The ZeroTrust Initiative

There is no Security without Transparency

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The ZeroTrust Initiative aims to improve overall IT security by removing forced trust

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Problems…

- we are forced to trust the vendors

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- we are forced to trust the vendors
- no source code for proprietary products
- no reproducible builds for open-source
- trusted build environment?
- secure distribution?
- reproducible installs?
- Spectre / Meltdown

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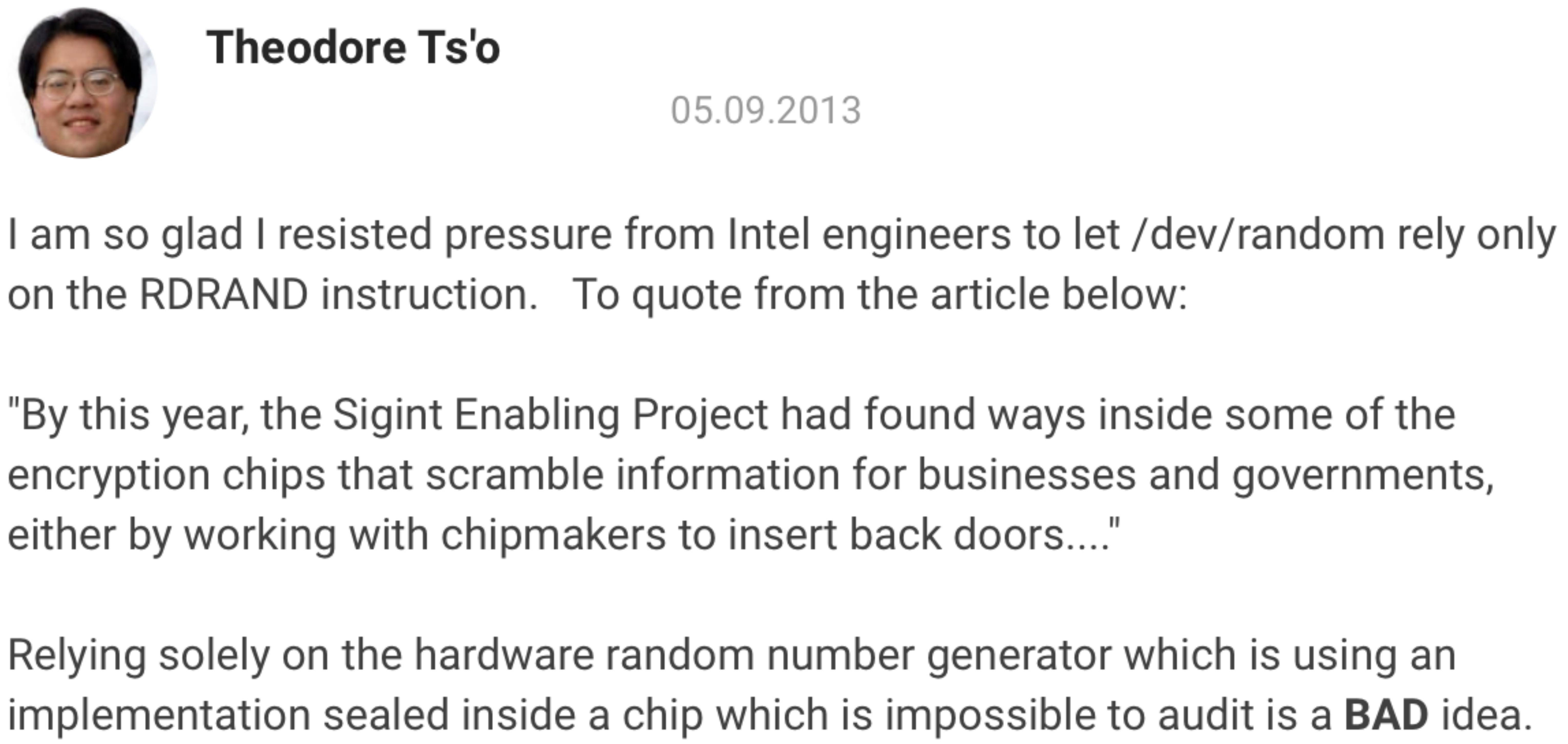
Who is right?

