

# Online: Copy / Cut / Paste

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*"Stand at the crossroads and look; ask for the  
ancient paths, ask where the good way is, and  
walk in it, and you will find rest for your souls..." -  
Jeremiah 6:16*





# Overview

## Web copy/paste technologies

- Baroque and paranoid
- Riddled with inelegant back-compatibility
- Layers of un-necessary and unhelpful 'security' features.

## Collabora Productivity Ltd.

- Dedicated to Enterprise LibreOffice
- Provides Level-3 support (code issues) to all Novell / SUSE LibreOffice clients
- Architects of Microsoft OpenXML filters

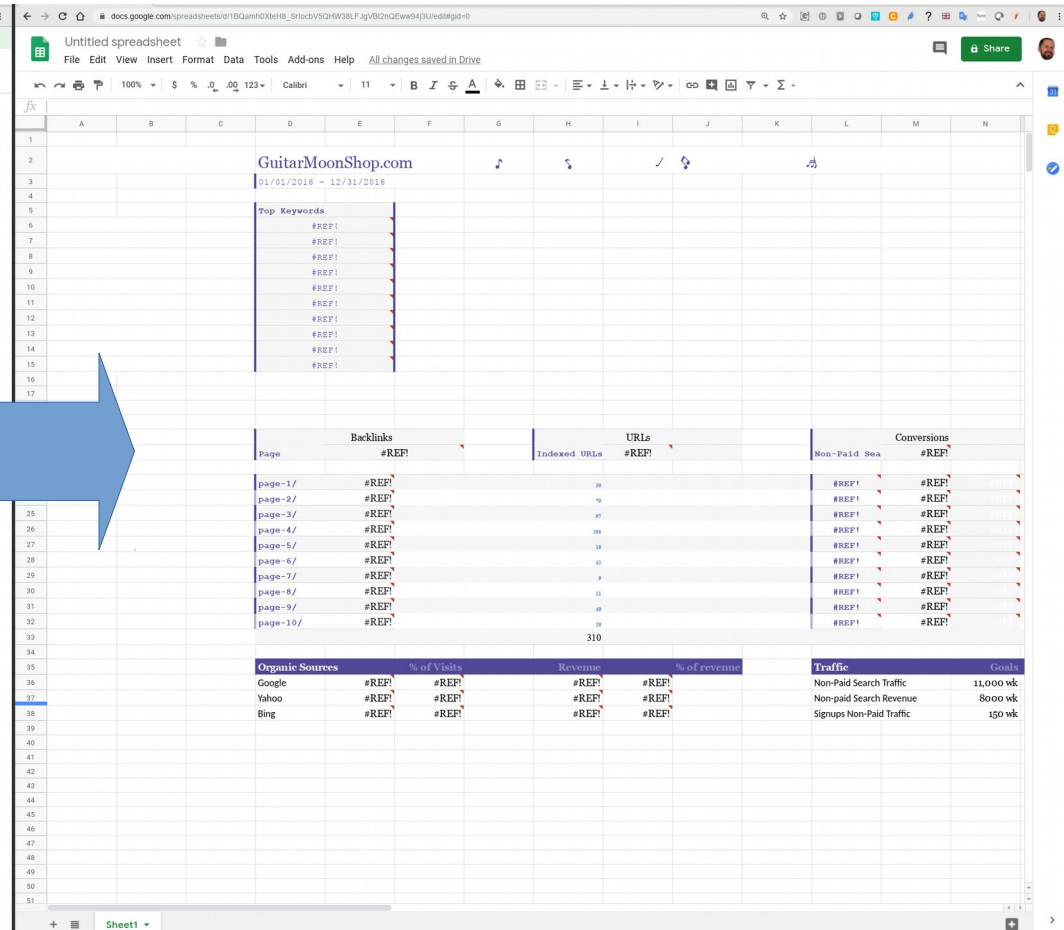
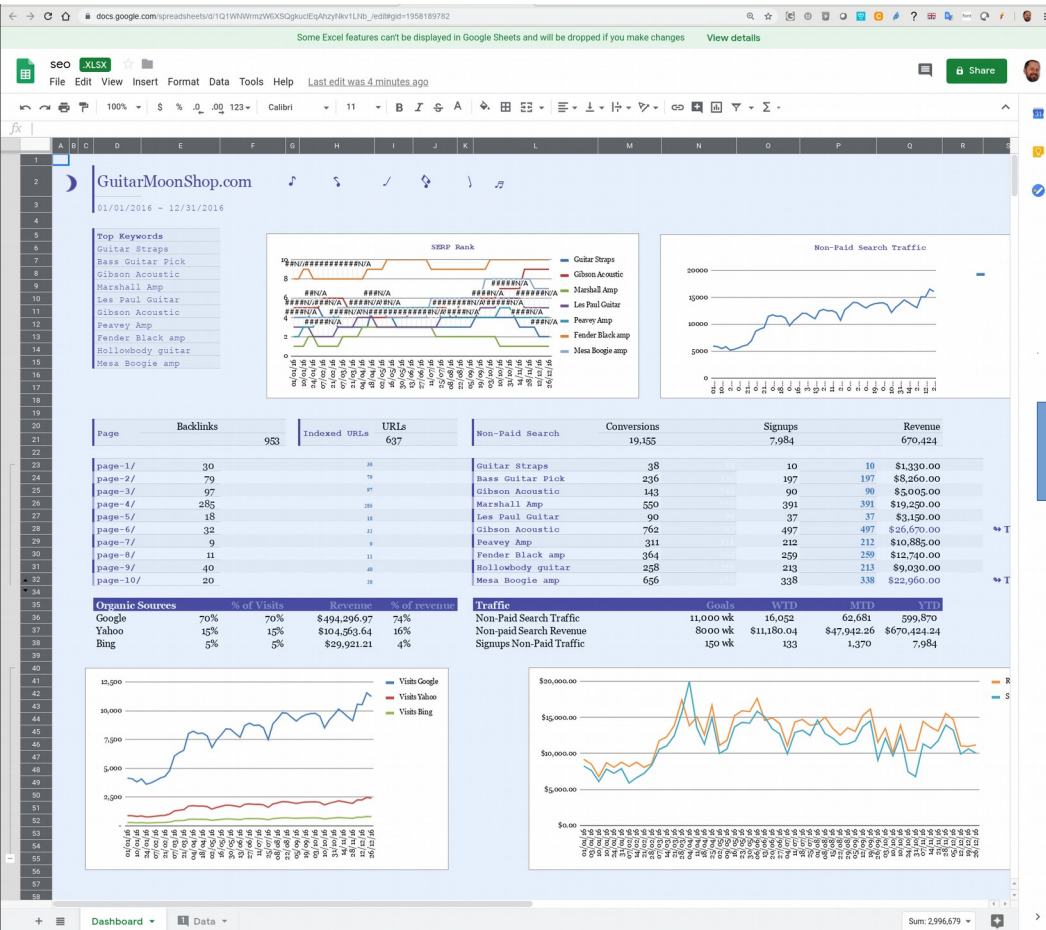
## Comparison / before and



