The Use of Smartphone in the Chain of Security

When all Becomes Electronically ---except the User

Who Berne University of Applied Sciences (BFH)
Research Institute for Security in the Information Society (RISIS)
E-Voting Group
Eric Dubuis, Rolf Haenni, Reto E. Koenig
IoT Group
Andreas Danuser, Franz Meyer, Reto E. Koenig

Why Experts in Remote Voting Over the Internet (E-Voting)
Demonstration of Voulnerabilities in E-Banking Systems (2012)
Demonstration of Voulnerabilities in E-Voting System (2013)
Demonstration of Voulnerability in E-Banking Solution (2014)

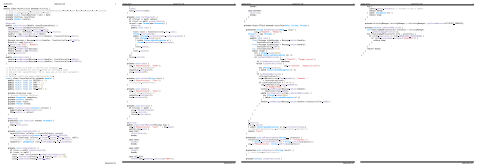
Quest Stop using Smartphones as Part of the Security Chain
Start using Secure Hardware Tokens instead

Berner Fachhochschule

What is It All About?

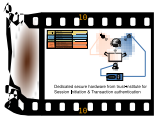
"This client option provides a secure cost-effective mobile tool for strong transaction authentication anywhere, anytime, without the need of an extra device."

Demo Transaction Substitution Exploit On a Current **Secure** E-Banking Solution



History of E-Banking and Security: From Past to Future

Introduction of Smartphone
Into the Chain of Security



Introduction of a Dedicated *Secure Hardware Token**
Into the Chain of Security

* Provided by Trustworthy Site
Secure Channel to Trusted Site
Non Reprogrammable
Secure Keyboard
Secure Display

How to Infect *General Purpose Device**

* Uncontrolled Provider
Connected to the Internet
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An Infected Browser is All It Needs

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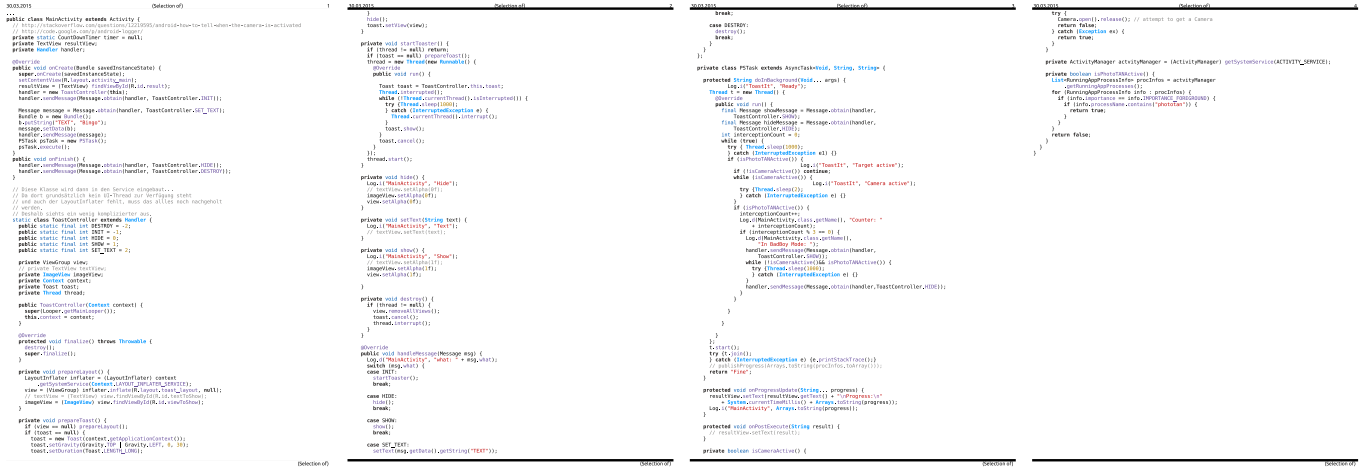

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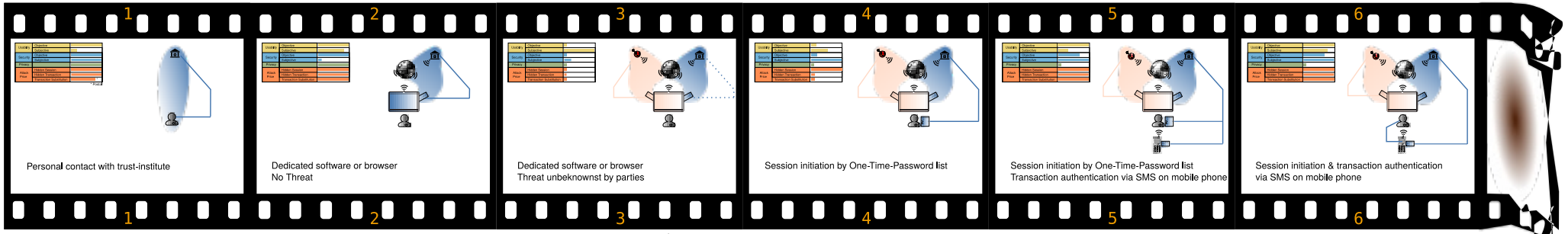

