DAI-Labor
TU Berlin

Smartphone Malware Evolution Revisited

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CC SEC
Security

14.09.2009 SIDAR Spring 2009 - Stuttgart

Agenda

1. Introduction
2. Background
3. Smartphone Malware Statistics
4. Countermeasures
5. Conclusion

1. Introduction

- Motivation
  - Smartphones get **increasingly popular**
  - Moore‘s law constantly leads to „stronger“ devices
    - Device got attractive to malware writers
  - Smartphones faced **wide range** of malware attacks
  - Most work **end 2006**
    - Continuous information needed for researchers
    - Public data inconsistent

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2. Background

- Malicious Software (Malware)
  - Software with malicious intentions
  - Major categories:
    - **Virus:** Hosting file can be virus itself, mostly needs **user interaction** for propagation
    - **Worm:** malicious code does not necessarily need a hosting file, normally, **no user interaction** needed for propagation
    - **Trojan horse: disguises malicious intention**, user interaction normally needed for propagation (user install)

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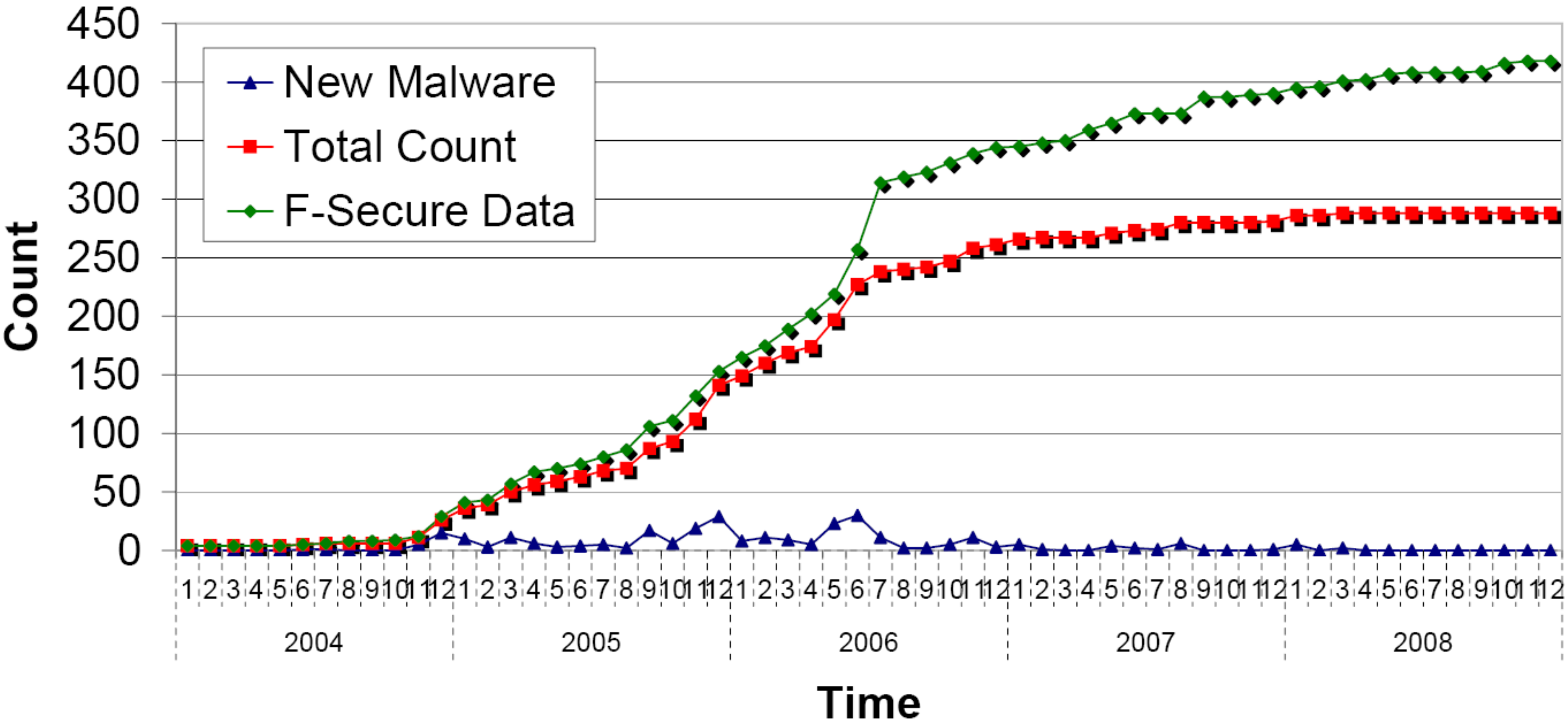
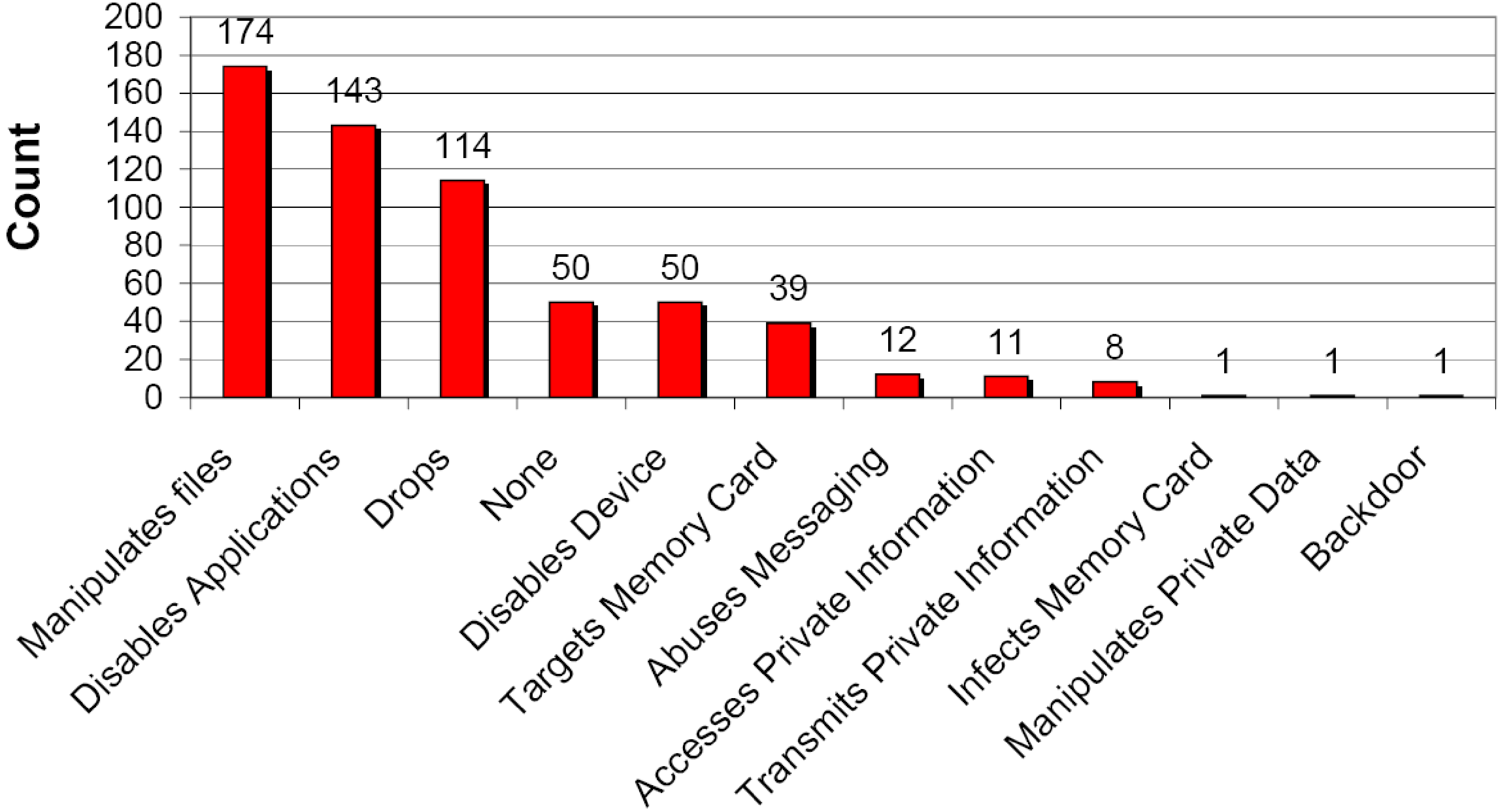
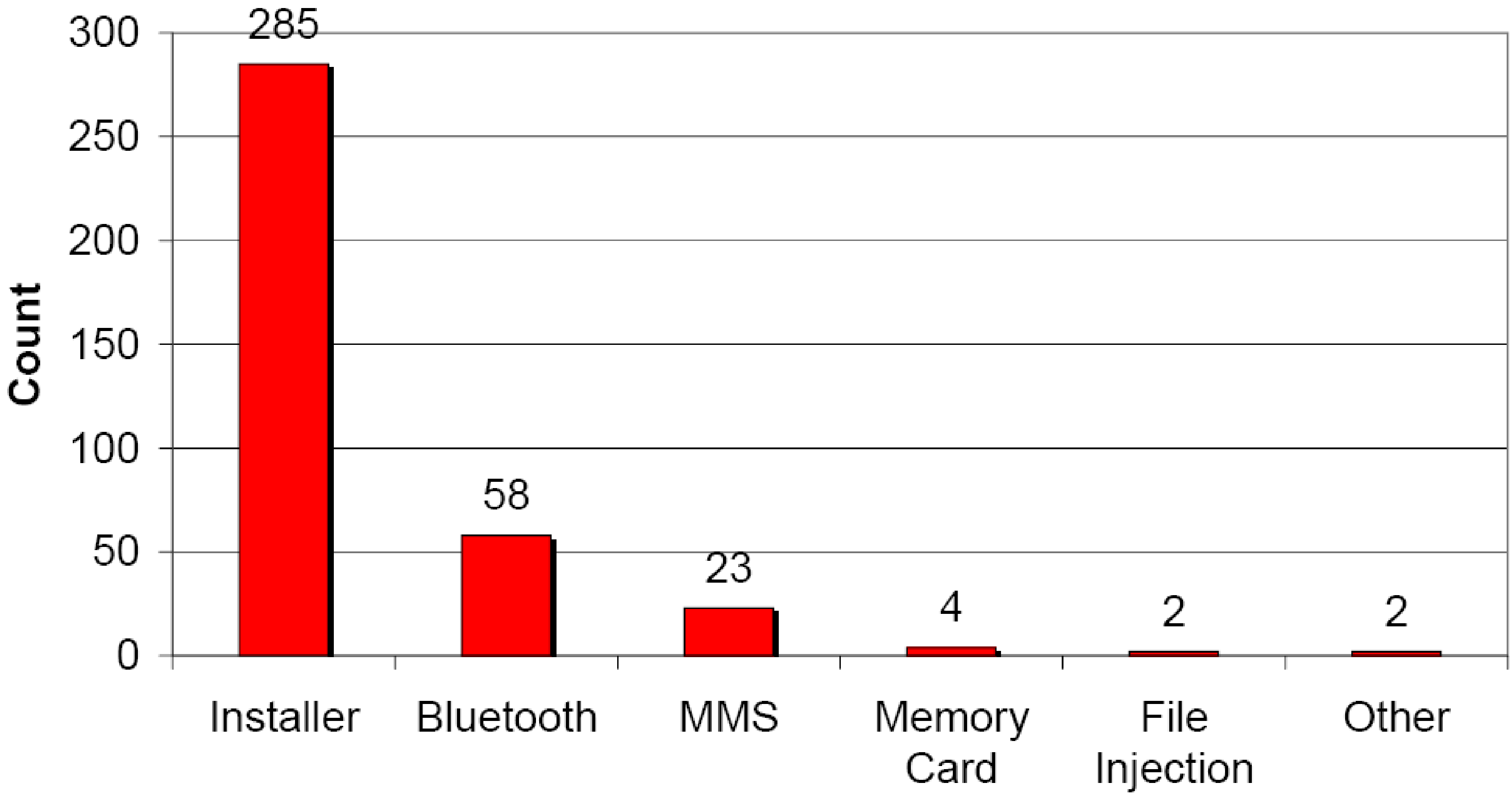
3. Smartphone Malware Statistics Smartphone Malware Appearance