**Beforehand:**  
**the Competition &**  
**the Problem**

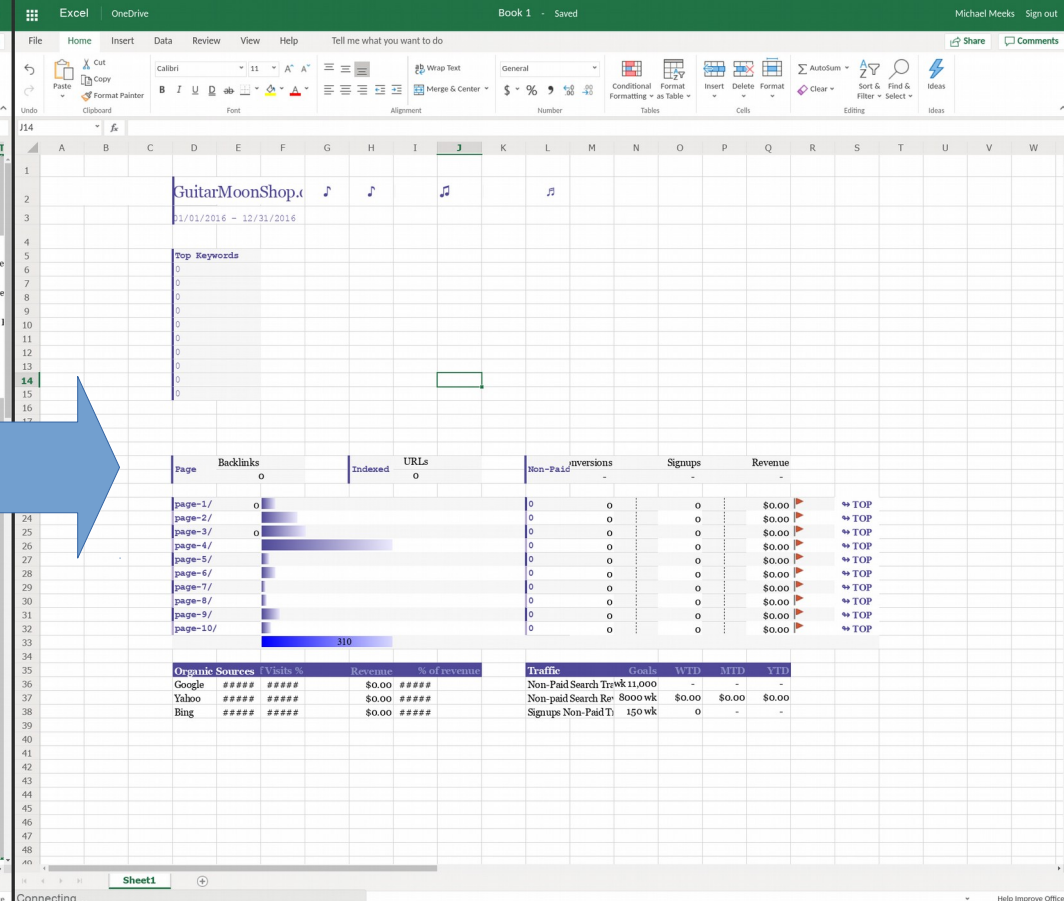
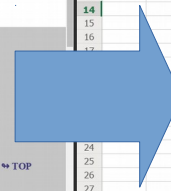
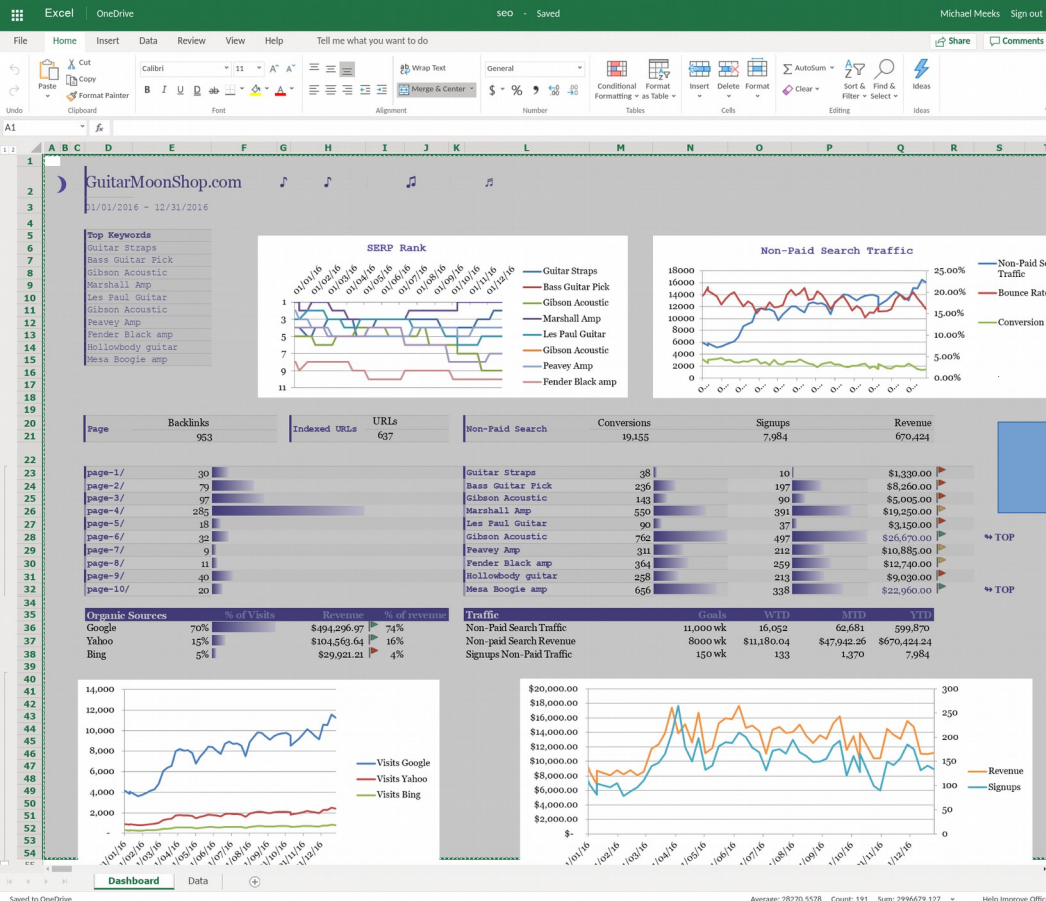