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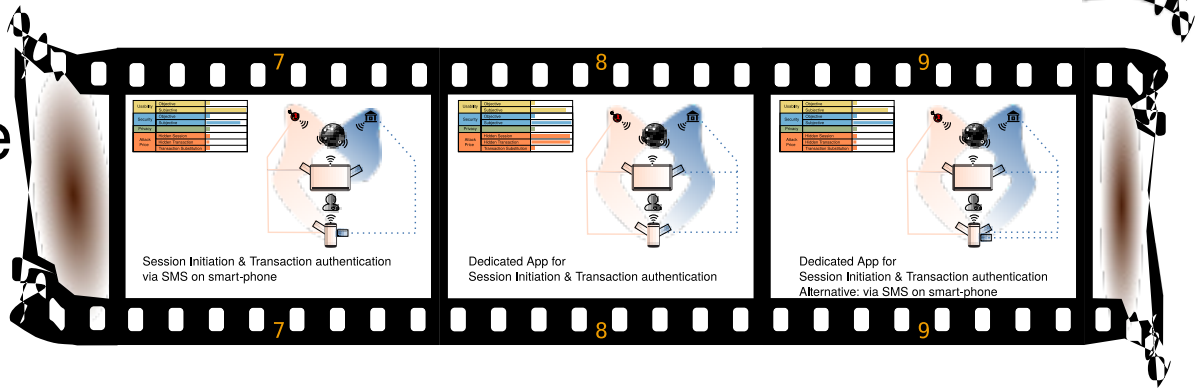
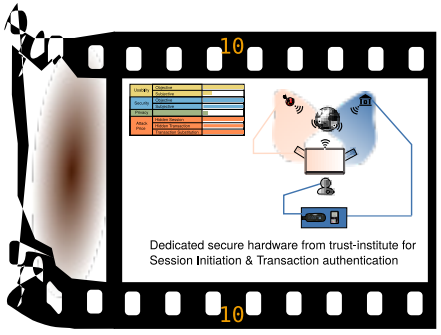


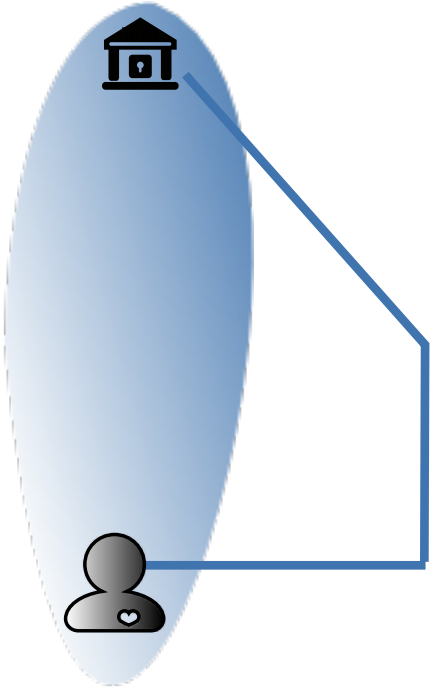


Introduction of a Dedicated *Secure Hardware Token** Into the Chain of Security

* Provided by Trustworthy Site
Secure Channel to Trusted Site
Non Reprogrammable
Secure Keyboard
Secure Display

Usability	Objective	
	Subjective	
Security	Objective	
	Subjective	
Privacy		
Attack Price	Hidden Session	
	Hidden Transaction	
	Transaction Substitution	*

* Postal



Personal contact with trust-institute

2

Usability	Objective	
	Subjective	
Security	Objective	
	Subjective	
Privacy		
Attack Price	Hidden Session	
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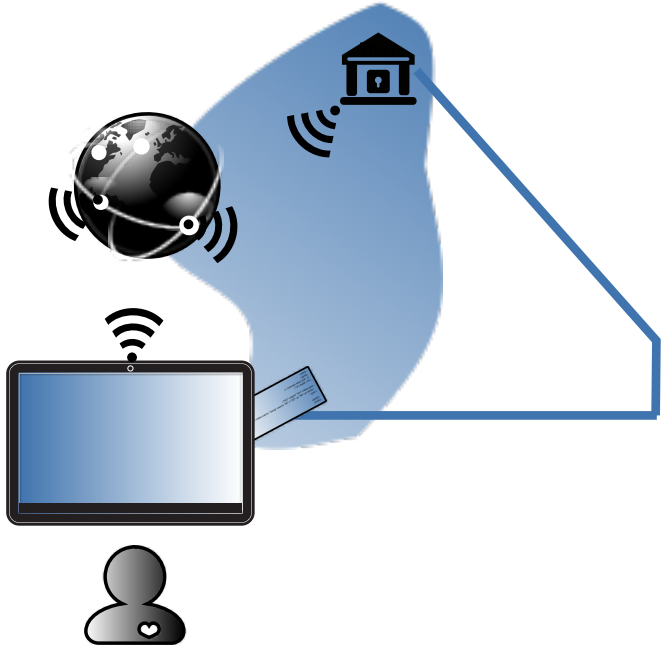
	Transaction Substitution	