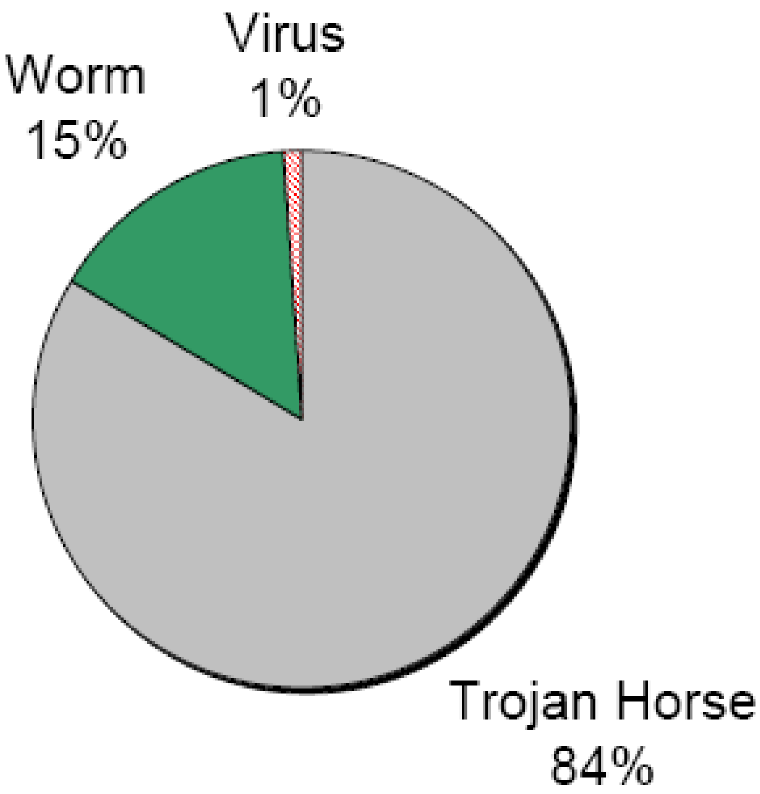
3. Smartphone Malware Statistics
Smartphone Malware Effects