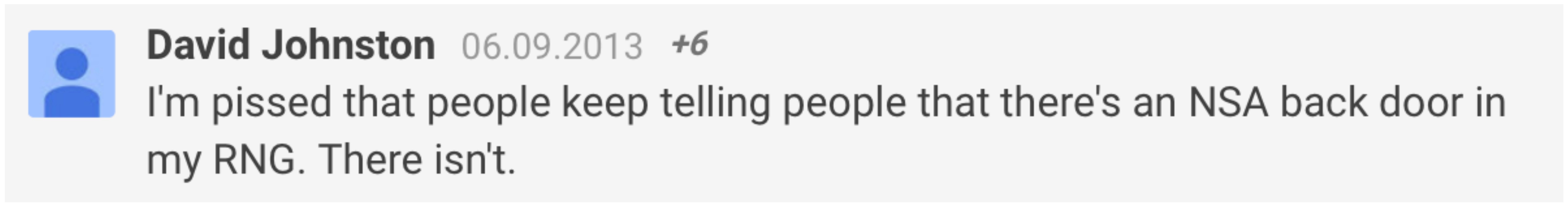

Theodore Ts'o

05.09.2013

I am so glad I resisted pressure from Intel engineers to let /dev/random rely only on the RDRAND instruction.   To quote from the article below:

"By this year, the Sigint Enabling Project had found ways inside some of the encryption chips that scramble information for businesses and governments, either by working with chipmakers to insert back doors...."

Relying solely on the hardware random number generator which is using an implementation sealed inside a chip which is impossible to audit is a **BAD** idea.


David Johnston 06.09.2013 *+6*

I'm pissed that people keep telling people that there's an NSA back door in my RNG. There isn't.

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„If it cannot be verified,
it is not secure”

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Why is that important, exactly?

No source code

„Be suspicious of commercial encryption software, especially from large vendors. My guess is that most encryption products from large US companies have NSA-friendly back doors, and many foreign ones probably do as well. It's prudent to assume that foreign products also have foreign-installed backdoors. Closed-source software is easier for the NSA to backdoor than open-source software.”

Bruce Schneier

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No source code

„Thanks to the recent NSA leaks, people are more worried than ever that their software might have backdoors. If you don't believe that the software vendor can resist a backdoor request, the onus is on you to look for a backdoor. What you want is software transparency.”
prof. Edward W. Felten

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No reproducible builds: different…

- compilers

No reproducible builds: different…

- compilers
- compilation options

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- signatures
- profile-guided optimizations

No reproducible builds

- How small can a backdoor be?

No reproducible builds

- How small can a backdoor be?

OpenSSH 3.0.2 (CVE-2002-0083) - privilege escalation to root

```
-     if (id < 0 || id > channels_alloc) {
+     if (id < 0 || id >= channels_alloc) {
```

No reproducible builds

- How small can a backdoor be?

Assembly

```
cmpl $0x0,0x8(%ebp)           cmpl $0x0,0x8(%ebp)
js   16                       js   16
mov  0x4,%eax                 mov  0x4,%eax
cmp  %eax,0x8(%ebp)           cmp  %eax,0x8(%ebp)
jle  30                       jl   30
mov  0x8(%ebp),%eax           mov  0x8(%ebp),%eax
mov  %eax,0x4(%esp)           mov  %eax,0x4(%esp)
movl $0x4c,(%esp)             movl $0x4c,(%esp)
call 25                       call 25
```

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No reproducible builds

- How small can a backdoor be?

Binary

```
39 45 08 7e 1a 8b 45        39 45 08 7c 1a 8b 45
```

No reproducible builds

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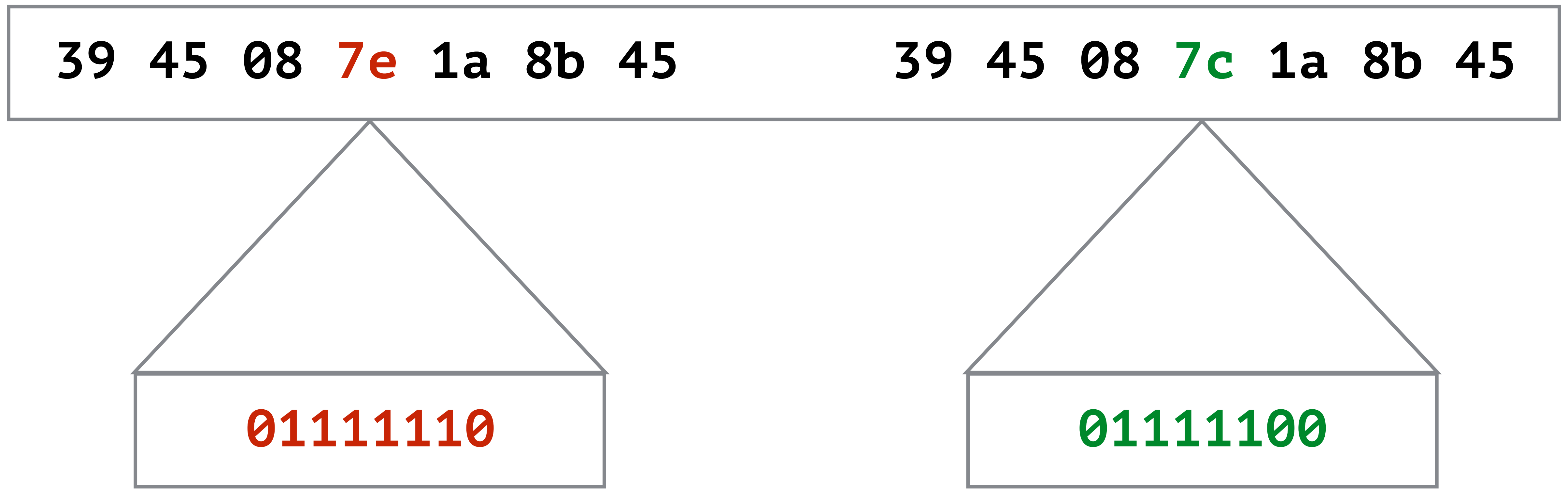
Binary

