
- How can we design technology to facilitate appropriate levels of trust in the user?
- Scholarly definitions of trust vary; there is no universally accepted definition.
- Trust is usually measured from a simple economic viewpoint, ignoring the complex cognitive underpinnings of trust development.
- Individuals have different tendencies to trust based on variations in culture, age, gender, and personality.

Research Results

Theoretical Model for Trust and Reliance in Automation

- Trust propensity (influenced by culture, gender, age, and personality) reflects an individual’s innate tendency to trust others independent of context and is relatively stable over time.
- Trust propensity combines with the more variable characteristics of the user, the situation, and the design of the system to influence an operator’s initial trust prior to use.
- The operator’s initial trust combines with other factors (see red box) to determine initial reliance on the system.
- Both the operator’s initial reliance on the system and the design of the system directly affect its performance.
- The performance of the system influences the operator’s dynamic trust in the system, which combines with other factors (see red box) to determine future reliance on the system.
- Future reliance on the system affects its subsequent performance, displaying the cyclical, dynamic relationship between trust, performance, and reliance.

Theoretical Model for Trust and Purchase Intent in E-commerce

- Culture, age, gender, and personality differences account for variations in consumer trust propensity independent of context.
- Situational trust varies depending on the current state of the consumer, as well as the characteristics of the purchase.
- The consumer cognitively evaluates characteristics of the website and vendor to determine if they appear trustworthy.
- The consumer’s attitude towards technology in general and previous experience with the internet make up the consumer’s trust in the internet.
- The consumer’s trust propensity and situational trust combine with their overall trust in the internet to influence their cognitive evaluation of the apparent trustworthiness of the website and vendor.
- After evaluating the trustworthiness of the website and vendor, the consumer develops a subjective level of trust that can range from very high to nonexistent.
- The level of trust the consumer feels interacts with other factors (see red box) to determine whether or not he will purchase from the website.

Related Work

- Human factors/ergonomics.
- The study of interpersonal trust from psychological and sociological perspectives.
- Interface design in Human Computer Interaction (HCI).
- E-commerce and the concept of trust from an economic perspective.
- Unmanned military vehicles and aircrafts.
- Automated decision aids (e.g., luggage screening, flight planning).
- Economic game theory.