Dedicated software or browser

No Threat

3

Usability	Objective	
	Subjective	
Security	Objective	
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Privacy		
Attack Price	Hidden Session	
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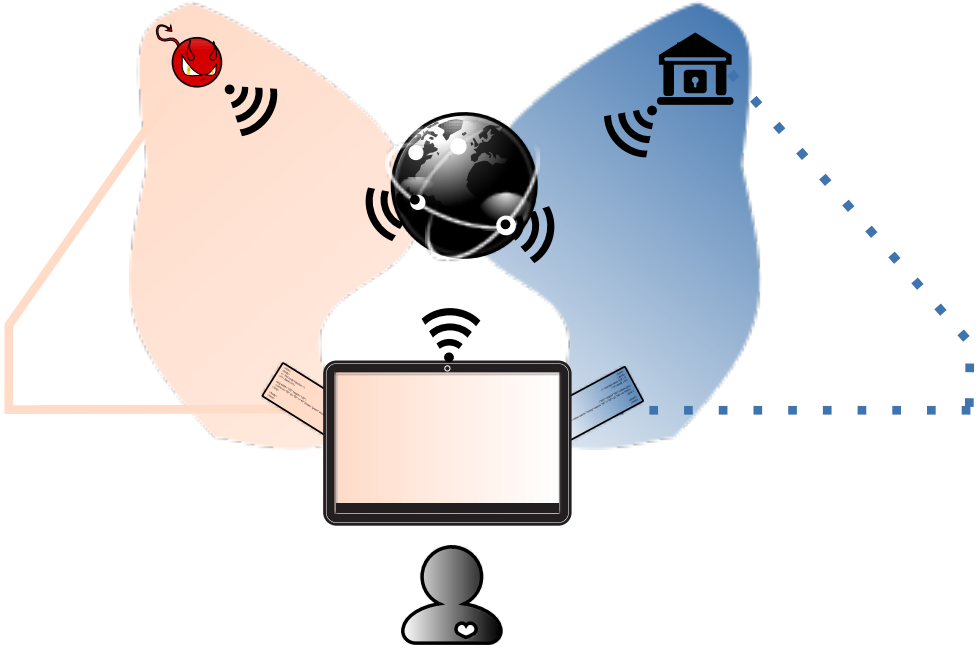
	Transaction Substitution	



Dedicated software or browser
Threat unbeknownst by parties

4

Usability	Objective	
	Subjective	
Security	Objective	
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Privacy		
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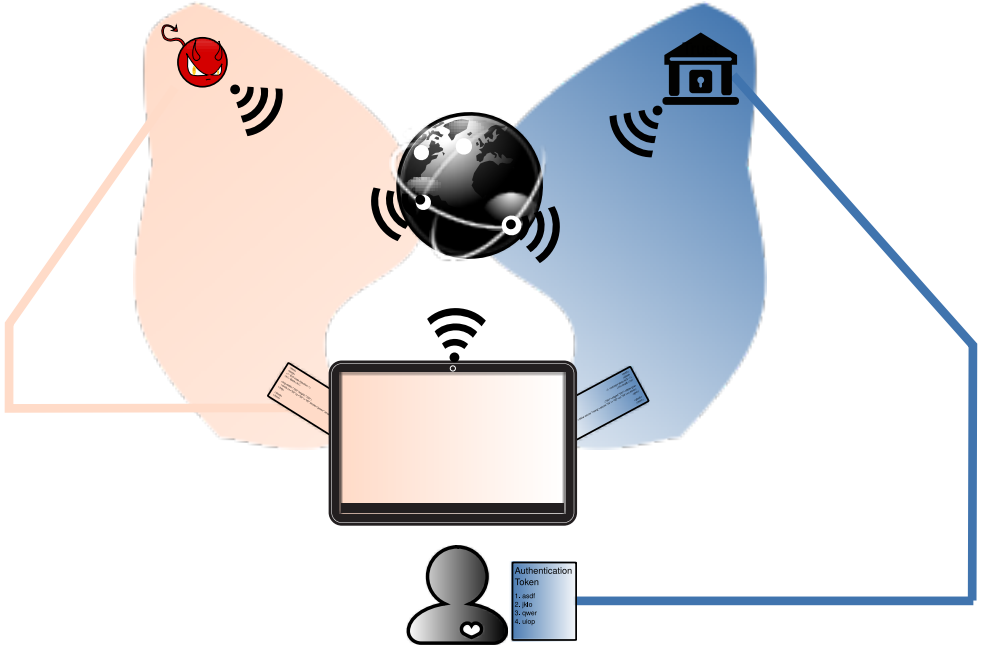

Session initiation by One-Time-Password list

5

Usability	Objective	
	Subjective	
Security	Objective	
	Subjective	
Privacy		
Attack Price	Hidden Session	
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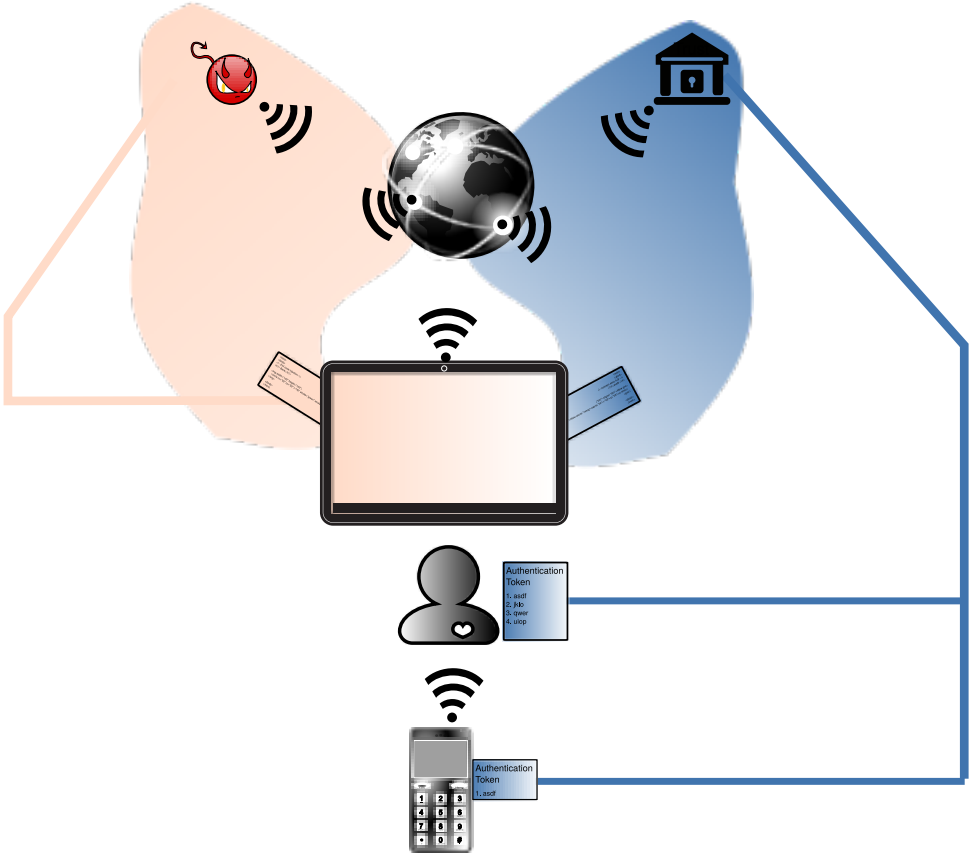
	Transaction Substitution	