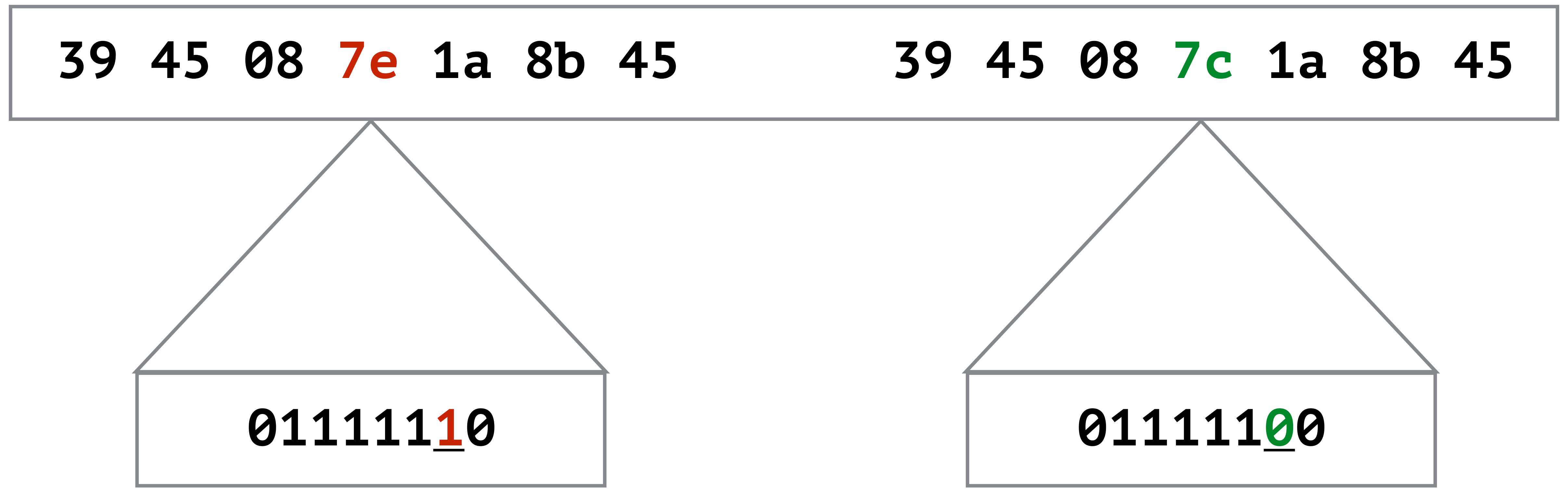


No reproducible builds

- How small can a backdoor be?

Binary

A single bit!



No reproducible builds

- Huge effort to verify TrueCrypt
- On-going work on reproducible builds (TOR, Debian, FreeBSD)
- More awareness among developers needed
- Reflections on Trusting Trust, 1984 Ken Thompson
- Countering Trusting Trust through Diverse Double-Compiling, David A. Wheeler

End-to-end independent verification

- How can you feel secure without it?

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Cryptography

- publicly available algorithms

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Cryptography

- publicly available algorithms
- extensive peer review

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Cryptography

- publicly available algorithms
- extensive peer review
- publicly available cryptoanalysis results

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Cryptography: the result?