# Chrome / GDocs spreadsheet copy/paste



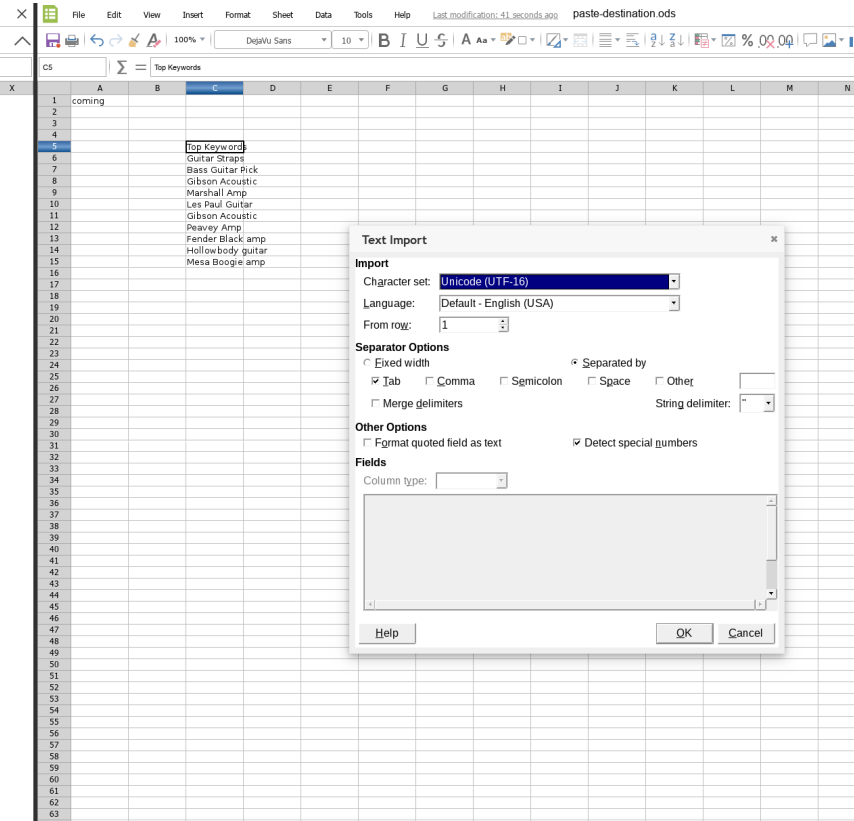
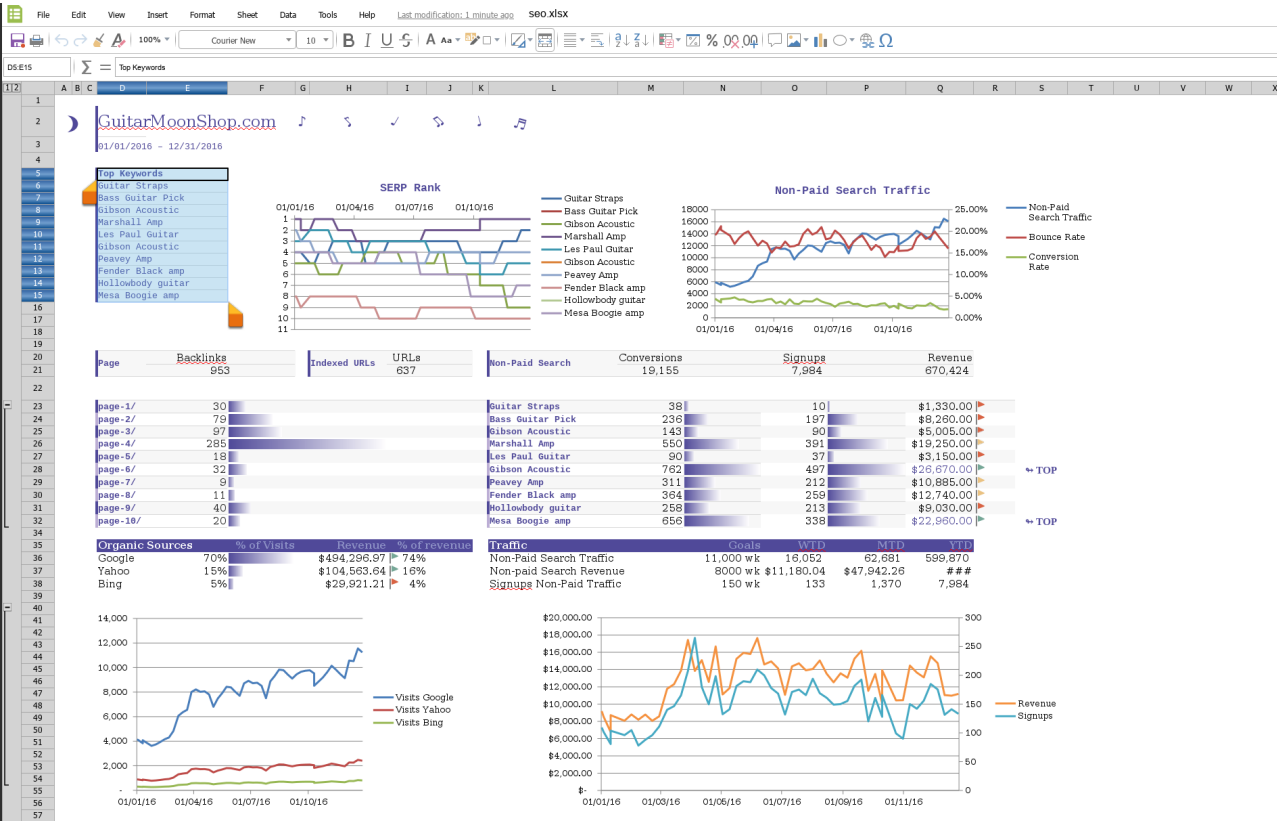


