CIB software

DIGITAL SIGNATURE AND ENCRYPTION WORKFLOWS WITH LIBREOFFICE

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LiMux

Die IT-Evolution

Bundesamt
für Sicherheit in der
Informationstechnik

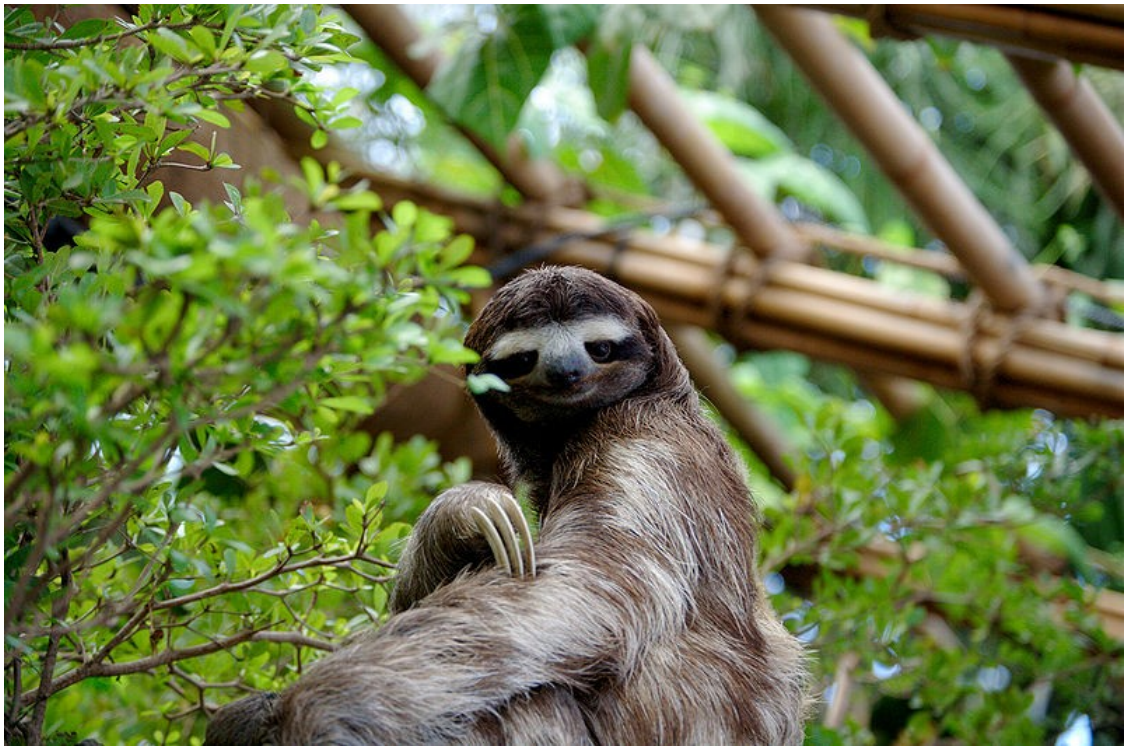
Who am I?

Thorsten Behrens

- since 2015 working for CIB, built our LibreOffice team
- one of the LibreOffice ~~forkers~~/founders, on the board of the foundation
- working on LibreOffice/OpenOffice code since 2001
- hacker, computer scientist, rooting for open source & open standards

It's 2018, y'all!

- it's 2018, and Germany is waking up to digitalisation :)



- ..and now, what can we do with free software?

First off, some background

Alphabet soup of standards

- AdES: https://en.wikipedia.org/wiki/Advanced_electronic_signature
  - PAdES (pdf)
  - XAdES (xml)
  - CAdES (CMS, e.g. s/mime)
  - for the EU: eIDAS - conforming to regulations for PDF signing https://en.wikipedia.org/wiki/EIDAS

A bit of history

- things started in Germany with signaturgesetz from 1997
- which subsequently got replaced by the EU eIDAS regulation in 2016 (with the VDG (Vertrauensdienstegesetz as auxiliary))
- (though eIDAS came into force in 2014 already)
- VDG permits personal certs, and org certs ("Siegel")
- with that the initial, very strict requirements got softened
- e.g. electronic invoices now valid even w/o qualified digital signature

..but:

- *but* - qualified signature helps a lot, in that it has prima facie authenticity
- by now, electronic signatures have been made equivalent (and therefore electronic document interchange) with paper-based contracts in Germany:
  - BGB 126a - https://www.buzer.de/s1.htm?g=BGB&a=126a
  - VwVfG 3a - https://www.buzer.de/s1.htm?g=VwVfG&a=3a
  - ZPO 130a - https://www.buzer.de/s1.htm?g=ZPO&a=130a
  - and ZPO 371a - https://www.buzer.de/s1.htm?g=ZPO&a=371a on authenticity
- higher probative value of a qualified signature, vs. a AdES one

Only a thing in the EU

- only true for EU, not a known concept in the US
- but - eIDAS requires *all* digital signatures, including e.g. openpgp ones, to be admissible as proof -> qualified signatures have higher probative value though
- QES signatures
  - only way to replace written contract
  - needs:
    - certified issuer
    - personally identifiable owner (with exclusive access)
    - also needs certified signature device (SSEE - secure signing engine)
      -> then equivalent to hand-written signature

And in Free Software land?

So we want to be able to do secure, digital aDES workflows with Linux!

- using a certified signing device, like Reiner SCT cyberJack RFID

....

So we want to be able to do secure, digital aDES workflows with Linux!