- secret, home-grown crypto uncommon

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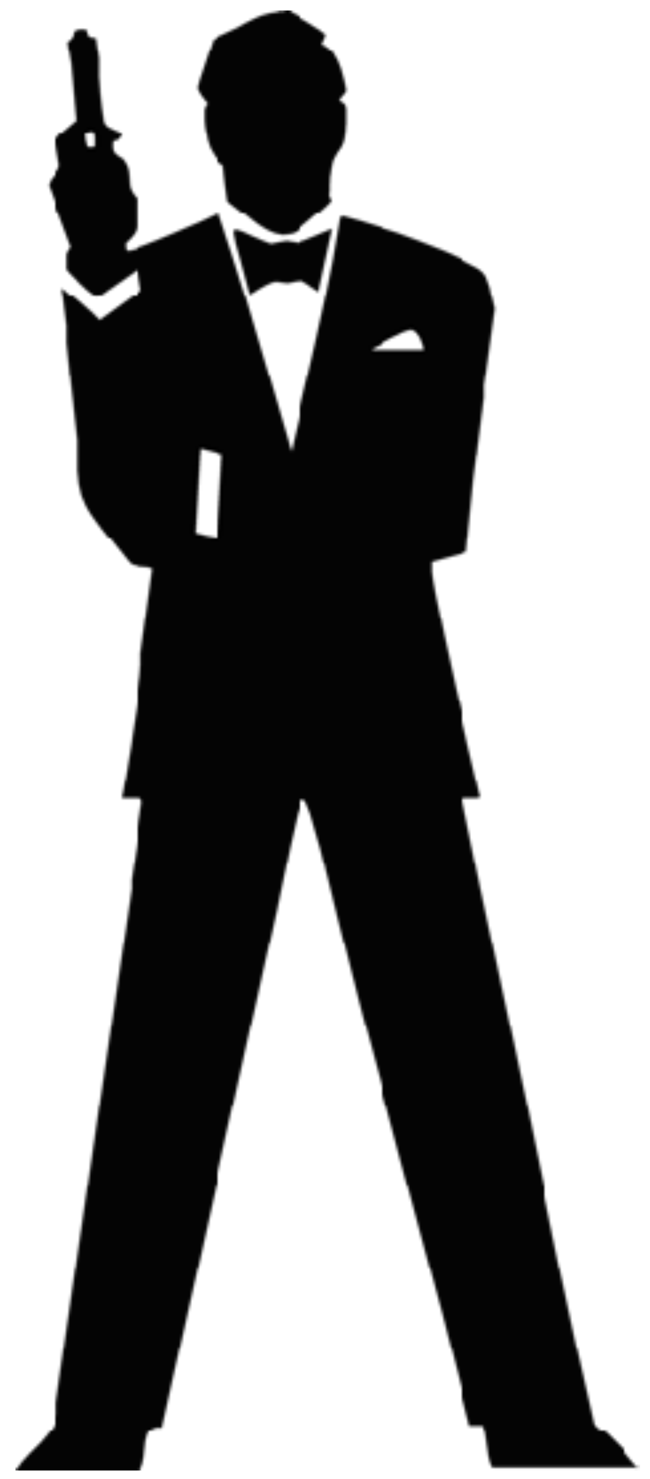
- secret, home-grown crypto uncommon
- the strongest link in the chain

Why not to trust?

- agencies can ask or force organizations to put backdoors



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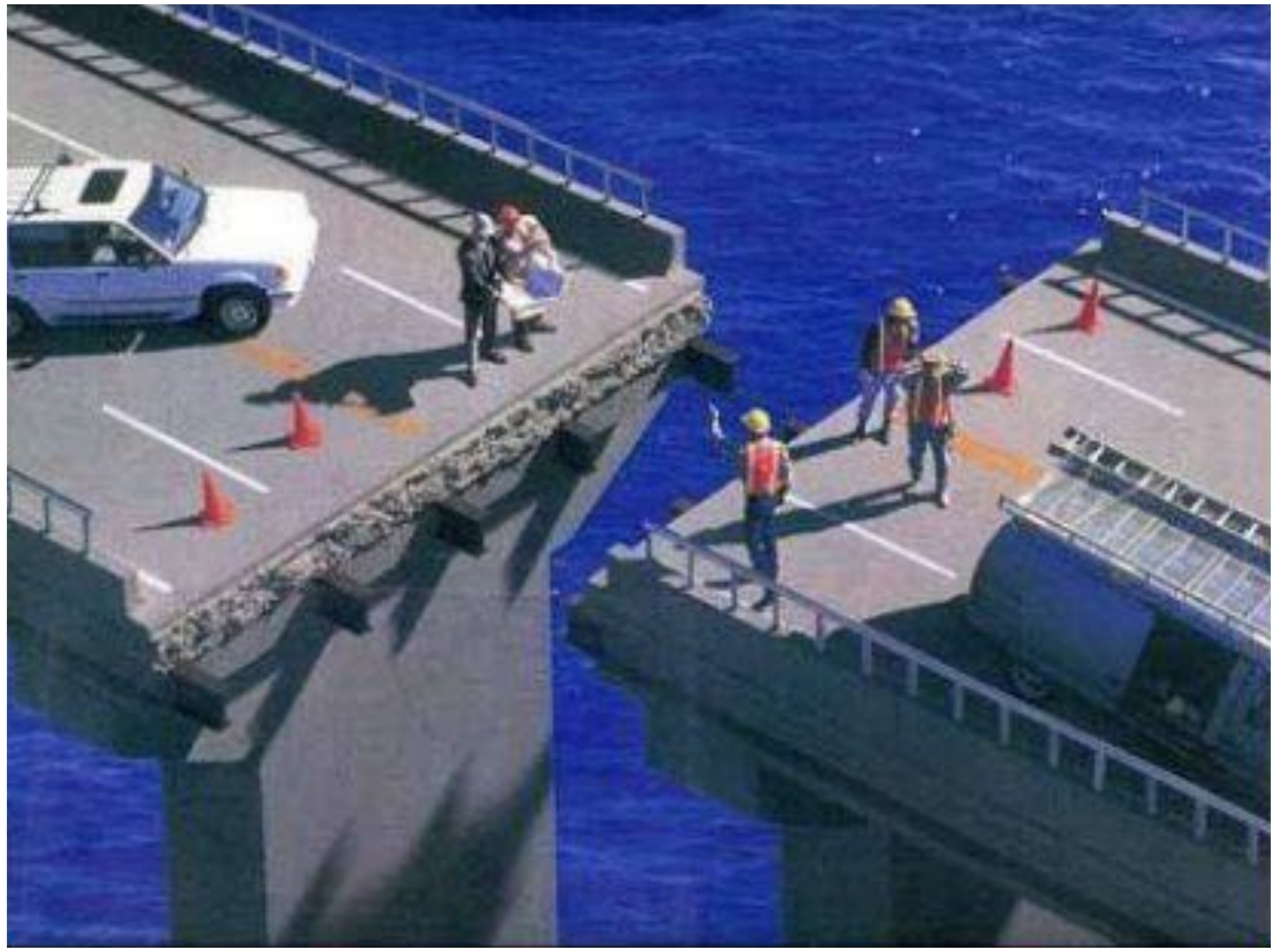

