FOSDEM 2020

Online: wrestling Copy / Cut / Paste *to usability*

Collabora Productivity

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General Manager at Collabora Productivity

@michael_meeks, mmeeks #libreoffice-dev irc.freenode.net

"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.

Comparison / before and after

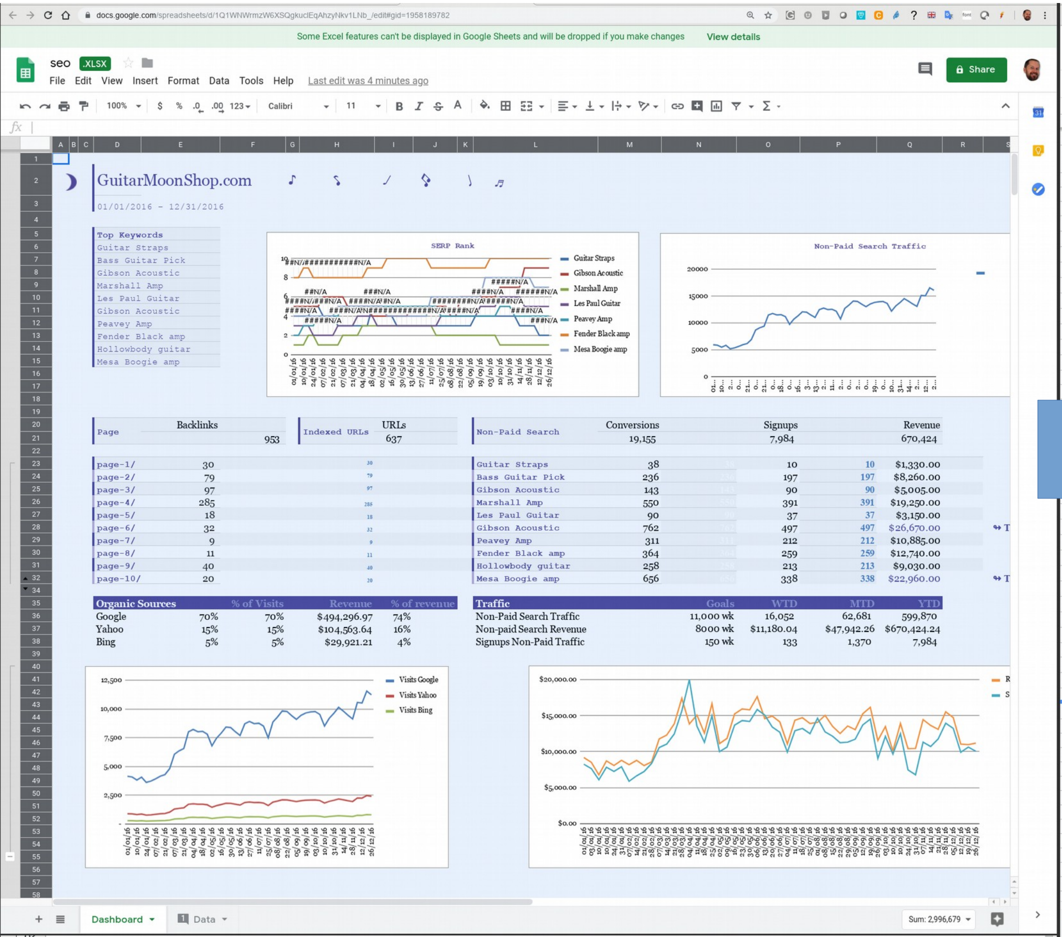
How we improved things.

