Assurance and Trust in the Internet System

Yuko Murayama
Iwate Prefectural University
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My research perspectives

- Internetworking: Dept of Computer Science, University College London (Ph.D., 1992)
- Access Control on the inter-domain network (IPA, Japan)
- Two-way communications over CATV (Hiroshima City University)
- Subliminal Messages (MEXT)
- On-Door Communications (MEXT, Iwate Prefectural University)
Assurance and Trust

Presentation:
- “sense of security” vs. security technology
- A model based on Beck’s cognitive model
- Sociological viewpoints
- Application on the Internet
- CSCW examples:
  - the on-door communication systems
Assurance and Trust: Perspective and Motivation

The Traditional Assumption of Security Research:

*Users would feel secure with secure systems*
An-Shin (安心)
安: easy 心: mind
An-Shin == Sense of Security

State of mind: no fear

Knowledge of probabilistic risk and its scope would help?

modeling
What is a fear?

- To lose one’s personal possessions:
  - Life and health
  - Property
  - Family
  - Identity
  - Country and citizenship
  - Jobs
  - Skill and career
  - …
Systems and services on the Internet which require security

- Banking and buying/selling stocks
- Shopping
- Antivirus software
- Medical services
- Governmental services
- …
Fears in Internet shopping

- **Systems**
  - Would my private information including the credit card number not be stolen?
  - Did I order correctly to get exactly what I wanted to order?

- **Services**
  - Does the item look exactly like what I see on the display?
  - Will the item which I have bought be delivered?
  - Can I trust the shop for the quality of the item?

Users’ requirements: not only system’s security but security in wider terms
Research Objective

- Make it clear the factors of fear and sense of security
- Apply the findings to internet services
Security Technologies and Sense of Security

A user feels secure

Security Problem

not secure

Target

Target

secure

Usability Problem

A user feels fear
Security vs. Sense of Security

Security: cognition (logical & rational)
- Cognition is based heavily on the ability of understanding

Sense of Security: emotion (not logical & irrational)
- Emotion is based on more factors
Beck’s Cognitive Model

- Aaron T. Beck, M.D., University Professor of Psychiatry, University of Pennsylvania School of Medicine
- The cognitive symptoms of depression actually precede the affective and mood symptoms of depression.

Event (stimulus) → Cognition → Emotion
A model of fear

Exterior Factors
- Previous Knowledge
- Contents

System Factors
- Security
- Interface

Trust → Preference → Understanding → Intuition

Experience (History of Emotion)

Weight Function

Personal Factors

feedbacks

Let the user feel like using the system again.

the degree of fear
Cognition Factors

- Users fear of the followings:
  - Trust factor
    - The service provider and their security policy
  - Preference factor
    - The items and services
  - Understanding factor
    - Security techniques and risks
  - Intuitive factor
    - User interface
An example of the use of a traffic accident information base system

Exterior Factors

Previous Knowledge: a rumor --- secure system

System Factors

Contents: Information on Traffic Accidents

Security: Explanation by the system developer

Interface: Not a perfect interface due to prototype

Weight Function: Understanding < Intuition < Trust < Preference

Experience: No

Degree of Fear

Shall I try and use it again?
Security and Understanding Factors

- **Security factor**
  - Controlled by the system provider
  - Explained with doc, figures and education

- **Understanding factors**
  - Measurable with questionnaires on system security
    (not understand : score 0 --- understand well : score 10)
  - Advanced and complicated techniques → hard to understand
  - Positive emotion feedbacks
    - Incorrect understanding → misunderstanding security
  - Negative emotion feedbacks
    - Hard to understand security → fear
Security Technologies and Sense of Security

A user feels secure

Security Problem

Target

Usability Problem

A user feels fear

not secure

secure

Target

CIIP Workshop
Assurance

- Sociology terms:
  assurance == sense of security

- Toshio Yamagishi:
  The Structure of Trust: the evolutionary games of mind and society
  University of Tokyo Press 1998
Assurance and Trust according to Yamagishi’s definition

Expectations of natural order

Expectations of moral order

Expectations of ability

Expectations of intention

Assurance

Trust
Assurance vs. Trust

- Little social uncertainty:
  no point for the others to deceive me
  → Assurance (collectivism)

- Much social uncertainty:
  some may deceive me
  → Trust
Assurance vs. Trust

the community with Assurance: there is no need for trust

the community with Trust: Judge the others based on the information

Cannot trust anyone
On the Internet: Assurance Model or Trust Model

Community with assurance
VPN

Community with trust

Internet: Community with Trust
Summary

- “sense of security” vs. security technology
  - Security and usability problems
- A model of fear:
  - Sense of security is an emotion.
- Sociological viewpoints: Assurance and Trust
- Open question: what kind of community over the Internet?
On-Door Communications

- Message board
- Knock on the door
- Under the door
The on-door message board
messages

I am so impressed! You are the model of student.

Hello, I am Mikako.

me

Kiss

57

東京からです

おっけん、結果は？

すず

村山

手

現立

す

す

夏らしく新！

仕事だけが実行できるキーが欲しい。

CGで実現して

とこうですが。

勉強はじめました。

OKですよ。ち、ふええん

きょうも一日

カシバリソコ

冷麺をCGで書くなどなる力方？
Drawing information
anonymity

Original writing  Local change  Global change

CIIP Workshop
Subliminal Channel with steganography

sender

(2) “本日は晴天なり”
(embedded data)

(3) Cover data

Stego key

(4) Generate stego data

receiver

(5) Stego data

(6) “本日は晴天なり．”
(extracted data)

(1) Share the stego key

Stego key

CIIP Workshop
The knock-on-the-door system

A chat system

LAUGH and BOOING sounds

owner

visitors

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Under-the-Door Communications

outside the door

inside the door

Click to enter the room

Click to insert a file

Click to see the file