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Why not to trust?

- agencies can ask or force organizations to put backdoors
- people can be criminals
- people can be bribed
- people can be intimidated
- people can be incompetent
- people's computers can be hacked

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The Solution

- don’t destroy business

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- don’t destroy business
- propose a license for auditing/reporting purpose

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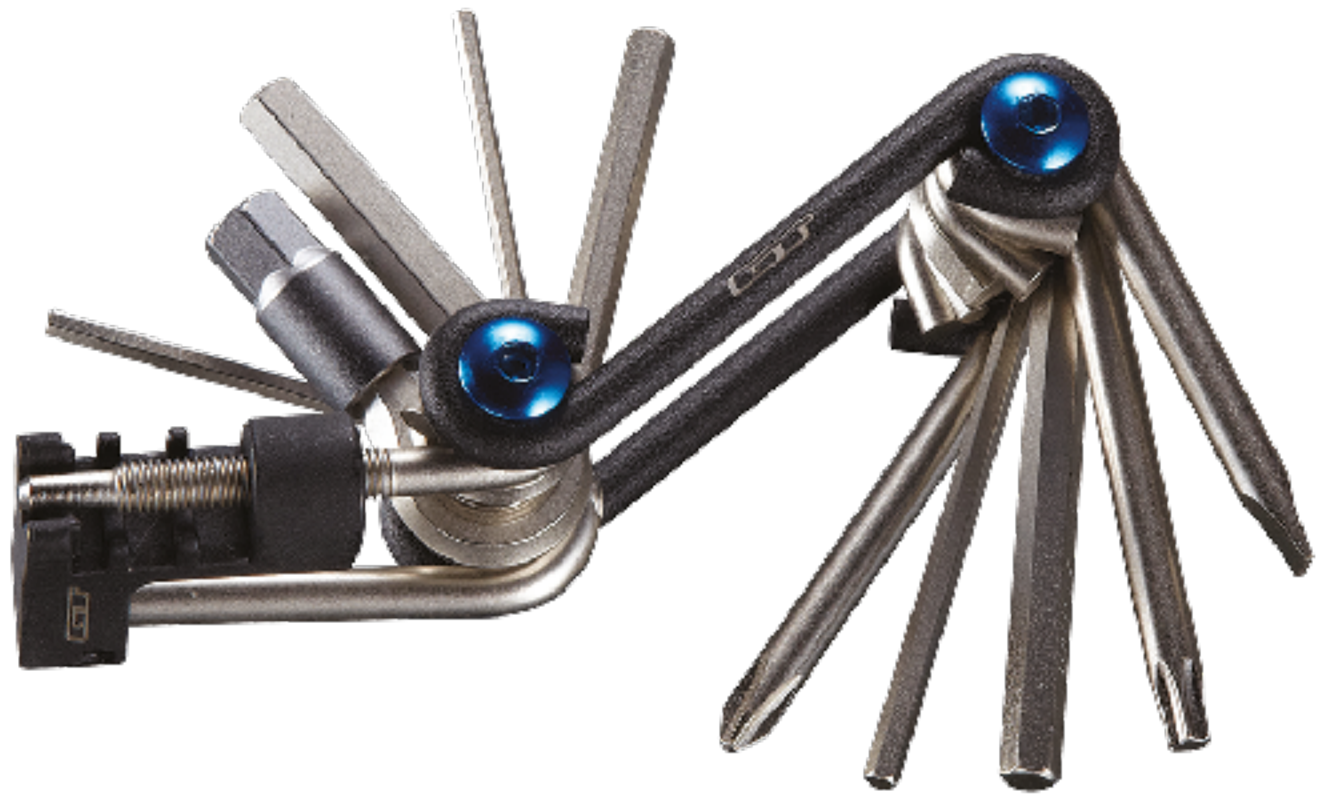
- talk to toolchain vendors