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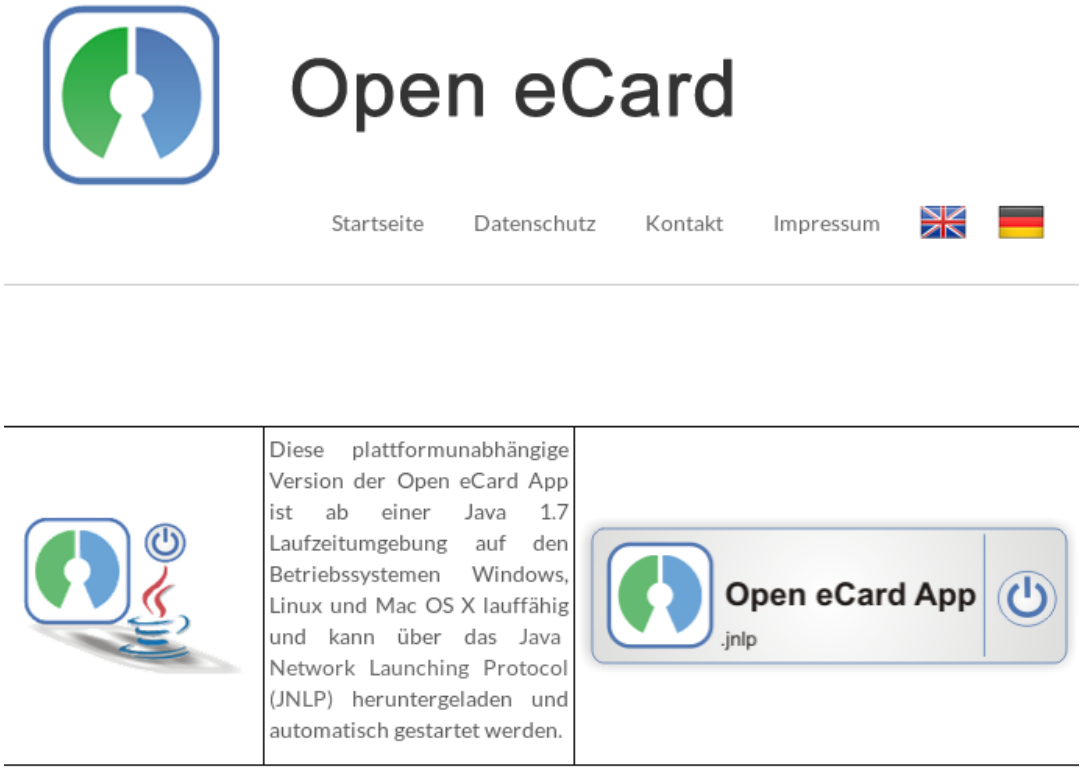
- fixed pcsc-cyberjack for openSUSE
  - upstream horror, no real repo, just tarball dumps..
  - unresponsive upstream
  - but there's people patching stuff, e.g.:
  - https://github.com/nunojpg/pcsc-cyberjack.git
    - https://github.com/thorstenb/pcsc-cyberjack.git
    - https://www.openecard.org/download/pc/
  - ugh java .jnlp - https://jnlp.openecard.org/openecard.jnlp
  - but works, eID functions of nPA are available on Linux now
- with that, just load a QES onto your signature card, and stuff works also on linux
- c.f. BeA ...

So we want to be able to do secure, digital aDES workflows with Linux!

- fixed pcsc-cyberjack for openSUSE – nPA stuff now works!
- Use the open eCard .jnlp to interact with service providers



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LibreOffice and OpenPGP

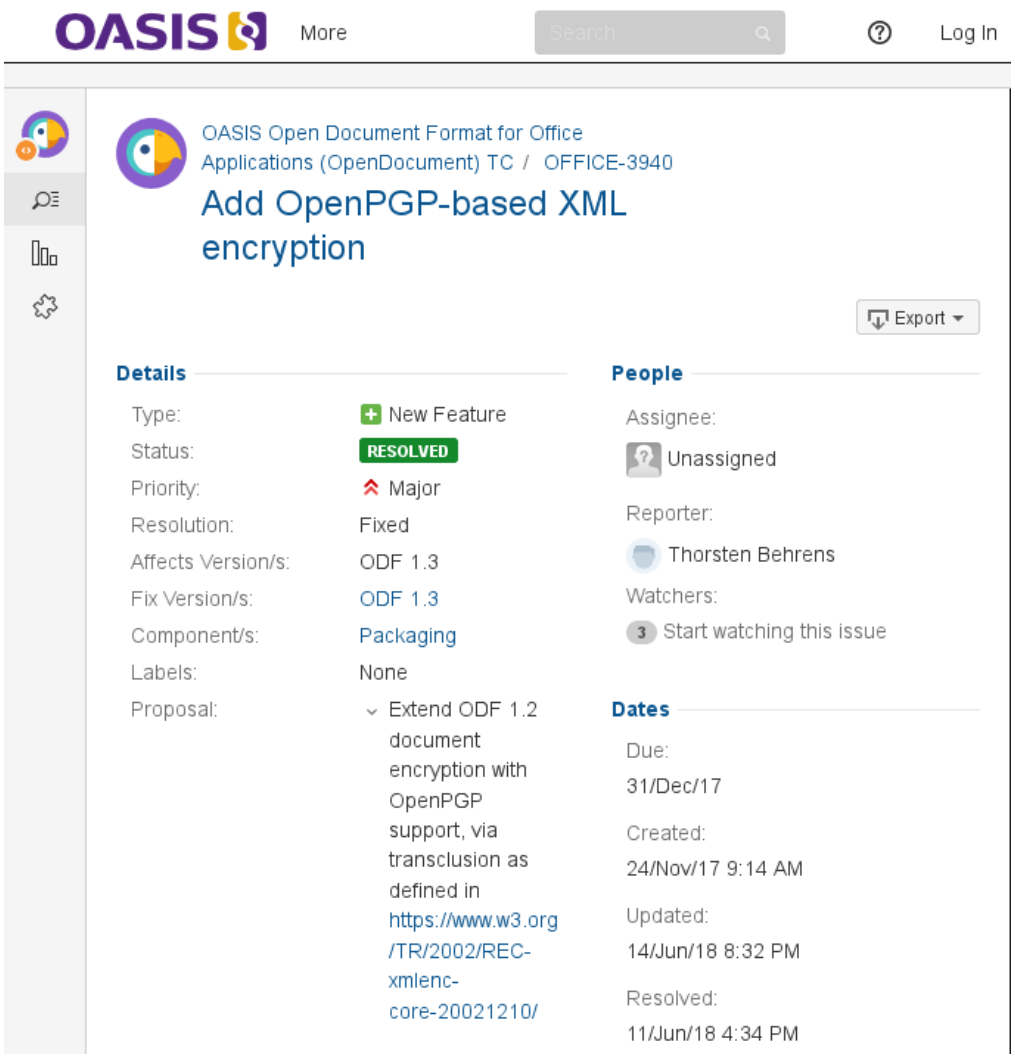
- thanks to BSI, implemented last year, last bits released with LibreOffice 6.0

LibreOffice and OpenPGP

- signing and encryption works since LibreOffice 6.0
- Encryption (with ODF extension namespace) since 6.1
- no time stamps yet -> though this is in theory possible
- GNUPGHOME
- https://issues.oasis-open.org/browse/OFFICE-3940 -> resolved, taken for ODF 1.3
- currently only works for ODF documents
- if you don't see your keys, set GNUPGHOME !