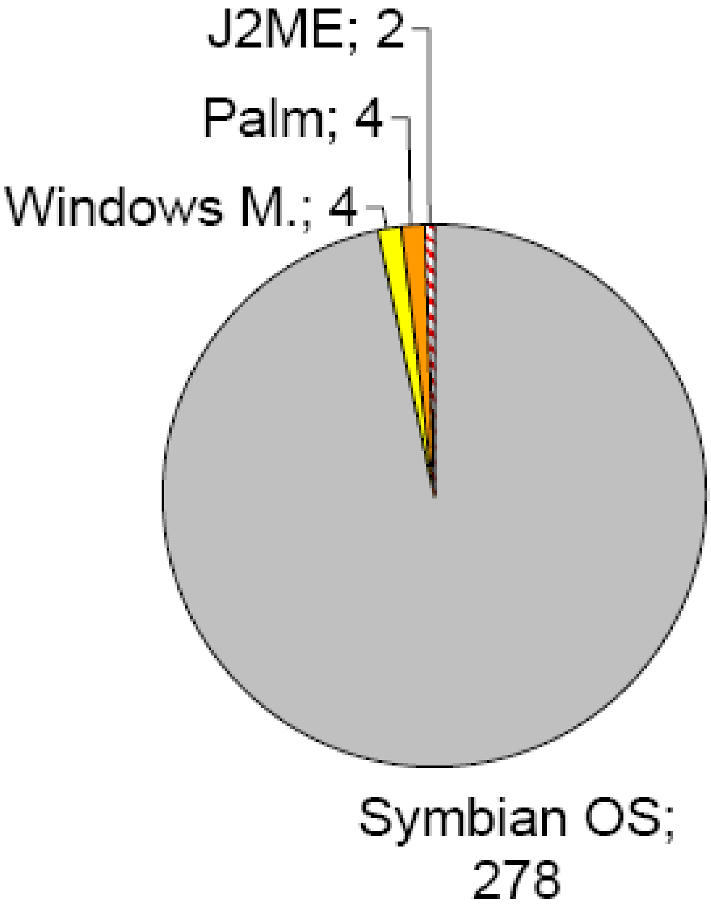


3. Smartphone Malware Statistics
Smartphone Malware Propagation



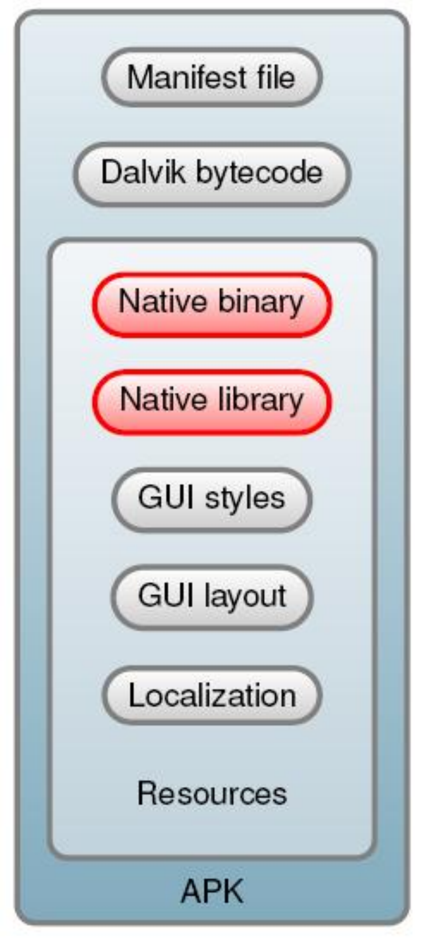
3. Smartphone Malware Statistics Additional Information