# Office.com / Excel copy / paste ...





# Online – old-style copy/paste: text → CSV import dlg.

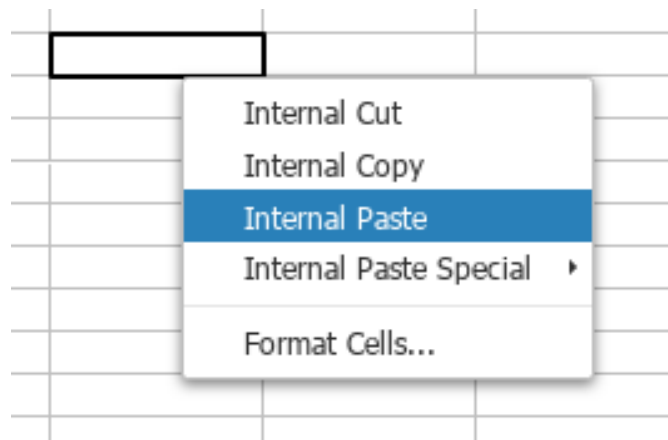






## High fidelity 'internal' shortcut ...

- A large proportion of copy/paste is for shuffling / pruning bits of the current document.
- So – initial context-menu / copy-paste short-circuited internally
  - Doing all the work inside the Online server.
- Particularly important for eg. large spreadsheet cell area movement.
  - This requires formula re-writing.
- Leaving plain-text for external use.





**Web Clipboard technologies.**

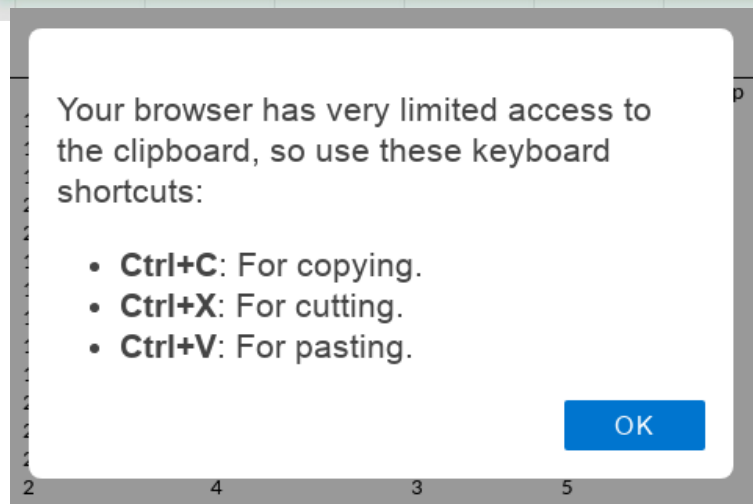
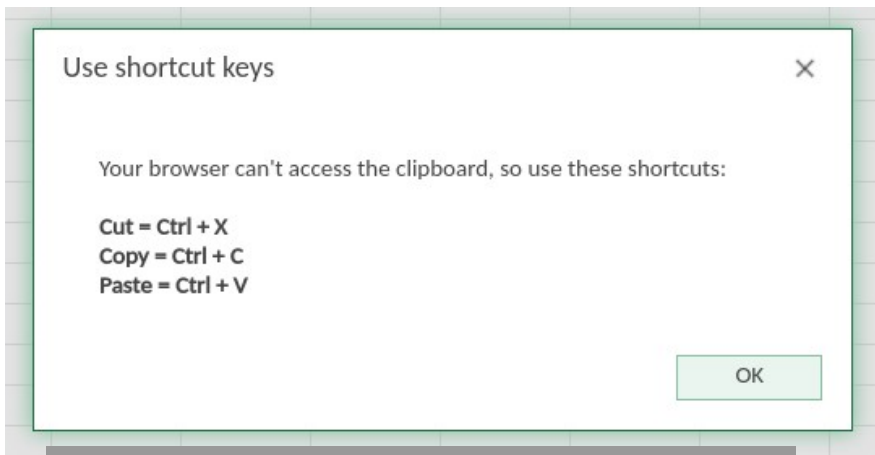




