What is Collaboration?
Collaborative real-time editor (2 modes)

In the end all “copies” are the same!

1) **Real-Time Mode**
   Good for working with a group of trusted members.

2) **Non-Real-Time Mode**
   Users like to be in control of all changes.
   Legal departments of two companies collaborating.
What is Collaboration?
Collaborative real-time editor (2 modes)

1) **Real-Time Mode**
(e.g. Etherpad, Google Docs, etc.)

Users can edit the same document simultaneously.

2) **Non-Real-Time Mode**
(similar revision control systems)

Users edit a copy of document and merge later.
What is Collaboration?
Collaborative real-time editor (2 modes)

In the end all “copies” are the same!

1) Automatic fix of merge conflicts! (for convenience).

2) Merge conflicts have to be resolved by the user!
How do real-time editors work?

- No documents are dispatched!
  As stupid as developers sending software repos!

- Sending changes/operations/differences/DIFFs!

Best not text/syntax based, but higher abstraction level:

semantic changes!
Requirements to implement Collaboration in LibreOffice?

„Some time-machine would be appropriate.“
Why is Collaboration a Problem?
“Collaboration“ in the 80ths!
Design based on former Requirements

• In the 80ths: One person on single machine

• Exchanging document by floppy disc or modem
Document Collaboration Today
New Requirements

• With Smartphones everyone has **multiple machines** (Smartphone & PC/Laptop)

• **Exchanging documents** faster via Internet, Mail, Dropbox, etc. will not solve the **merge problem**!

• **Key Collaboration Question:** What have you changed?
Document Collaboration Idea
New Change Design

- Allow **collaboration functionality** similar as software developers have with repositories

- **Exchanging changes (commits)** instead of **documents (repositories)** via Internet, Mail, Dropbox, etc.

- **Solving Key Question:** What have you changed?
Interoperable Collaboration
Exchanging ODF Changes

ODF Application

LibreOffice
The Document Foundation

Google Docs

ODF Application

ODF Application

ODF Application
Interoperable Collaboration
Exchanging ODF Changes

ODF Application → LibreOffice

Google Docs: 4th paragraph blue → ODF Application

ODF Application → Google Docs: 4th paragraph blue → ODF Application
Interoperable Collaboration
Exchanging ODF Changes

ODF Application → ODF 2nd paragraph new → LibreOffice

ODF 4th paragraph blue → Google Docs

ODF 4th paragraph blue → ODF Application

ODF 2nd paragraph new → ODF Application
ODT ↔ Changes

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See https://github.com/svanteschubert/odftoolkit/tree/odf-changes/
Soon https://github.com/tdf/odftoolkit (1.0.0-beta)
ODT ↔ Changes
-sponsored by PrototypeFund

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Soon https://github.com/tdf/odftoolkit (1.0.0-beta)
ODFDOOM
Architecture / Local API

1. ODF Package Layer
   ODF Package API

2. ODF XML Layer
   ODF DOM API

3. ODF Semantic Layer
   ODF User API
ODF DOM
Architecture / Local API (in spe)

1. ODF Package Layer
   - ODF Package API

2. ODF XML Layer
   - ODF DOM API

3. ODF Semantic Layer
   - ODF User API

public/private
ODF Collaboration Prototype

Upcoming Goals

• Prototype of Collaboration of Editors based on ODF Changes (ODFDOM)

• WYSIWYG Editors with different feature set editing same ODT Document:
  – LibreOffice (ODT)
  – Emacs (Text)
  – CKEditor 5 (HTML 5)
ODF Toolkit – CKEditor5
Proof of Concept

• Build your CKEditor5 example:

  
git clone -b stable https://github.com/ckeditor/ckeditor5-build-classic.git  
  npm install  
  npm run build

• Open local editor in browser (& add eventlistener from notes)

  .sample/index.html
ODF Toolkit – CKEditor5
Demo results in Chrome console

- enventinfo
  - {"baseVersion":12,"position":
    {"root":"main","path":[0,6],"stickiness":"toNone"},"nodes":
    [{"data":"X"}],"shouldReceiveAttributes":true,
    "__className":"InsertOperation"}

- index.html:48 enventinfo
  - {"baseVersion":13,"range":
    {"start":
      {"root":"main","path":[0,3],"stickiness":"toNext"},
      "end":
      {"root":"main","path":[0,7],
        "stickiness":"toPrevious"}},"key":"italic","oldValue":null,"newValue":true,"__className":"AttributeOperation"}
Bringing ODF Changes to ODF Specification

- ODF XML base of interoperability
- Define „User Semantic Entities“ (e.g. table, image) from ODF XML
- Define how „User Semantic Entities“ are changed via parameters of API
ODF GRAMMAR - TEXT
HARD TO READ! WE NEED TOOLS!

```
<define name="table-table">
  <element name="table:table">
    <ref name="table-table-attlist"/>
    <optional>
      <ref name="table-title"/>
    </optional>
    <optional>
      <ref name="table-desc"/>
    </optional>
    <optional>
      <ref name="table-table-source"/>
    </optional>
    <optional>
      <ref name="office-dde-source"/>
    </optional>
    <optional>
      <ref name="table-scenario"/>
    </optional>
    <optional>
      <ref name="office-forms"/>
    </optional>
    <optional>
      <ref name="table-shapes"/>
    </optional>
    <ref name="table-columns-and-groups"/>
    <ref name="table-rows-and-groups"/>
    <optional>
      <ref name="table-named-expressions"/>
    </optional>
  </element>
</define>
```

ODF 1.2 XML:
- 598 XML Elements
- 1300 XML Attributes
>18k lines
<define name="table-table">
  <element name="table:table">
    <ref name="table-table-attlist"/>
    ...
  </element>
  <optional>
    <ref name="text-soft-page-break"/>
  </optional>
  <ref name="table-table-row"/>
</define>

ODF 1.2 XML:
• 598 XML Elements
• 1300 XML Attributes
>18k lines
ODF GRAMMAR - GRAPH
TABEL ELEMENT WITH CHILDREN

Apache TinkerPop
ODF GRAMMAR - GRAPH
TABEL ELEMENT WITH CHILDREN

Apache
TinkerPop
ODF GRAMMAR - GRAPH
HARD TO READ! WE NEED REFACTORYING!
ODF GRAMMAR - GRAPH
SIMPLIFIED FOR HUMANS!
ODF Collaboration Resources

Resources

• **Website (in progress):**
  https://tdf.github.io/odftoolkit/docs/odfdom/operations/operations.html

• **Sources:**
  https://github.com/tdf/odftoolkit

• **3 Pages:** *The Next Millenium File Format*

• **ODF Specification**
  http://docs.oasis-open.org/office/v1.2/os/