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- propose a license for auditing/reporting purpose
- encourage and promote reproducible builds
- talk to toolchain vendors
- talk to platform vendors to make verification possible
- propose ways to protect IP

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The Ultimate Goal

ZeroTrust as a natural element of security hygiene

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Though questions / Commom concerns

Common concerns

V: We make money by selling our software and we don’t want to destroy our business by giving it away for free.

Common concerns

V: We make money by selling out software and don’t want to destroy our business by giving it away for free.

ZT: The ZTI doesn’t expect your company to start giving products for free. ZTI will propose a license that will allow to release the source code, but only for auditing and reporting purposes.

Common concerns

V: We don’t want our competitors to use our code which we will release as Open Source.

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ZT: With ZTI license that would be illegal. Your competitor will also have disadvantage, because of not releasing the code.

Common concerns

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ZT: Then don’t release it. We fully understand it might be too expensive and too risky to release current source code. But when you start building a new product, do it according to the ZTI ideology.

Common concerns

V: It won’t work, nobody will be interested, we are too big to try.

Common concerns

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ZT: Start in small steps. Release ZeroTrust version of your product, with limited functionality and see what the market will choose.

Common concerns

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ZT: Bad idea. This means people who care, will need to wait for your product to become possible to verify.

Common concerns

V: Opening the source code solves nothing! No one will ever be able to audit my entire code anyway!

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Common concerns

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ZT: That's possible, of course, but that's not crucial. People may want to audit the code once they suspect something. Independent parties may audit the code and I can choose who to trust. It is much more risky to put a backdoor into a product with open source.

Common concerns

V: Open source software less secure, because it is easier to find security bugs.

Common concerns

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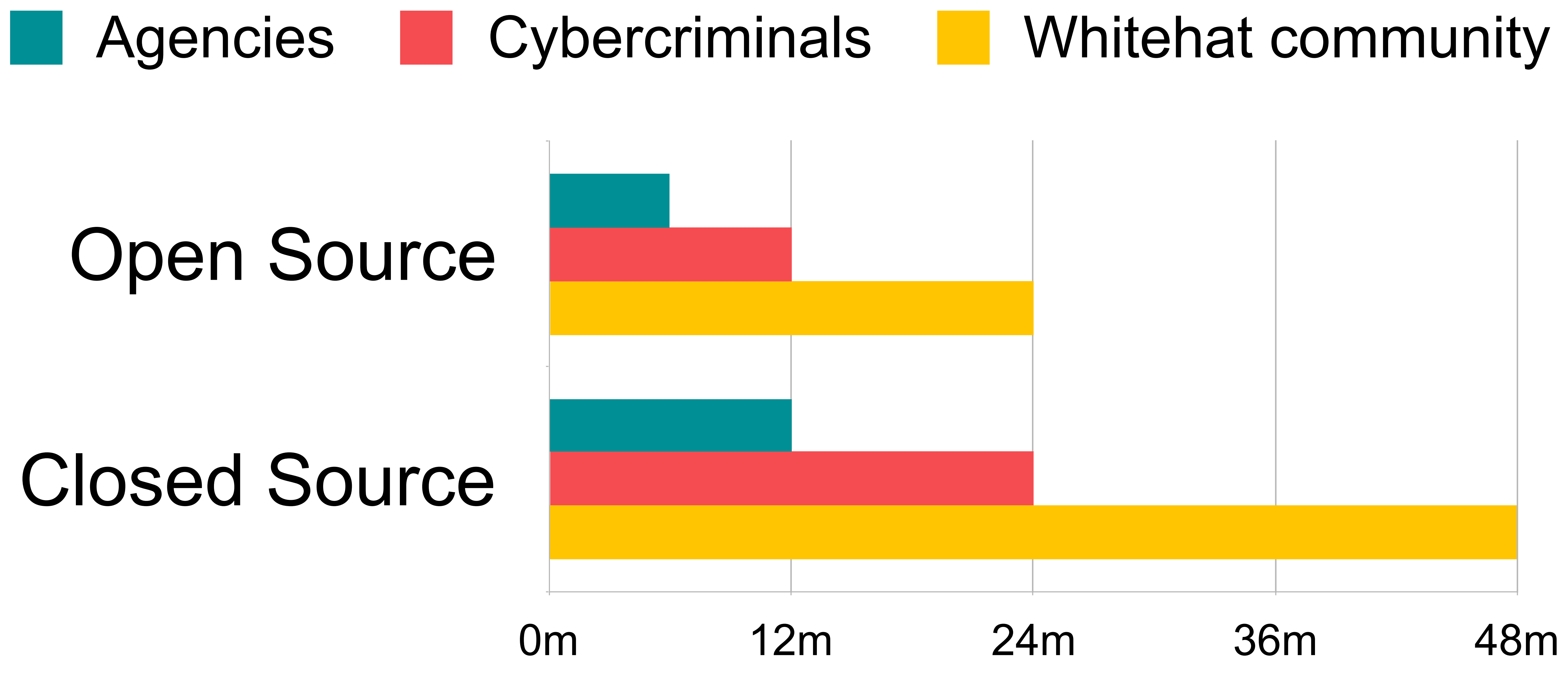
ZT: Yes, it is easier to find bugs, but…