# Web copy/paste is baroque & paranoid beyond belief.

## APIs for copy/paste are very mixed

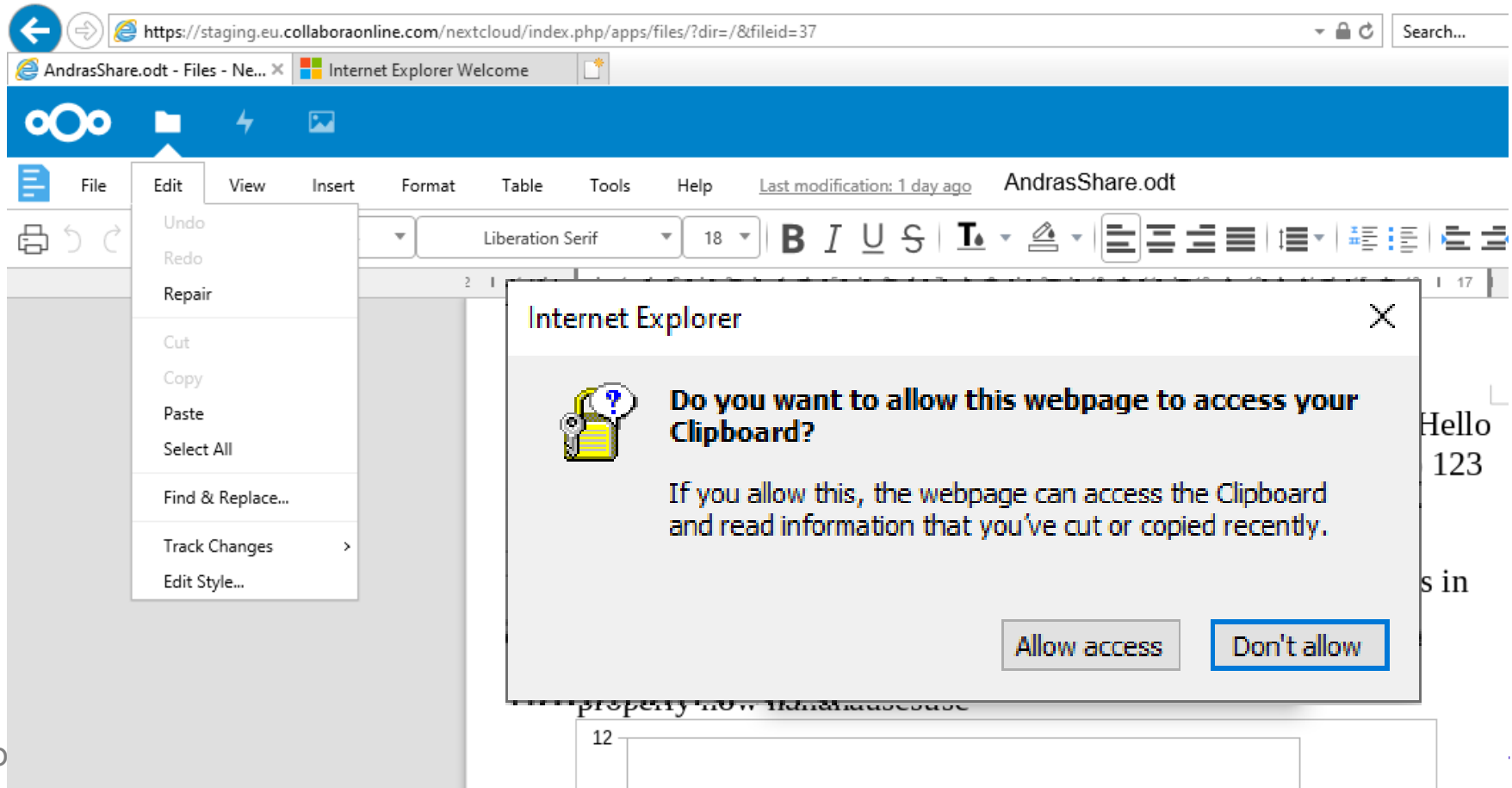
- In many browsers copy/cut can put ~anything on the clipboard ~whenever they like.
  - But they have to work-around layers of obsolete 'security' foo.
- 1. Find/focus/select content-editable
  - 2. `document.execCommand('copy')`
    - 3. catch events if you get them
      - 4. tweak your content-editable,
        - 5. retry from 1.







# IE11 – had a great initial approach:







# Google Chrome / Docs – joined up thinking ?

## Google Chrome's

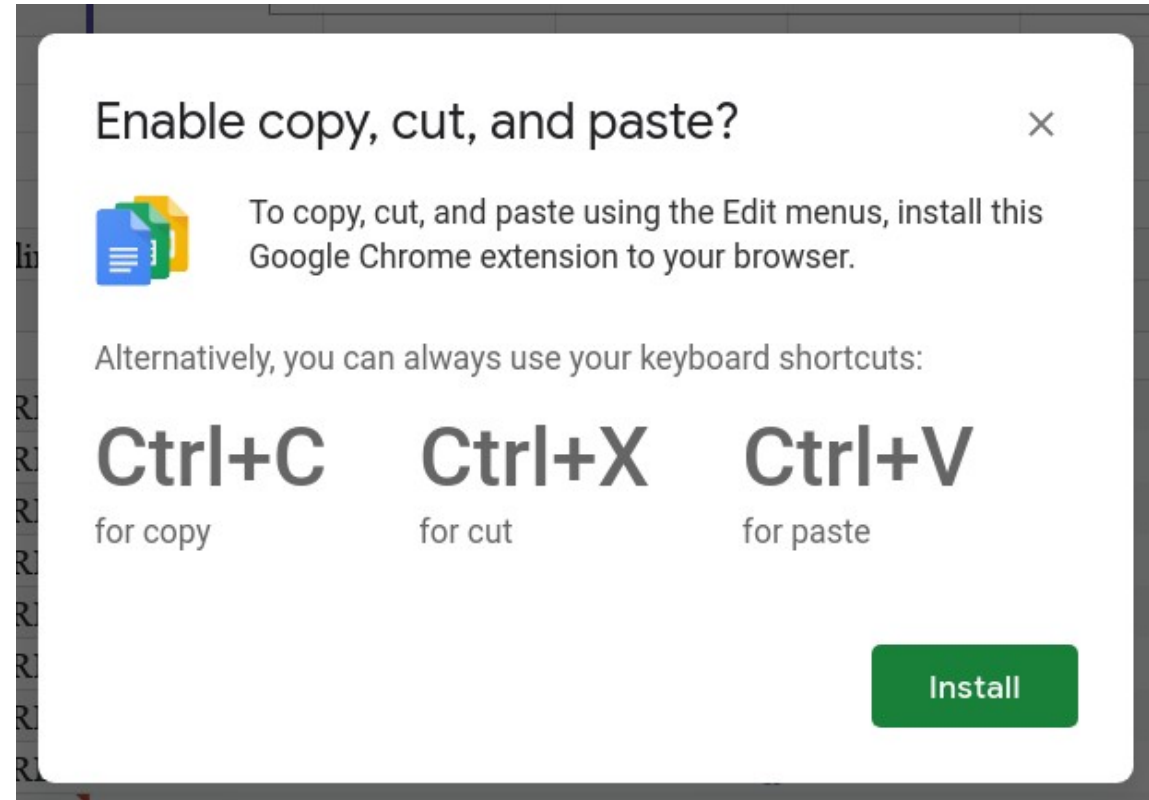
- Security team hardened by many issues → so rightly paranoid.