LibreOffice and OpenPGP

- ODF enhancement
  https://issues.oasis-open.org/browse/OFFICE-3940
  -> resolved, taken for ODF 1.3



Gpg4Libre Project

GPG4LIBRE - MOTIVATION

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- we *don't* do enough crypto yet!
- put encryption and signing at user's finger tips
- use something that's
  - cheap
  - ubiquitous
  - peer to peer
  - stable, reliable, cross-platform, and comes with tons of features

ARCHITECTURE

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GnuPG

⋮

GPG4WiN

Seahorse

⋮

IPC / execve

gpgme

LibreOffice
The Document Foundation

ODF™

SEQUENCE DIAGRAM

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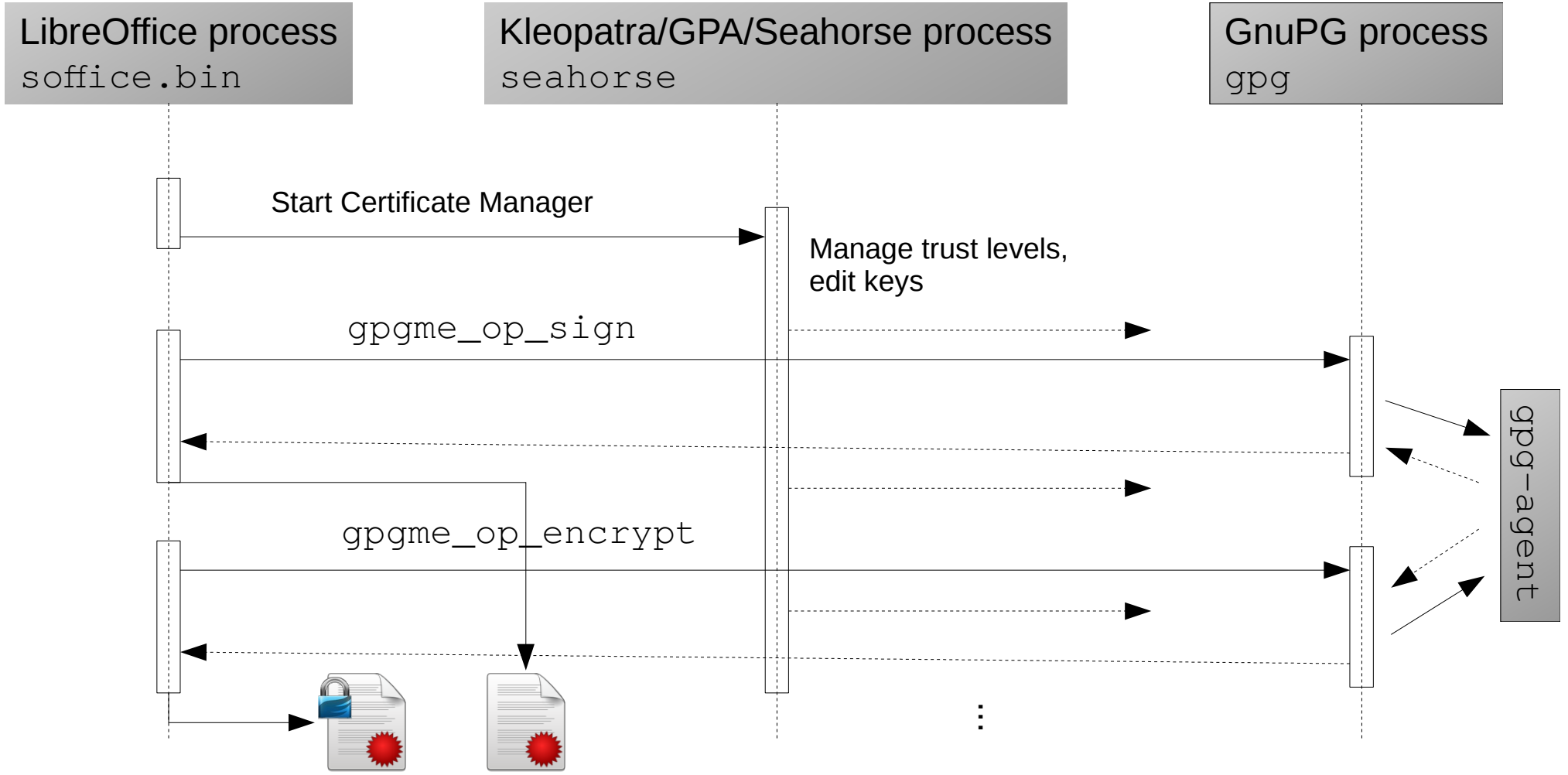