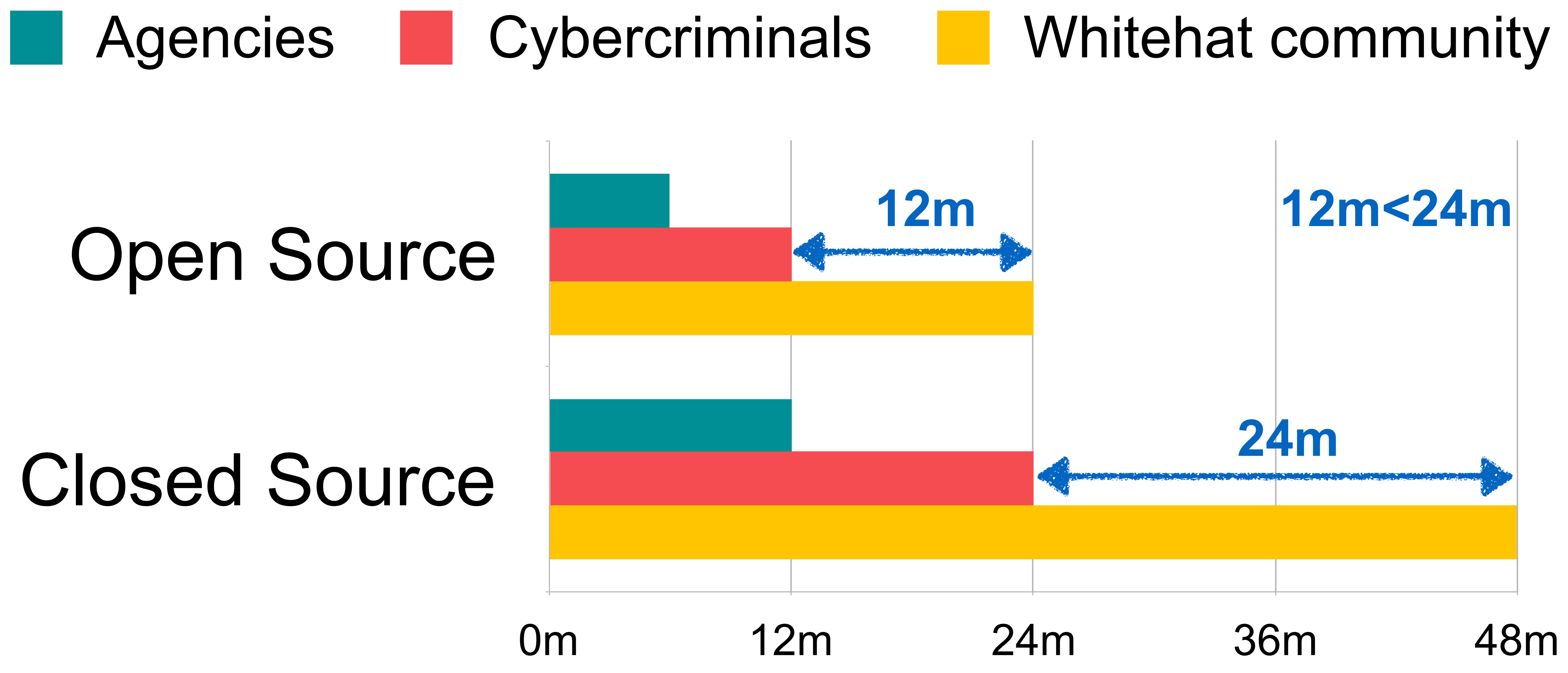
Common concerns

Time to find a security bug



Common concerns

Time the bug can be exploited by Cybercriminals



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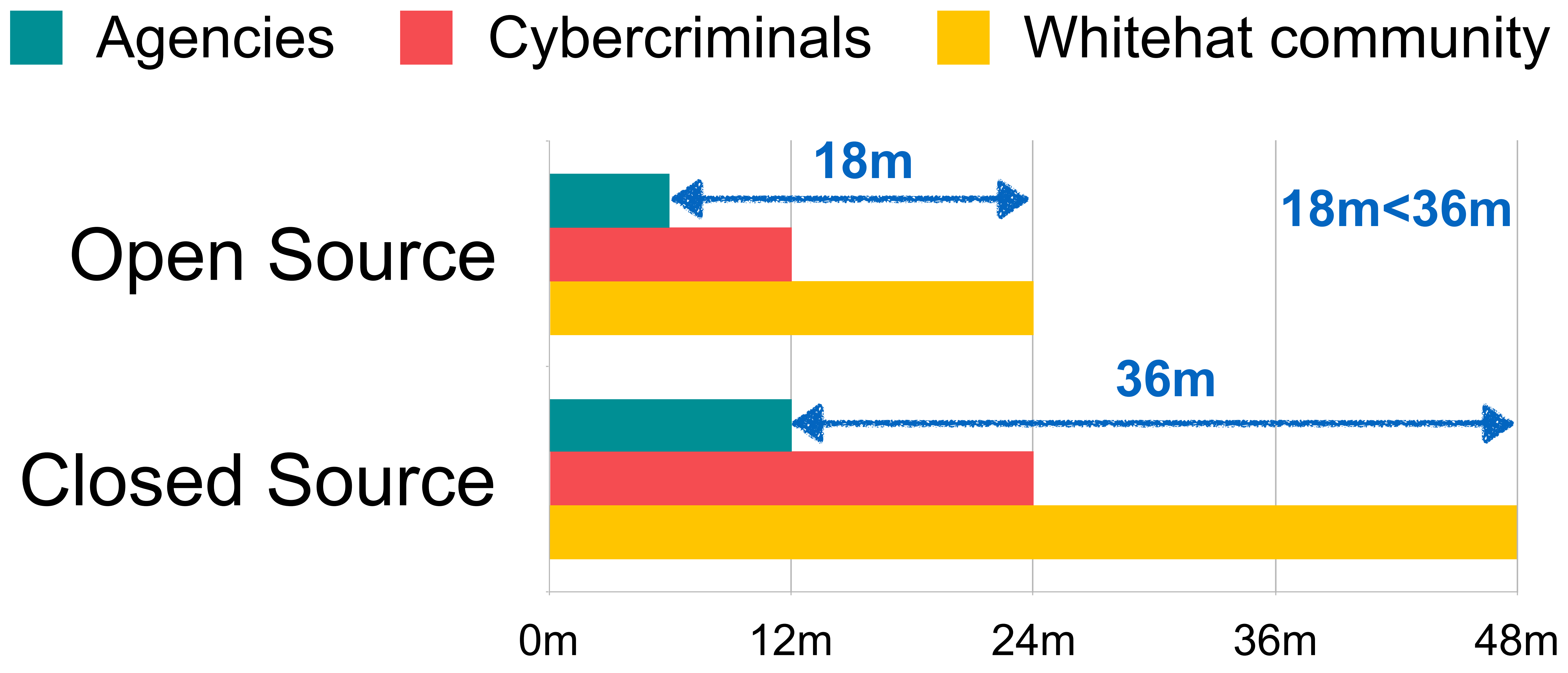
Common concerns

Time the bug can be exploited by Government Agencies



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Common concerns

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ZT: Sure, it is your call. Release as much source code as you can and let your customers decide if this explanation convinces them or maybe they will prefer ZT alternative. You may also design your software so that binary-only functionality is closed in a tight sandbox (look out for side-channel attacks).

Common concerns

V: How can the ZTI ideology be applied to cloud service providers?

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Common concerns

V: How can the ZTI ideology be applied to cloud service providers?

ZT: We don't know yet, but tarsnap, sync.com.

Common concerns

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Common concerns

V: I’m a vendor from the USA and after Edward Snowden leaks nobody trusts me anymore. What do I do?

ZT: Boy, do we have great news for you! Join the ZTI and rebuild your trust!

To sum up…

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- don’t blindly trust the vendors
- having source code is always better, but be sure the source code matches the binaries
- start looking for ZeroTrust products
- support vendors that apply ZTI even if they provide alternative versions of their products - show them that you care

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To sum up…

- don’t blindly trust the vendors
- having source code is always better, but be sure the source code matches the binaries
- start looking for ZeroTrust products
- support vendors that apply ZTI even if they provide alternative versions of their products - show them that you care
- imagine your whole IT infrastructure build on top of ZeroTrust products and it will be so!

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Questions?

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