Session initiation by One-Time-Password list
Transaction authentication via SMS on mobile phone

Usability	Objective	
	Subjective	
Security	Objective	
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Privacy		
Attack Price	Hidden Session	
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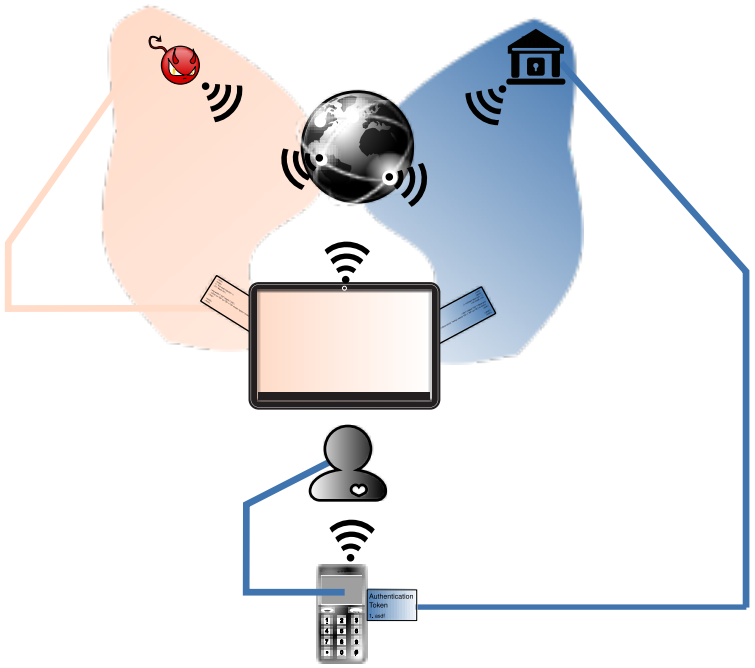
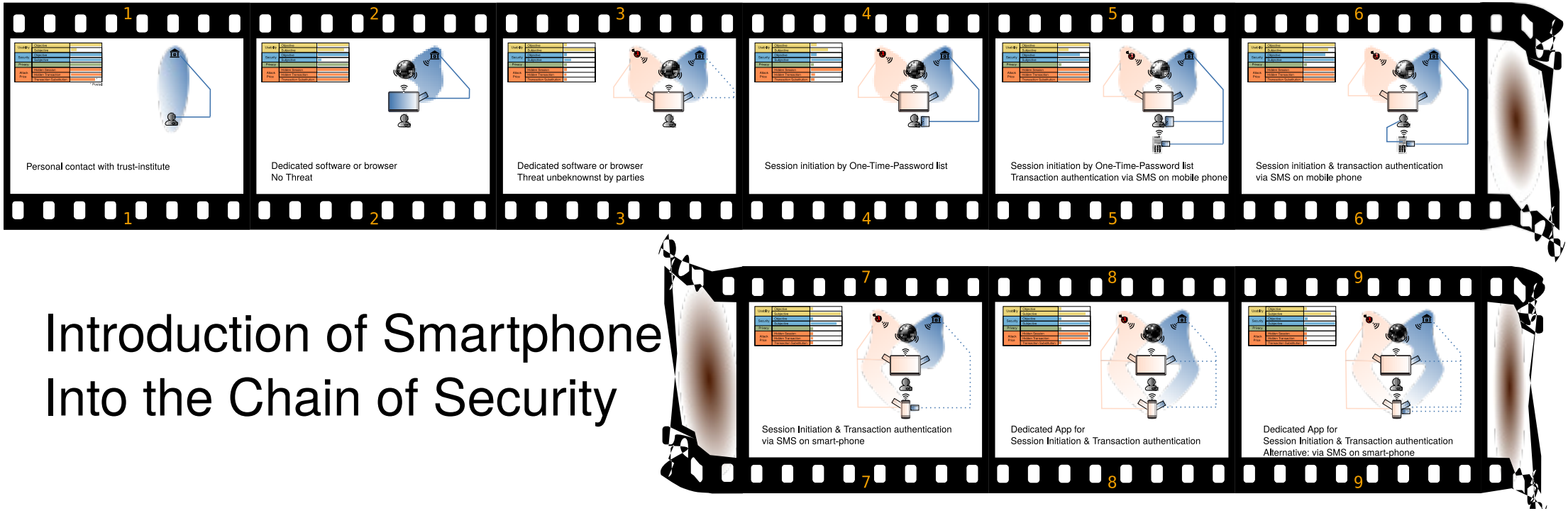