UI IMPROVEMENTS

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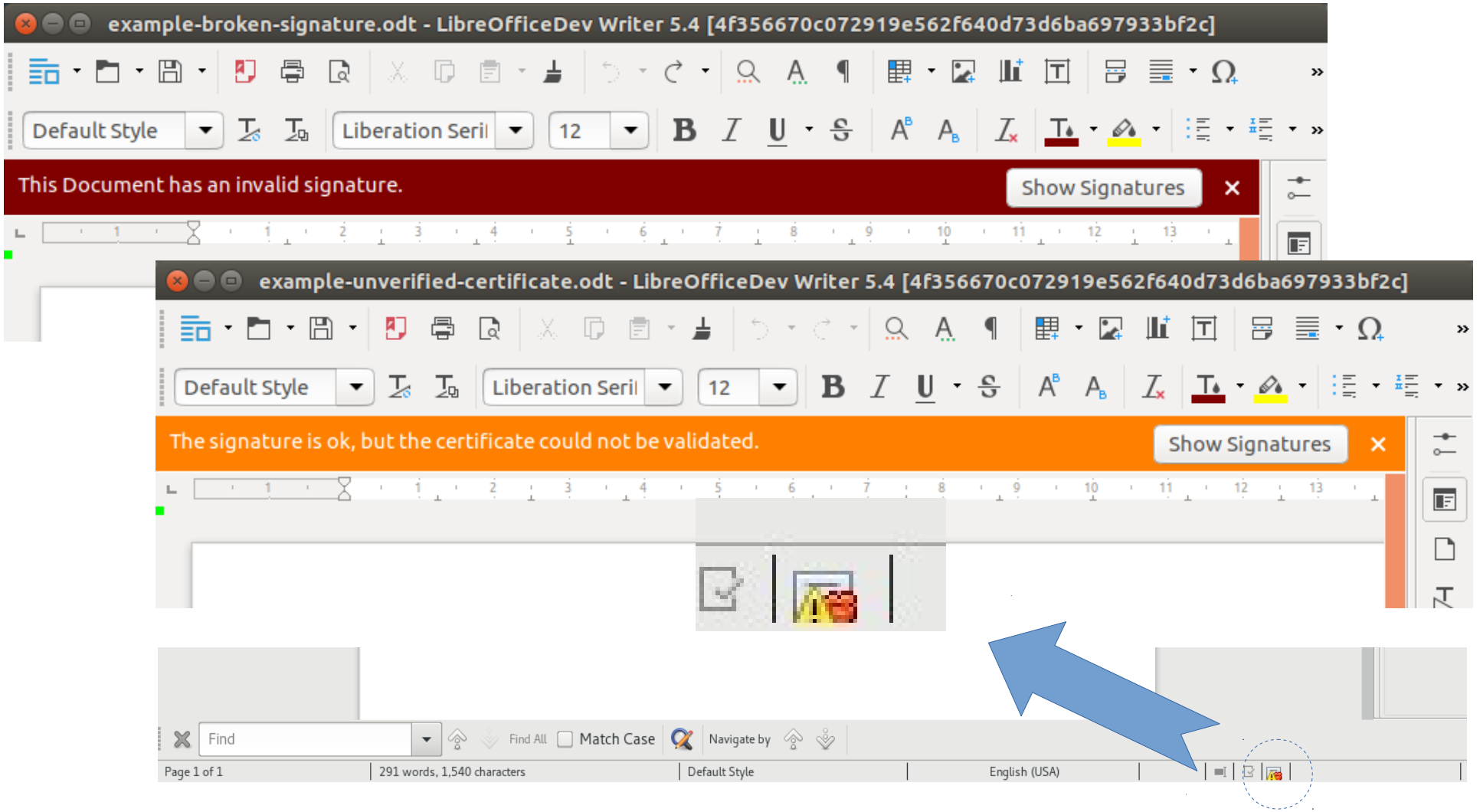

INTEGRATING ALL AVAILABLE KEYS

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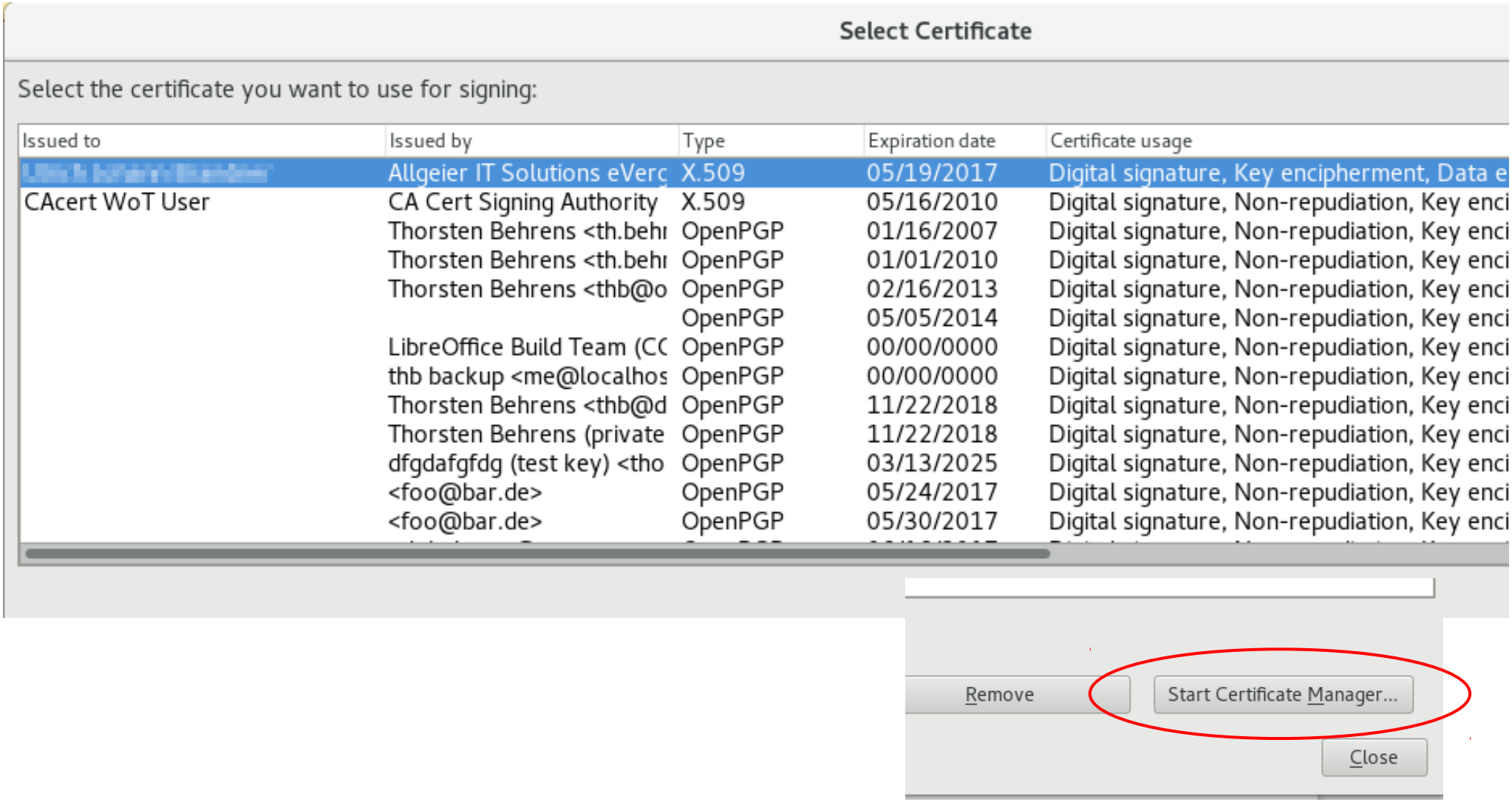