Android: Next Target?

- Android
  - Main parts are set open source
- Malware for Android
  - bypass permission system
  - Linux for malicious payload
  - Can reboot a „rooted“ device
    - „Loop of death“ through daemon
- Additionally: always keep an an eye on <u>Collin Mulliner’s</u> work



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4. Countermeasures - AV

- Antivirus software
  - Startet with simple pattern matching
    - 16 Byte were enough
  - Was extended by Wildcard approach
  - Was extended by Mismatch approach
- Smartphone antivirus **limited to signature-based** approaches

4. Countermeasures – AV Improvements: 1st Gen.

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- Hashing
  - Increase speed of comparison
- Generic detection
  - (in most cases simple single string detecting variants)
- Bookmarks
  - Distance start of virus body to matching string
- Top and Tail Scanning
  - Scan first or last bytes ->early viruses mod. these areas
- Entry-point and Fixed-point scanning
  - Start scanning in seperate areas
- Hyperfast scanning
  - Access hd via bios bypassing OS-level API

4. Countermeasures – AV Improvements: 2nd Gen.

- Smart Scanning
  - Ignores nop
- Skeleton Scanning
  - Checks makros line by line for ignoring useless instructions
- Nearly exact identification
  - Two strings to match instead of one
- Exact identification
  - As many as necessary (static) ranges

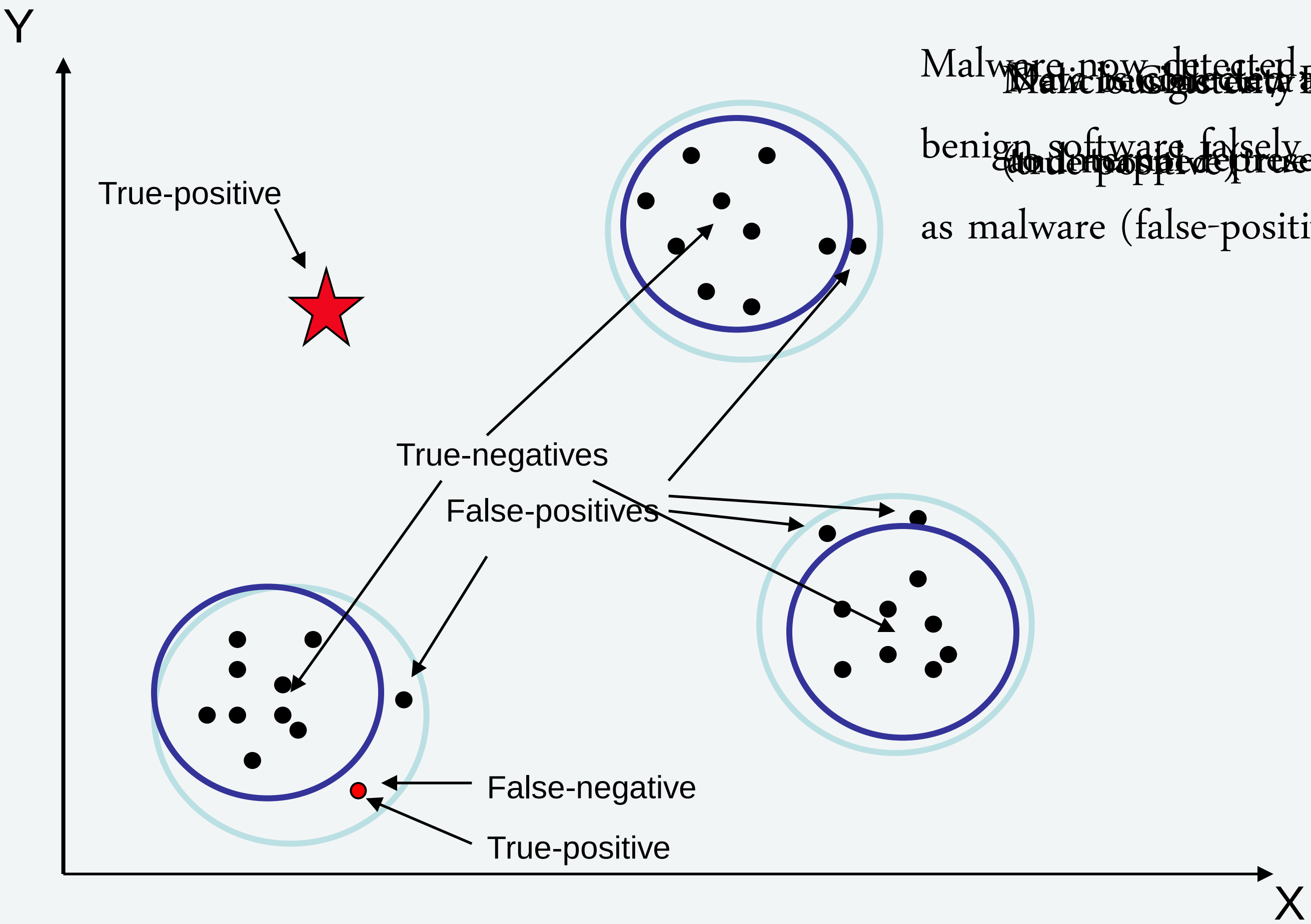
4. Countermeasures – AV Improvements: Further 1/2