Session initiation & transaction authentication via SMS on mobile phone

Introduction of Smartphone Into the Chain of Security



Usability	Objective	
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Attack Price	Hidden Session	
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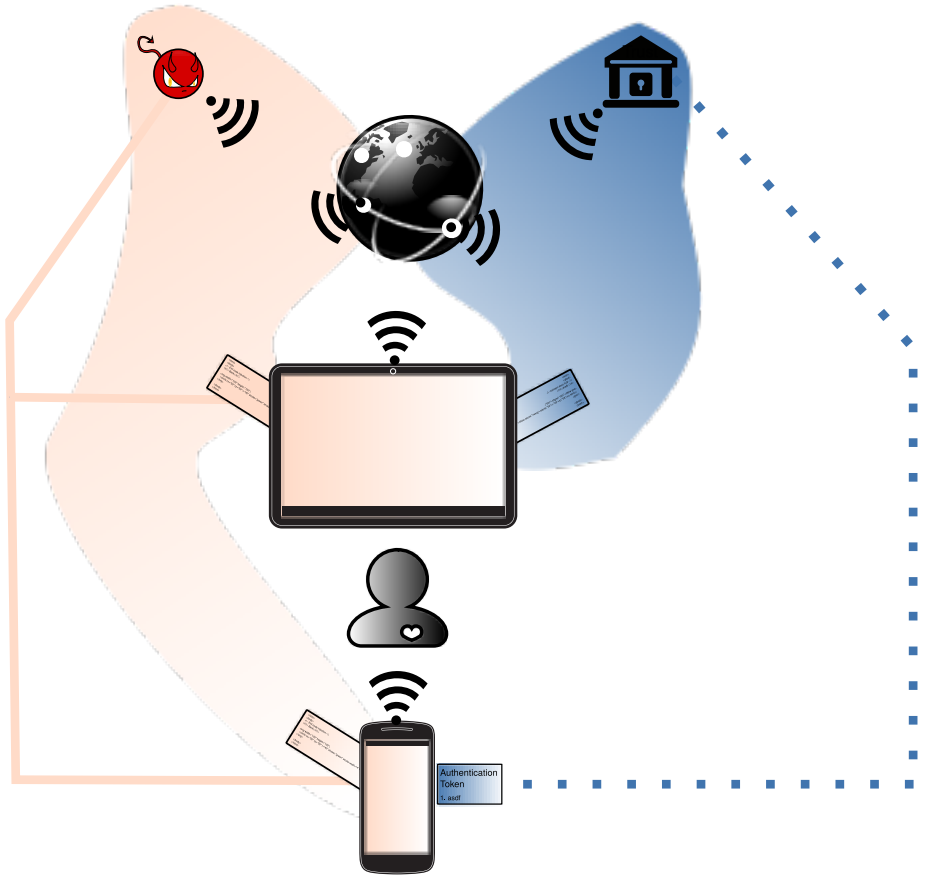

Session Initiation & Transaction authentication via SMS on smart-phone

3

Usability	Objective	
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Security	Objective	
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Privacy		
Attack Price	Hidden Session	
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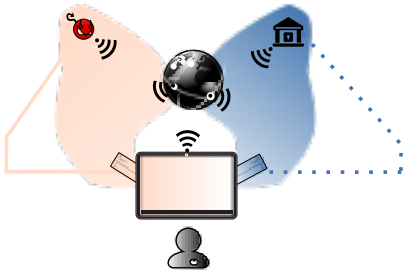

Dedicated software or browser
Threat unbeknownst by parties

3

4

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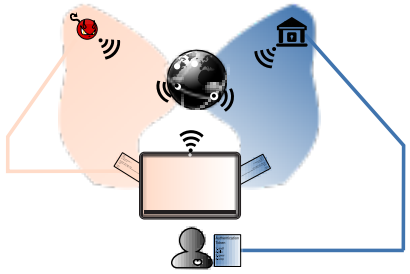

Session initiation by One-Time-Password list

4

ırtphone
ecurity

7

Usability	Objective	
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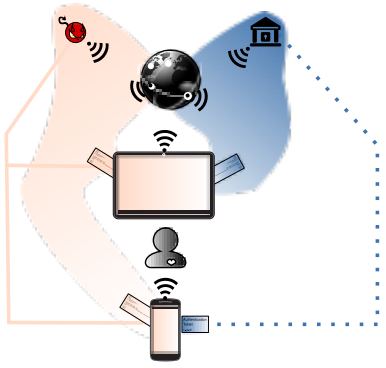