DEFER TO PLATFORM WHERE USEFUL

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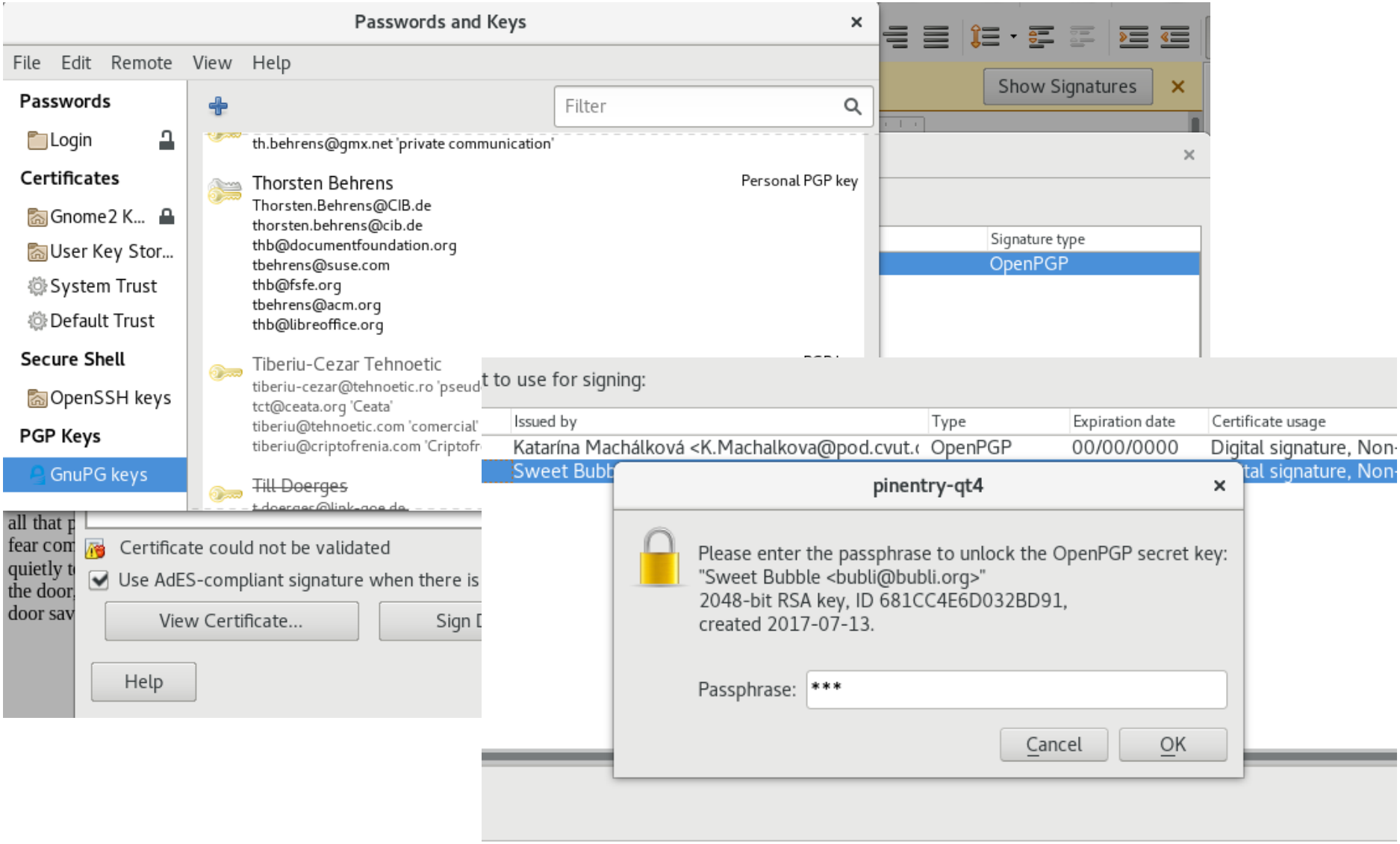

MARKUP: XML SIGNATURES

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Based on: https://www.w3.org/TR/xmldsig-core/

```
<Signature xmlns="http://www.w3.org/2000/09/xmldsig#"">
  <SignedInfo>
    <CanonicalizationMethod Algorithm="http://www.w3.org/TR/2001/REC-xml-c14n-
20010315"/>
    <SignatureMethod Algorithm="http://www.w3.org/2001/04/xmldsig-more#rsa-
sha256"/>
    <Reference URI="styles.xml">
      <Transforms>
        <Transform Algorithm="http://www.w3.org/TR/2001/REC-xml-c14n-
20010315"/>
      </Transforms>
      <DigestMethod Algorithm="http://www.w3.org/2001/04/xmlenc#sha256"/>
      <DigestValue>h8x5UxEL9t9W8UfYEHeLme1JOqpke+H7AaGGFD8qzFY=</DigestValue>
    </Reference>
```

MARKUP: XML SIGNATURES

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Actual OpenPGP-Signature:

```
<SignatureValue>LS0tLS1CRUdJ...tLS0tCg==</SignatureValue>
<KeyInfo>
  <PGPData>
    <PGPKeyID>OTA5QkUyNTc1Q0VEQkVBMw==</PGPKeyID>
    <PGPKeyPacket>LS0tLS1C...S0tCg==</PGPKeyPacket>
  </PGPData>
</KeyInfo>
```