Beforehand:

the Competition &

the Problem

Chrome / GDocs spreadsheet copy/paste



docs.google.com/spreadsheets/d/1Q1WNWrmzW6XSQgkuclEqAhzyNkv1LNb_/edit#gid=1958189782

Some Excel features can't be displayed in Google Sheets and will be dropped if you make changes — View details

seo .XLSX — Last edit was 4 minutes ago

GuitarMoonShop.com

01/01/2016 - 12/31/2016

Top Keywords
Guitar Straps
Bass Guitar Pick
Gibson Acoustic
Marshall Amp
Les Paul Guitar
Gibson Acoustic
Peavey Amp
Fender Black amp
Hollowbody guitar
Mesa Boogie amp

Page	Backlinks 953	Indexed URLs	URLs 637
page-1/	30		30
page-2/	79		79
page-3/	97		97
page-4/	285		285
page-5/	18		18
page-6/	32		32
page-7/	9		9
page-8/	11		11
page-9/	40		40
page-10/	20		20

Non-Paid Search	Conversions 19,155	Signups 7,984		Revenue 670,424
Guitar Straps	38	10	10	$1,330.00
Bass Guitar Pick	236	197	197	$8,260.00
Gibson Acoustic	143	90	90	$5,005.00
Marshall Amp	550	391	391	$19,250.00
Les Paul Guitar	90	37	37	$3,150.00
Gibson Acoustic	762	497	497	$26,670.00
Peavey Amp	311	212	212	$10,885.00
Fender Black amp	364	259	259	$12,740.00
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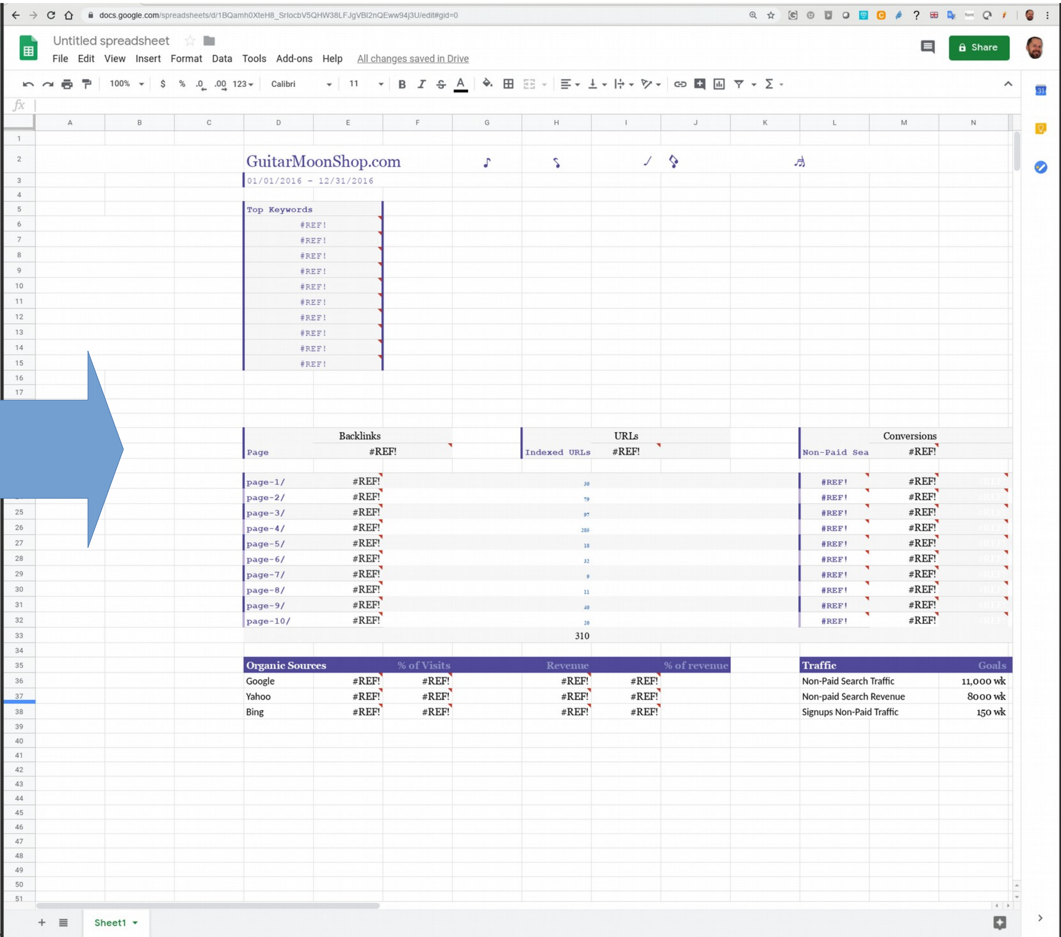
Mesa Boogie amp	656	338	338	$22,960.00