Session Initiation & Transaction authentication
via SMS on smart-phone

8

Usability	Objective	
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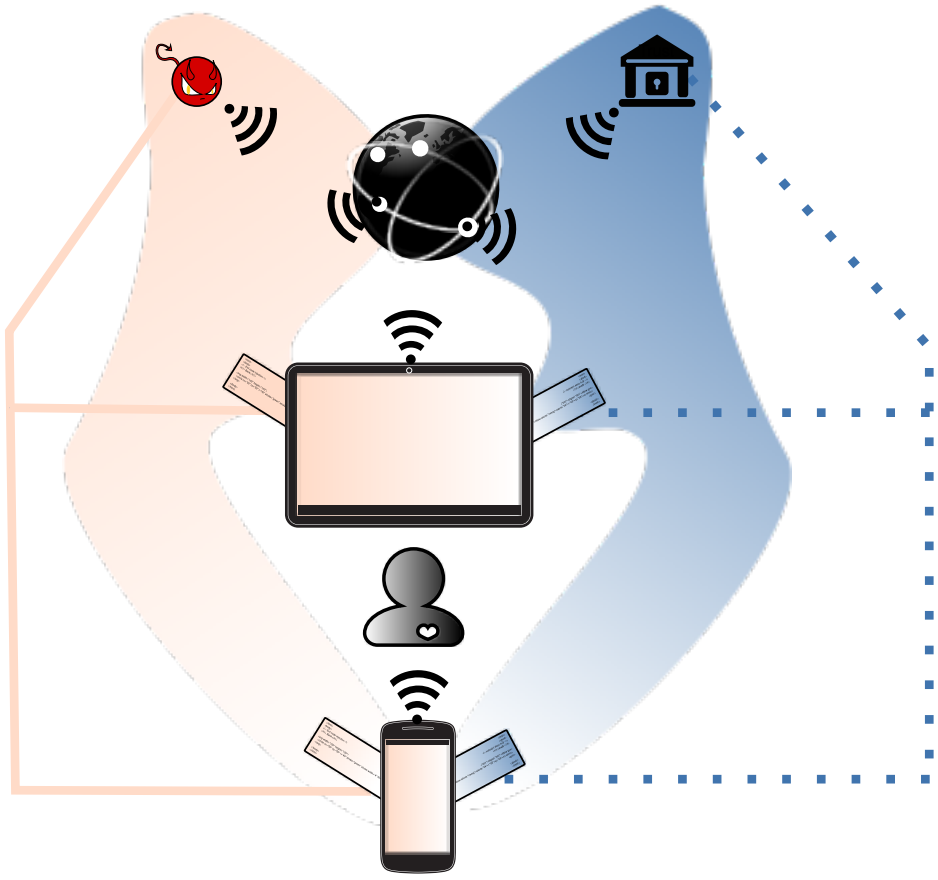

Dedicated App for
Session Initiation & Transaction authentication

Usability	Objective	
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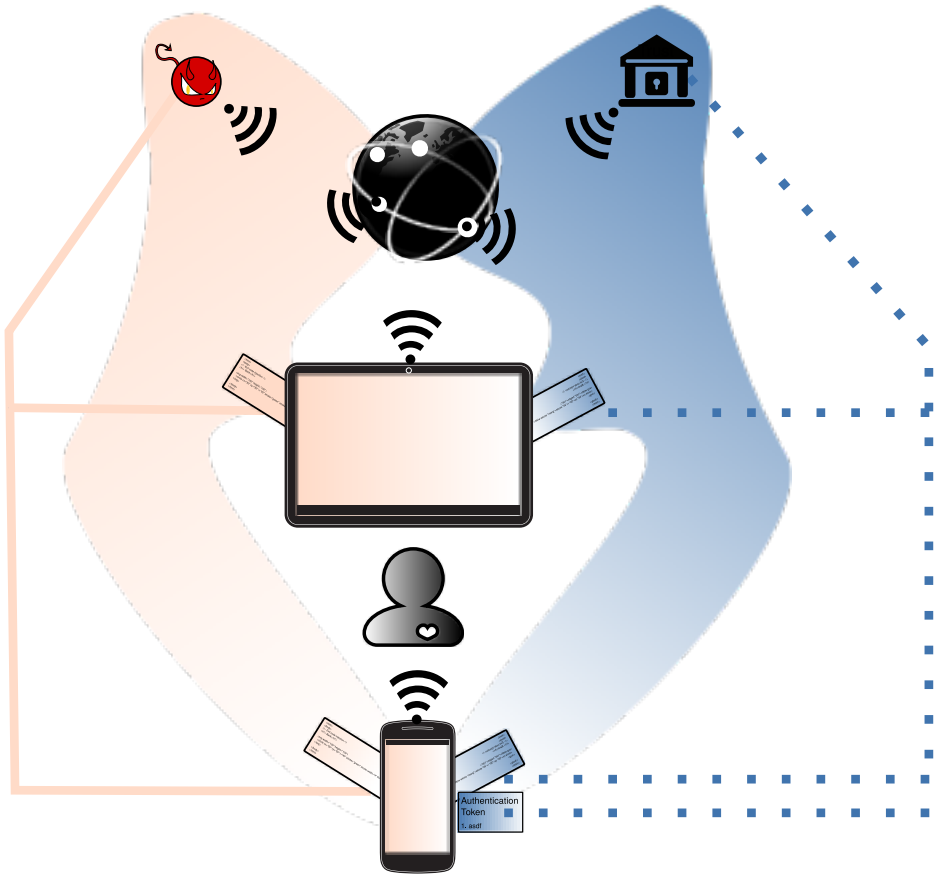
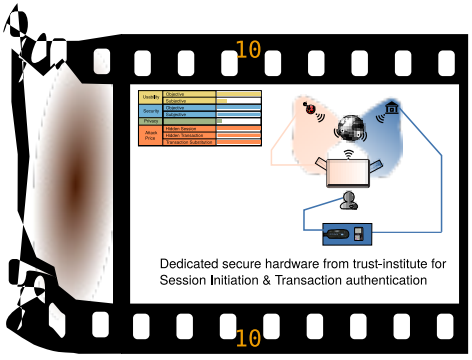


Dedicated App for
Session Initiation & Transaction authentication
Alternative: via SMS on smart-phone