ENCRYPTION

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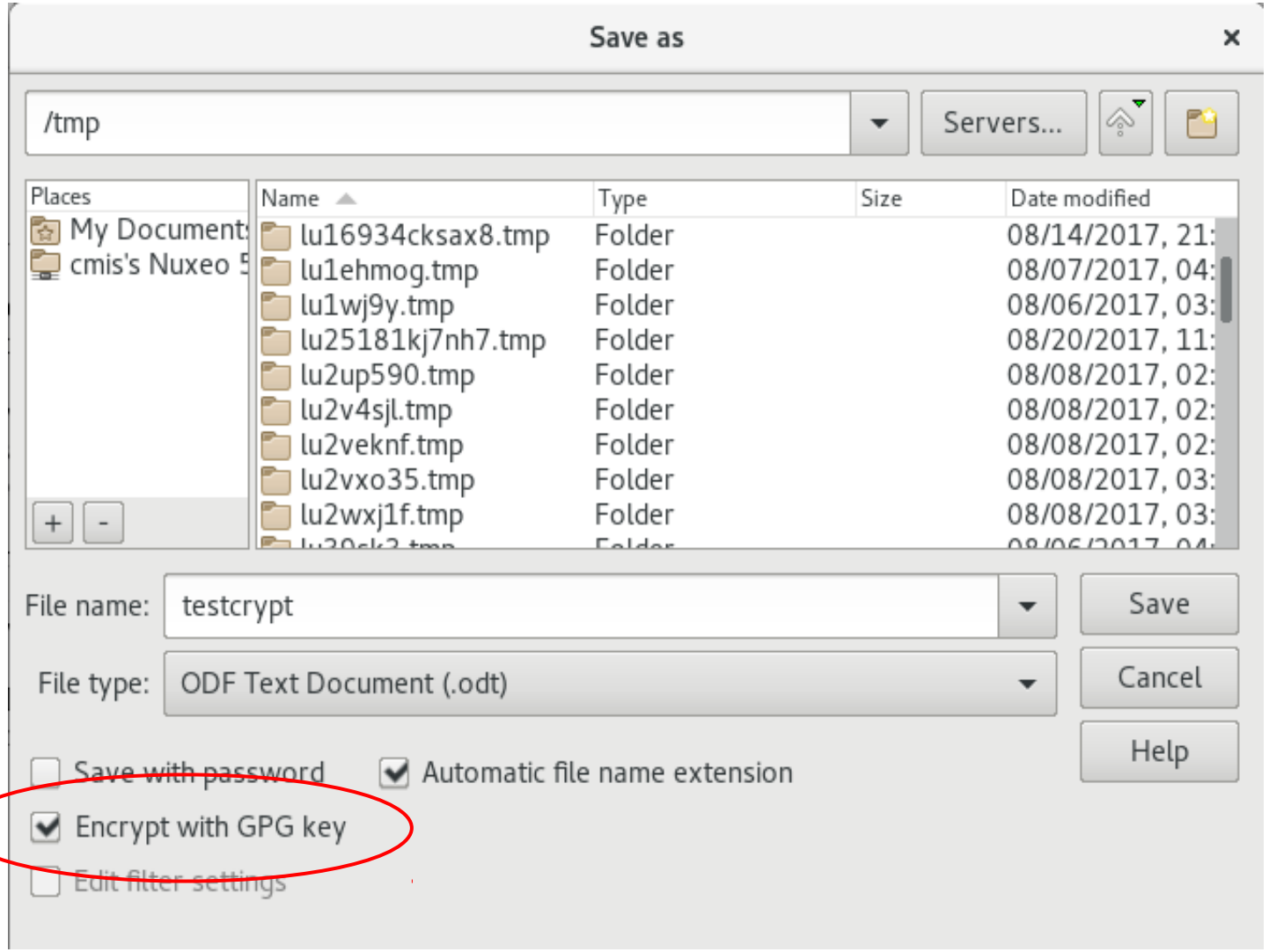
- extended save dialog



ENCRYPTION

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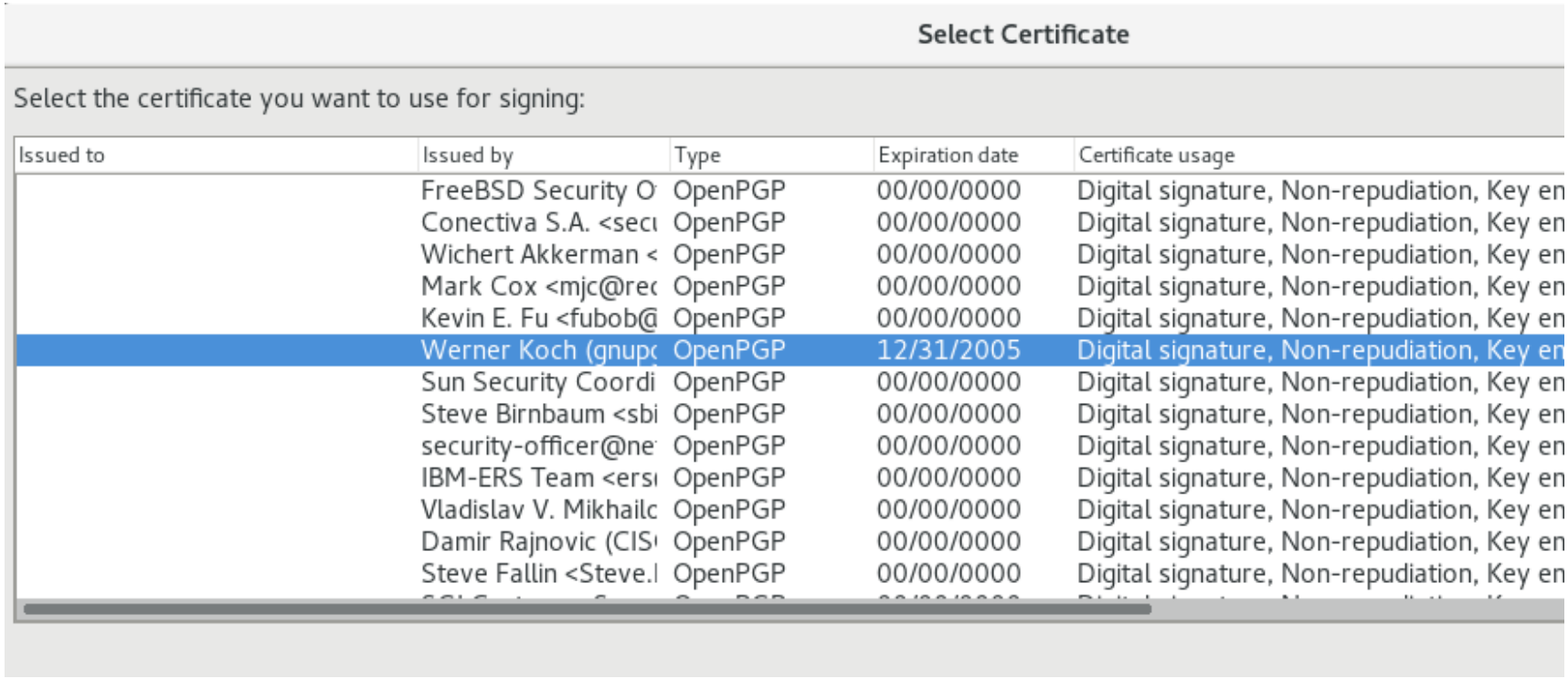
- pick recipient