Organic Sources		% of Visits	Revenue	% of revenue
Google	70%	70%	$494,296.97	74%
Yahoo	15%	15%	$104,563.64	16%
Bing	5%	5%	$29,921.21	4%

Traffic	Goals	WTD	MTD	YTD
Non-Paid Search Traffic	11,000 wk	16,052	62,681	599,870
Non-paid Search Revenue	8000 wk	$11,180.04	$47,942.26	$670,424.24
Signups Non-Paid Traffic	150 wk	133	1,370	7,984



docs.google.com/spreadsheets/d/1BQamh0XteH8_SrlocbV5QHW38LFJgVBI2nQEww94j3U/edit#gid=0

Untitled spreadsheet — All changes saved in Drive

GuitarMoonShop.com

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#REF!
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			310		

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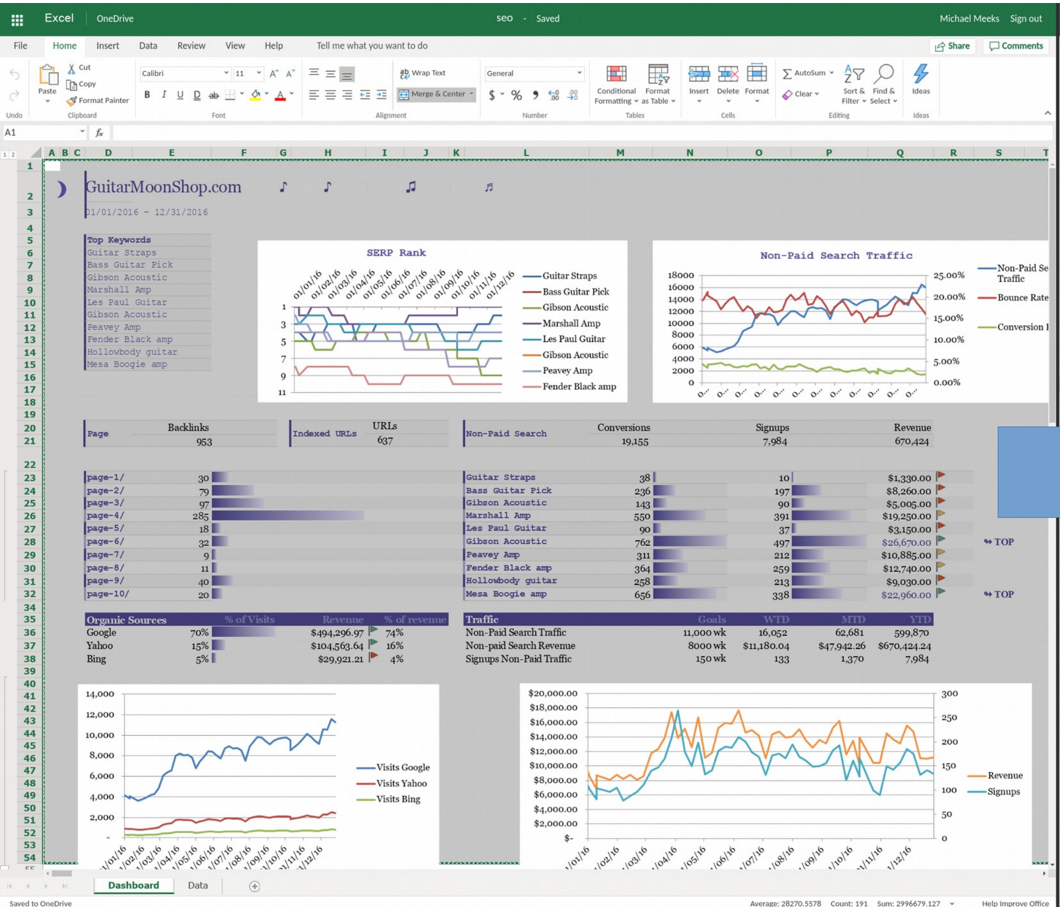
Office.com / Excel copy / paste …