## Google Doc's

- Users cannot copy/paste using context menus → make a plugin for that.

## The Security situation ?

- Snooping is indeed bad:
  - IE11 solution was a good one.
  - Signed sites you trust ... ?







# Other web security (mis-)features.

## Piles of Baroque nonsense

- All schemes revolve around a hidden / transparent / off-screen / textarea / contenteditable.
- JQuery → a great idea for cross-platform support.
  - iOS: JQuery foo's click' isn't.
    - It is a wrapped touch event
    - Which doesn't have the popup security context we need.
    - Breaks only iOS
      - needs `<a href="#">` links

## More Piles of Baroque nonsense

- IE11
  - Can only do HTML copy/paste out of a hidden content-editable
    - You have to fill / empty the HTML out of that manually in a very odd sequence.
- Secure Copy/paste types:
  - text/plain, text/html, text/rtf
  - Image/\*
    - but in reality unpacked platform Bitmap
  - Getting meta-data through: text/html ...





# Mobile Web clipboard problems ...

## Pressing Ctrl-C is harder ...

- iOS has a nice button on the keyboard
- Android does not
  - But GBoard does
    - But GBoard converts HTML→Text and includes random <head> tags.
    - GBoard creates text input behavioural horrors of its own.

## Luckily we can detect if we succeeded ?

- Not trivially:
  - return values from `execCommand` is unreliable.
  - So set incrementing global serial of successful c/c/p operations
- iOS
  - Amazing ... if security context is not perfect: everything appears to succeed.
  - You just successfully push data to a clipboard no-one else can see (not even you).





# Fundamentals: Synchronous & no negotiation

## Synchronous Web clipboard APIs

- Are all synchronous
  - They all assume that all the data you want to copy/paste is already in the browser.
  - Horrible for us, VDI clients, and other large / server hosted applications
- When we get Ctrl-X
  - Need all the data-ready to put to the OS clipboard.

## All data at once ...

- All (sensible) OS APIs look like
  - “tell me what formats you support”
  - “later (if someone pastes) – I’ll get back to you to ask for the (few) they actually want.
  - Why ?  $10^9+$  cells in a spreadsheet.
- Not the web:
  - All formats must be inserted synchronously

**Consider paste-as PNG of spreadsheet ranges**



**Improving things ...**





# Users: KISS – for the simple case ... and then ...

## Plain text

- As you select 'simple' selections – these are pushed KIT → browser as HTML

## Try to explain the sorry situation to users:

- Necessary to click-again after download to copy / cut → for security.

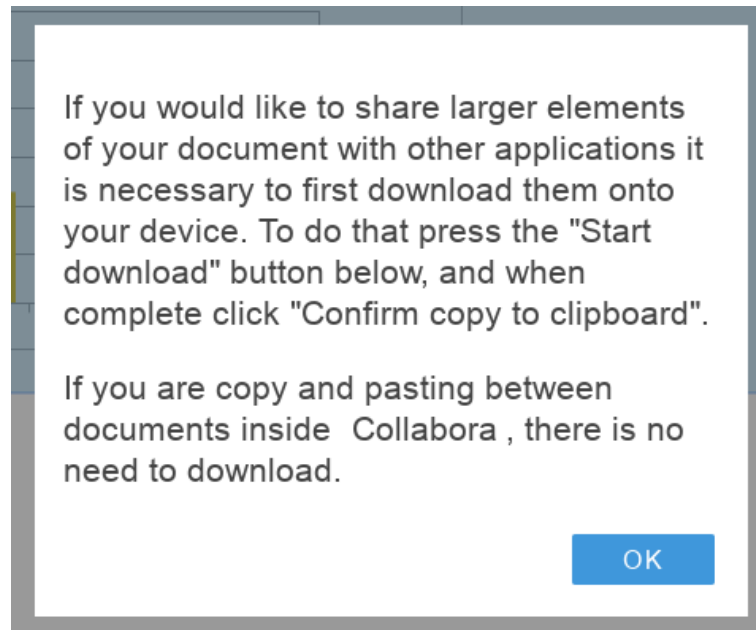
## Paste to another Online instance / window ...

- Shortcut, no need to download via a custom meta-origin.



## Complex cases

- Push an interesting text to the clipboard:
  - ***“To paste outside Online, please first click the 'download' button”***







# HTML with meta-file bits ...

```
"<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
```

```
<html>
```

```
  <head>
```

```
    <title>Stub HTML Message</title>
```

```
    <meta http-equiv="content-type" content="text/html; charset=utf-8"/>
```

```
    <meta name="origin" content="%2Flool%2Fclipboard%3FWOPIsrc%3Dfile%253A%252F%252F%252Fopt%252Flibreoffice%252Fonline%252Ftest%252Fdata%252Fhello-world.ods%26ServerId%3Dc2bde695%26ViewId%3D0%26Tag%3D6da096542b9602ad"/>
```

```
  </head>
```

```
  <body lang="en_US" dir="ltr">
```

```
    <p>To paste outside Collabora Online,  
    please first click the 'download' button</p>
```

```
  </body>
```

```
</html>
```

## When we get paste data

- If it has 'our' meta then:
  - If that is for the same document-id, part, view etc.
  - Short-circuit to uno:Paste
    - Job done (as before)
- Otherwise download the data





# Download & re-up-load to paste

## Paste of 'our' data:

- Async Download source data  
(as all mime types)
- Async Up-load data  
(as all mime types)  
set it to Kit clipboard.
- Send an .uno:Paste to Kit.

## 'Download' of data:

- Async Download of (just) HTML
  - Base64 embedded images.