MARKUP: XML ENCRYPTION

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Encryption based on: https://www.w3.org/TR/2002/REC-xmlenc-core-20021210

```
<manifest:manifest xmlns:manifest="urn:oasis..." manifest:version="1.2"
xmlns:loext="urn:org:do...">
 <loext:KeyInfo>
  <loext:EncryptedKey>
   <loext:EncryptionMethod loext:Algorithm="http://www.w3.org/2001/04/xmlenc#rsa-
oaep-mgf1p"/><loext:KeyInfo>
    <loext:PGPData>
     <loext:PGPKeyID>QjE3...5NA==</loext:PGPKeyID>
     <loext:PGPKeyPacket>LS0tL...LS0K</loext:PGPKeyPacket>
    </loext:PGPData>
   </loext:KeyInfo>
   <loext:CipherData>
    <loext:CipherValue>FAm4B...aB8=</loext:CipherValue>
   </loext:CipherData>
  </loext:EncryptedKey>
 </loext:KeyInfo>
 <manifest:file-entry manifest:full-path="/" manifest:version="1.2"
manifest:media-type="application/vnd.oasis.opendocument.text"/>
```

MARKUP: XML ENCRYPTION

File entry (details might still change):

```
<manifest:file-entry manifest:full-path="content.xml" manifest:media-
type="text/xml" manifest:size="15781">
 <manifest:encryption-data manifest:checksum-
type="urn:oasis:names:tc:opendocument:xmlns:manifest:1.0#sha256-1k"
manifest:checksum="bbpZzvw+pOu+BAMI0wsxn0BbsOn3P3oABCd9IGxKqyg=">
  <manifest:algorithm manifest:algorithm-
name="http://www.w3.org/2001/04/xmlenc#aes256-cbc"
manifest:initialisation-vector="0jF3LtJHWJr/j9UvipYw0Q=="/>
 </manifest:encryption-data>
</manifest:file-entry>
```

And X509?

LibreOffice and X509

- available for ODF and OOXML
- available for builtin PDF export
  - most complete for PDF, including timestamps
- if you don't see your certs, set `MOZILLA_CERTIFICATE_FOLDER`

Further workflow / user-facing features

LibreOffice and advanced UI features

- thanks to Limux / City of Munich!
- works for both OOXML and ODF
- available since LibreOffice 6.1
- currently uses some ODF extension
- currently works nicely for X509 signatures

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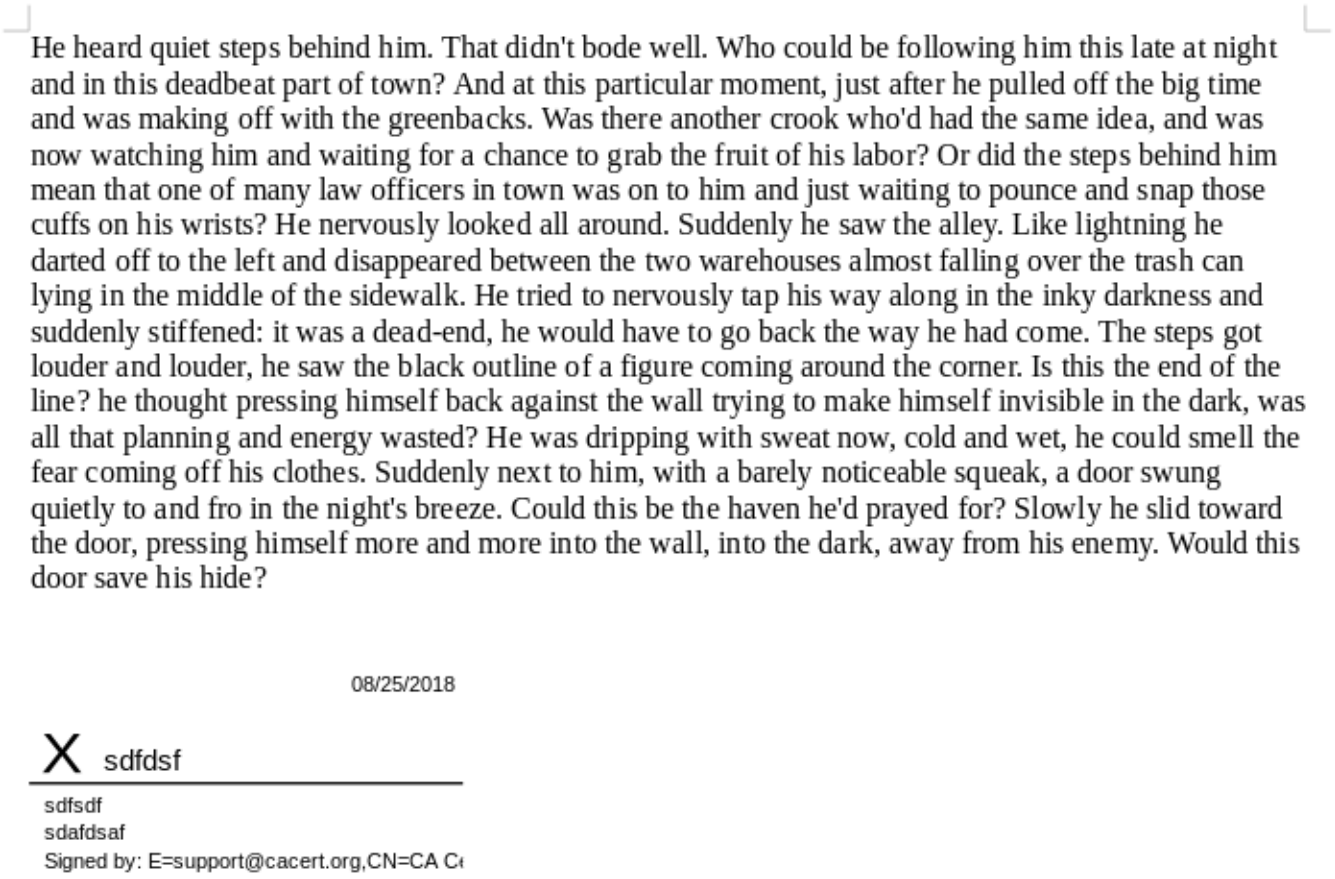
SIGNATURE LINES