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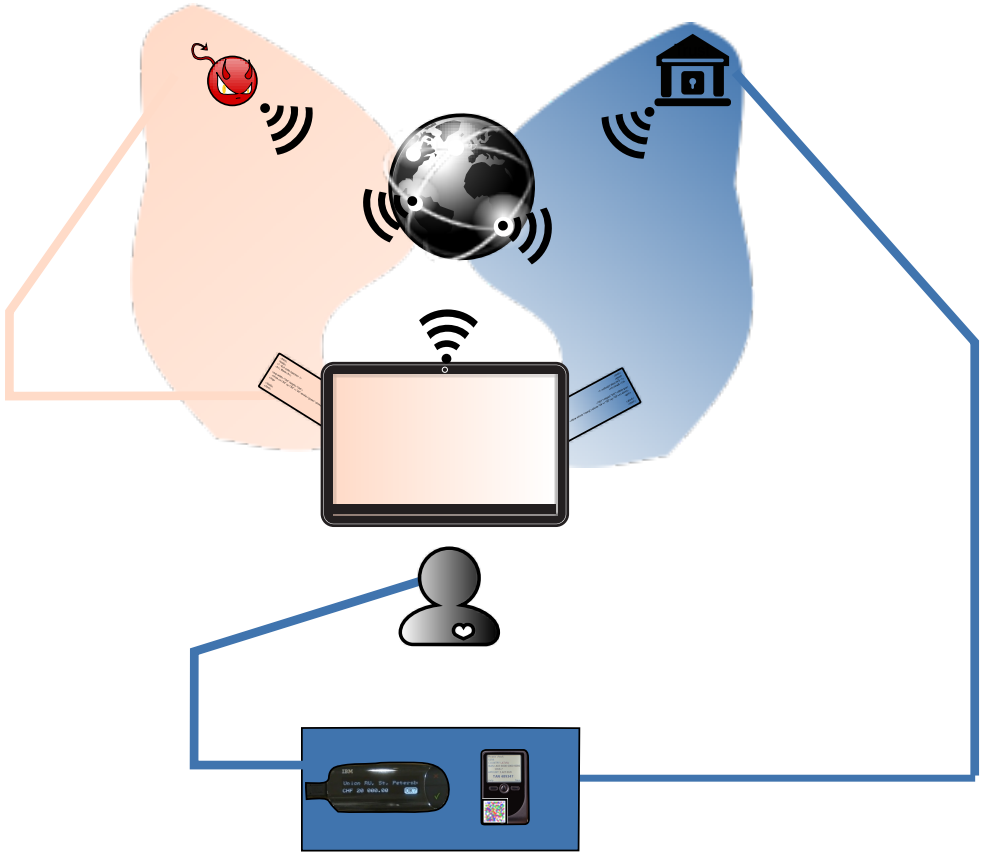

Dedicated secure hardware from trust-institute for Session Initiation & Transaction authentication

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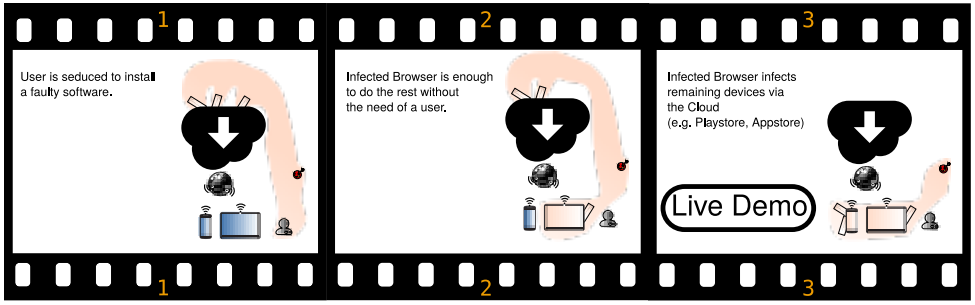
How to Infect *General Purpose Device**