## Infrastructure to make this work

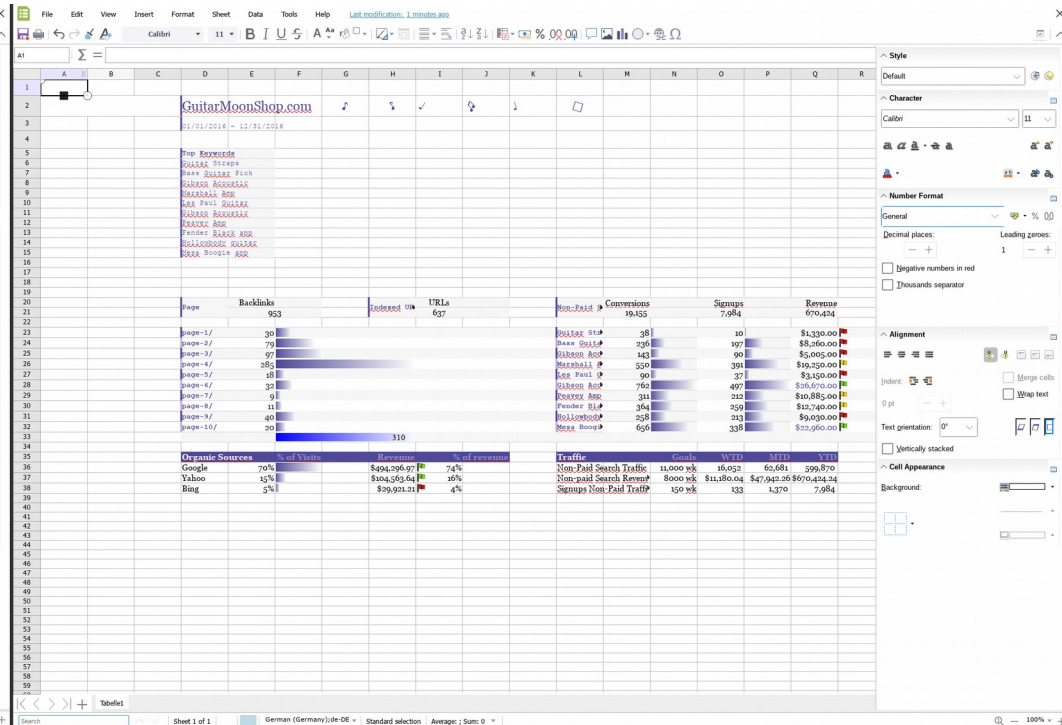
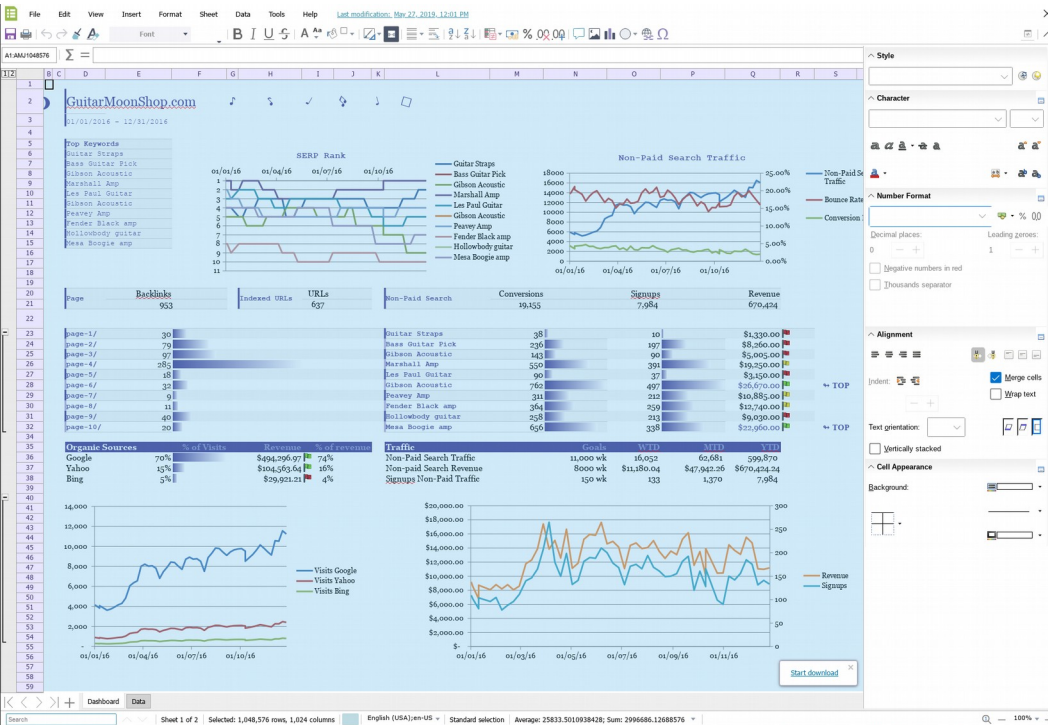
- New web */clipboard/* end-point
  - Connects to the relevant Kit process to serve & set the data.
- Kills final need for 'X' libraries → safer ...

## Gotchas

- Dialog paste / paste-keys
- Initially empty Kit clipboard → no 'Paste'
- Closing a Document → loose its clipboard ?
  - New synchronous Kit shutdown state machine... urk.