- Visual representation of document signature
- Combine handwritten signature and digital signature
- LibreOffice 6.0:
  - OOXML Import
- LibreOffice 6.1
  - OOXML Roundtrip (Export added)
  - ODF Import & Export
  - Generate new Signature Lines
  - Digitally sign Signature Lines

SIGNATURE LINES

- Visual representation of document signature



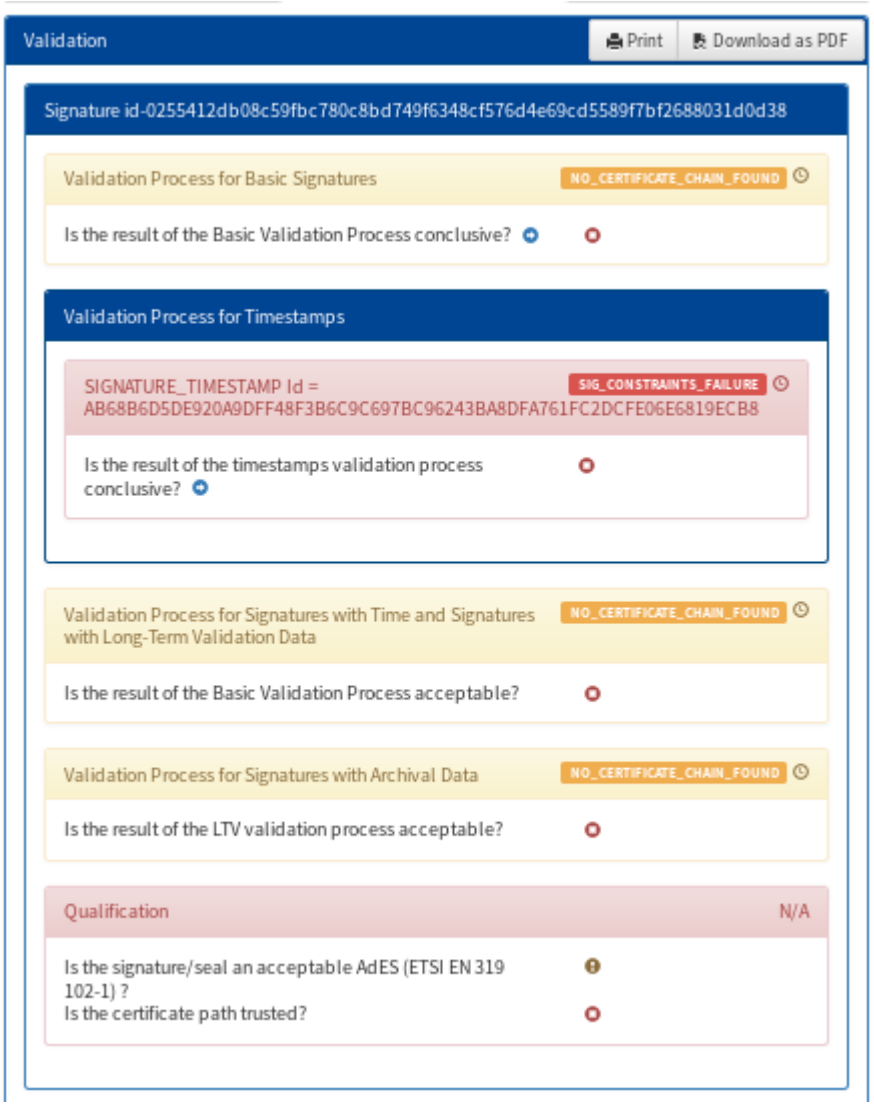
Further userland tools

Support for checking digital signatures

- check digital signatures:
  - For ODF and OOXML, just load the file
  - For PDF, also within LibreOffice – just load the file!
  - or via `$ pdfsig tmp/bug83877SignatureLine.pdf` (part of poppler these days)
  - or via the real deal - official digital signature service DSS EU project:
    - https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/eSignature
    - https://github.com/esig/dss.git - LGPL
      - bundle for webservice is there, so you can deploy that internally
    - online demo - validate a signature: https://ec.europa.eu/cefdigital/DSS/webapp-demo/validation
    - also checks the timestamp

Support for checking digital PDF signatures

- online demo - validate a signature: https://ec.europa.eu/cefdigital/DSS/webapp-demo/validation



ROADMAP

- ODF-conformant signing on Linux
  - ships with LibreOffice 5.4
- ODF-conformant signing also on Windows
  - shipped for LibreOffice 6.0 (Feb. 2018)
  - Works also for OS X – open for Android
- experimental encryption on Linux & Windows
  - shipping for LibreOffice 6.0 (Feb. 2018)
  - with ODF extension namespace
- ODF 1.3
  - proposed XMLSEC-extensions for OpenPGP encryption to OASIS ODF TC – GA for 1.3 around 2019
- Further signature line improvements in 6.2, reading and writing standard-conformant ODF 1.3 encryption – due February 2019

THANK YOU!

OUR PRODUCTS:

HTTP://LIBREOFFICE.CIB.DE/

WE CAN HELP:

HTTP://LIBREOFFICE.CIB.DE/SUPPORT