* Uncontrolled Provider
Connected to the Internet
Freely Reprogrammable

An Infected Browser is All It Needs



General Purpose Device*

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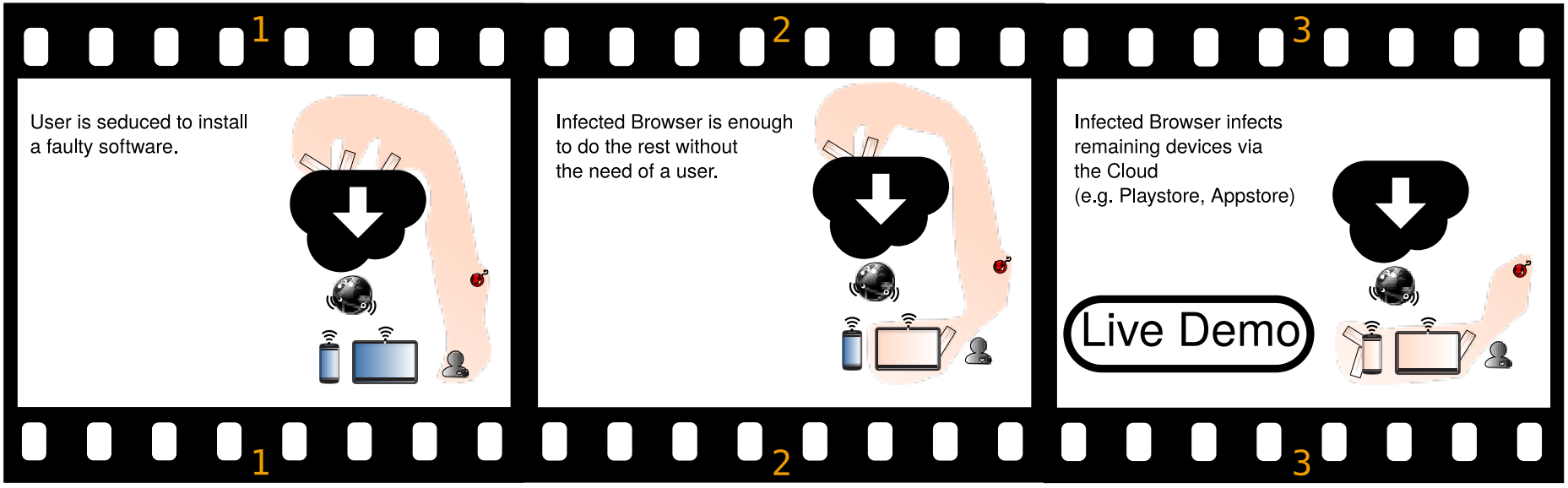
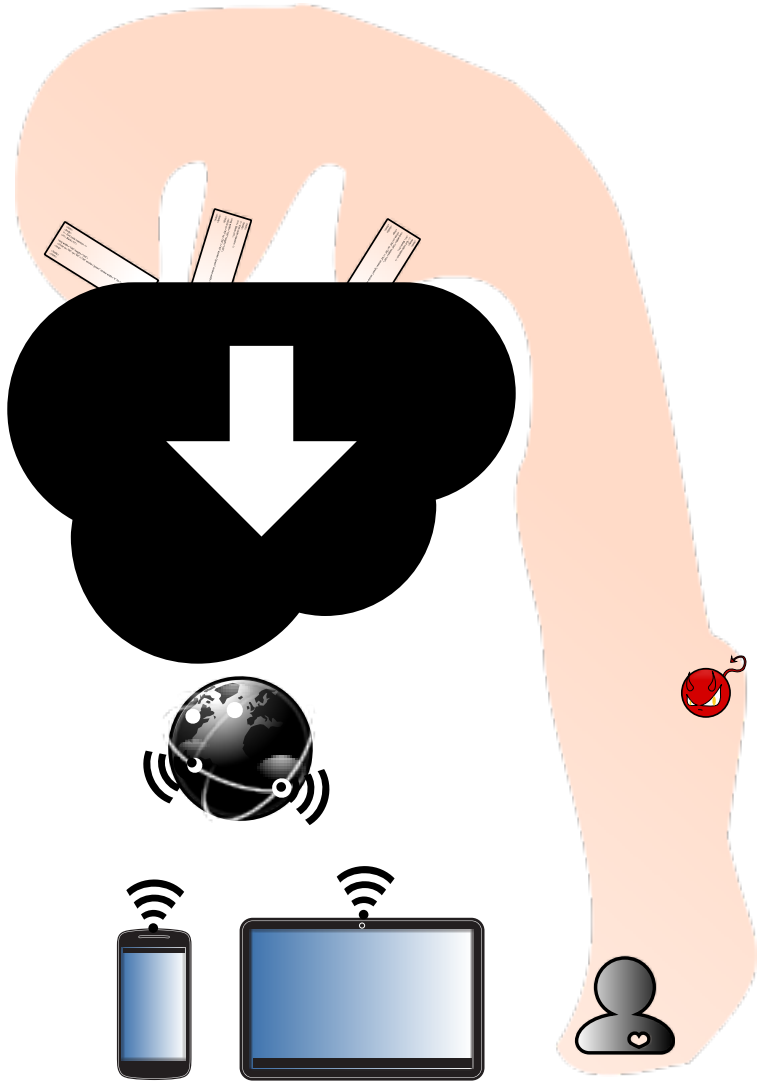


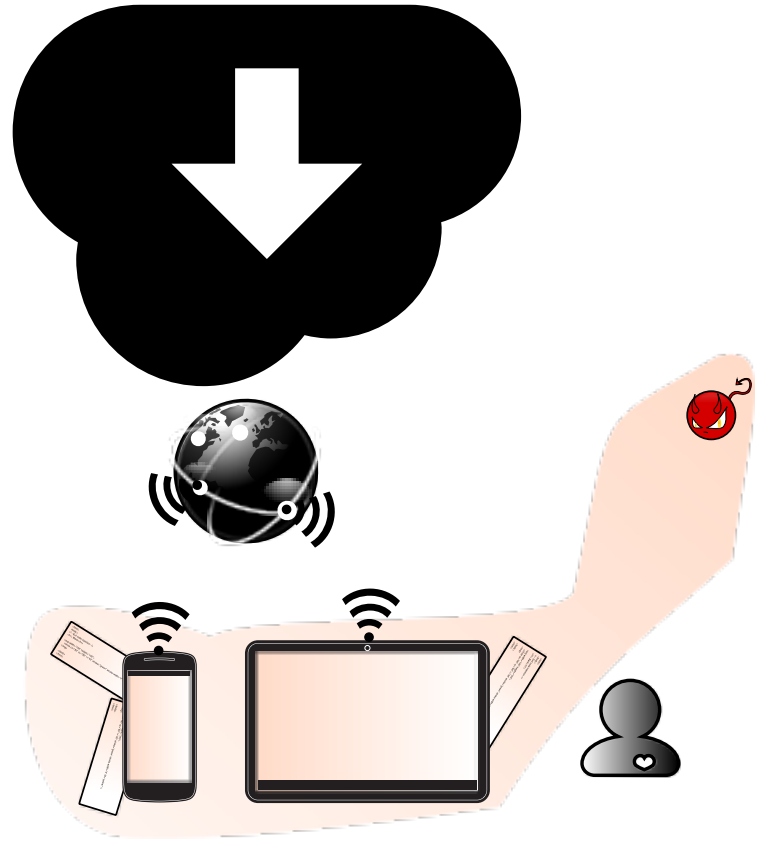
1

User is seduced to install a faulty software.



3

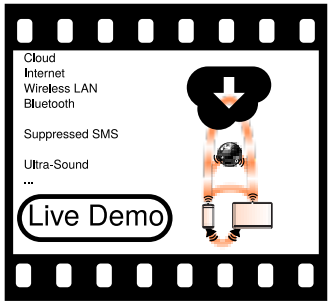
Infected Browser infects
remaining devices via
the Cloud
(e.g. Playstore, Appstore)



Live Demo

How Infected Devices Communicate

There is no Air Gap



There is no Air Gap