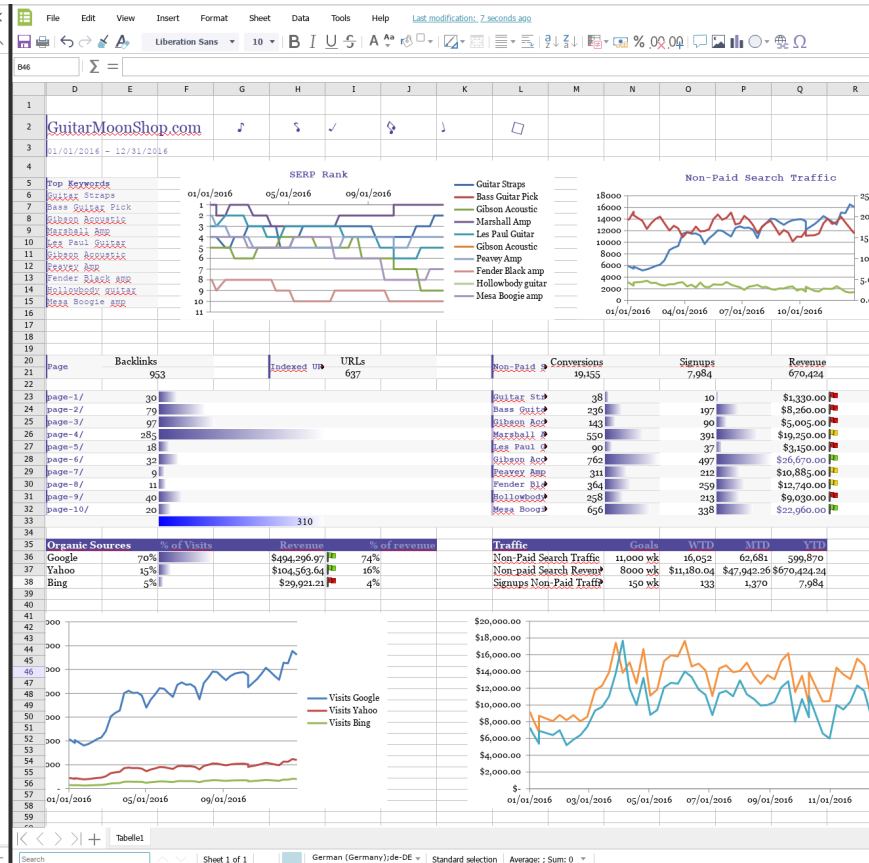
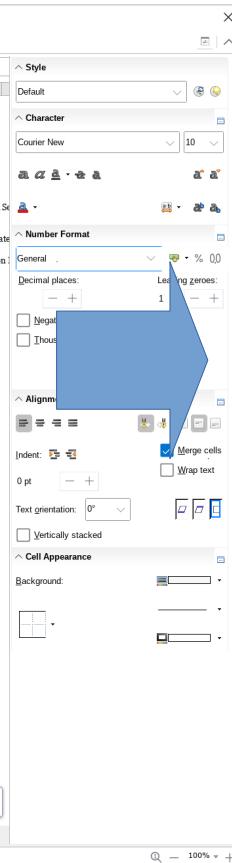
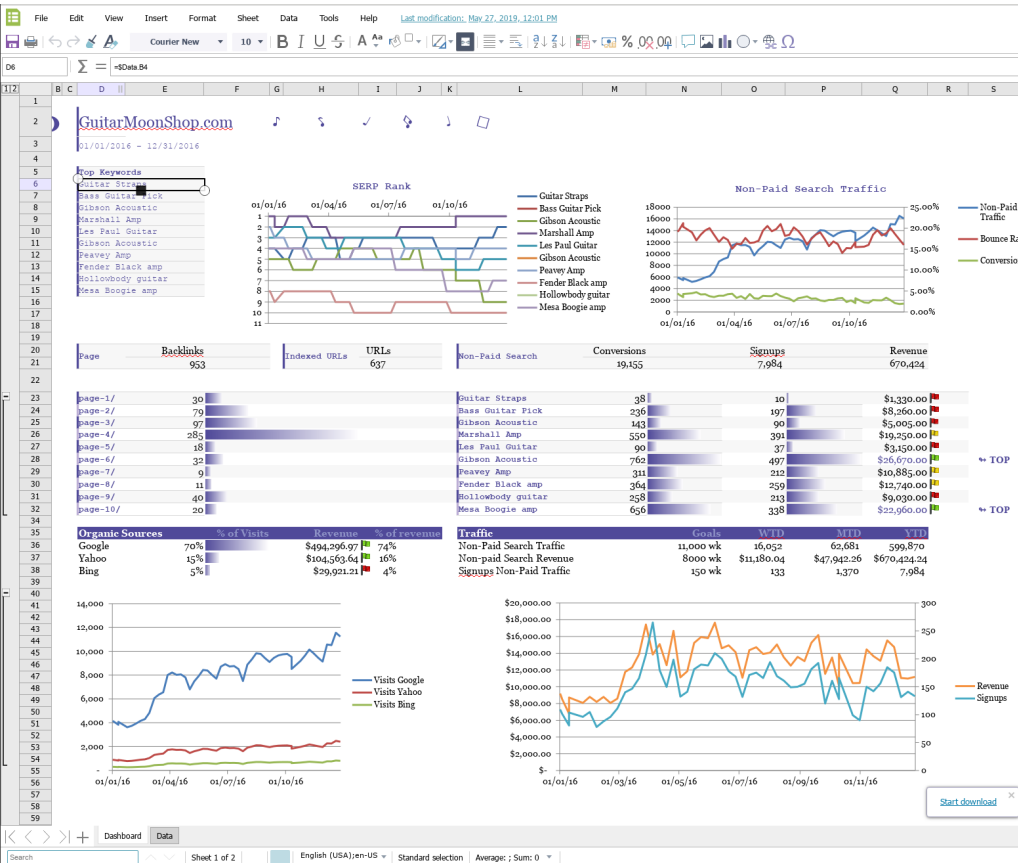


# Afterwards ...





# Afterwards + explicitly copying charts:







# Other miscellaneous details ....

## Mac / Safari

- Pasting *from* Safari – we get RTF !
  - Lovely, powerful, rich-text ...
- Unfortunately – doesn't contain images.
- Unfortunately – by design can't tell who is sending you the data...
  - So don't accept RTF on the Mac

## Security

- We push a new clipboard access key every 2 minutes
  - We accept this + previous key
  - → between 2 & 4 minutes to copy/paste.
- Or you can disable copy/paste with the relevant WOPI-like property

## Text/plain – regression ...

- Web can't easily convert HTML → text !?
- Will need to send text/plain too.





# Conclusions

- Our codebase has a fantastic heritage & rich copy-paste code
- But connecting it was an epic – primarily fighting web api
- Online can now copy rich types – leading in its class.
- Thanks to: Ashod, Szymon, Marco, Miklos, Aron and others...
- Thanks to all of our customers & partners who make this possible.
- Questions ?

*Oh, that my words were recorded, that they were written on a scroll, that they were inscribed with an iron tool on lead, or engraved in rock for ever! I know that my Redeemer lives, and that in the end he will stand upon the earth. And though this body has been destroyed yet in my flesh I will see God, I myself will see him, with my own eyes - I and not another. How my heart yearns within me. - Job 19: 23-27*