- Algorithmic Scanning
  - If standard alg. fails, propietary algorithm is used
  - Formery were hard-coded detection routines
  - Filtering
  - Static decryptor detection
  - Cryptographic detection

4. Countermeasures – AV Improvements: Further 2/2

- Code Emulation
  - Geometric Detection
    - Checks for alteration in file system
  - Heuristic Analysis
    - Basically – behavior-based
- Disassembling
- Heuristic Analysis using Neural Networks
  - Basically applied AI, feature-based

4. Countermeasures – Anomaly Detection



Malware now detected, but new benign software falsely detected as malware (false-positive) [illegible]

4. Countermeasures – Static Function Call Analysis 1/2

- Current solutions use **signatures**
  - Vulnerable to **new/unknown** malware
  - Vulnerable to **old** malware
- **Function call** analysis can be valuable extension
  - Check **similarity** to benign applications
  - **Light-weight** algorithms
  - **High** detection rates

4. Countermeasures – Static Function Call Analysis 2/2

1. Function calls are extracted
   - From common benign software
   - From installed application
2. Function calls are compared
   - Simple string matching for occurrences
3. Occurences are checked for
   - Clusters
   - Statistics

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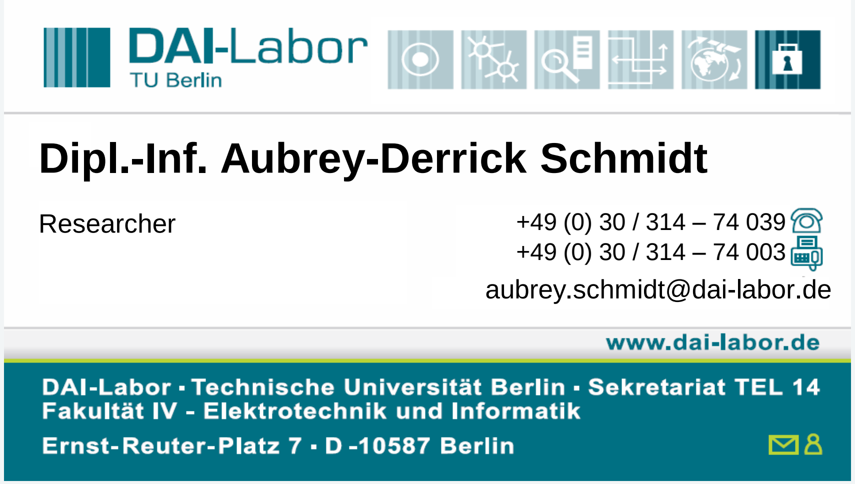
5. Conclusion

- Smartphone malware evolution
  - Main target Symbian
  - New platforms still waiting for malware „in the wild“
  - Countermeasures on smartphones currently limited to signature-based approaches
    - Our research shows that static analysis might be an interesting addition

Kontakt



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