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SERP Rank

Non-Paid Search Traffic

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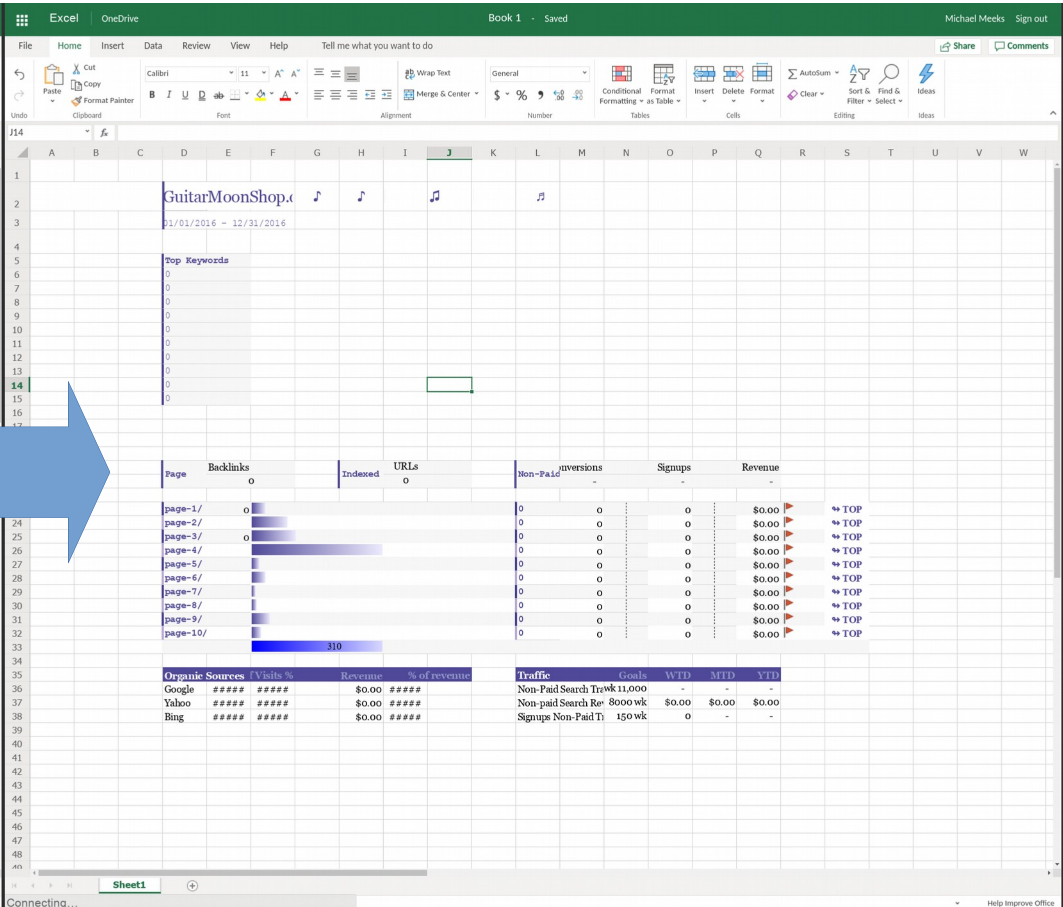

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	0		0		-	-	-

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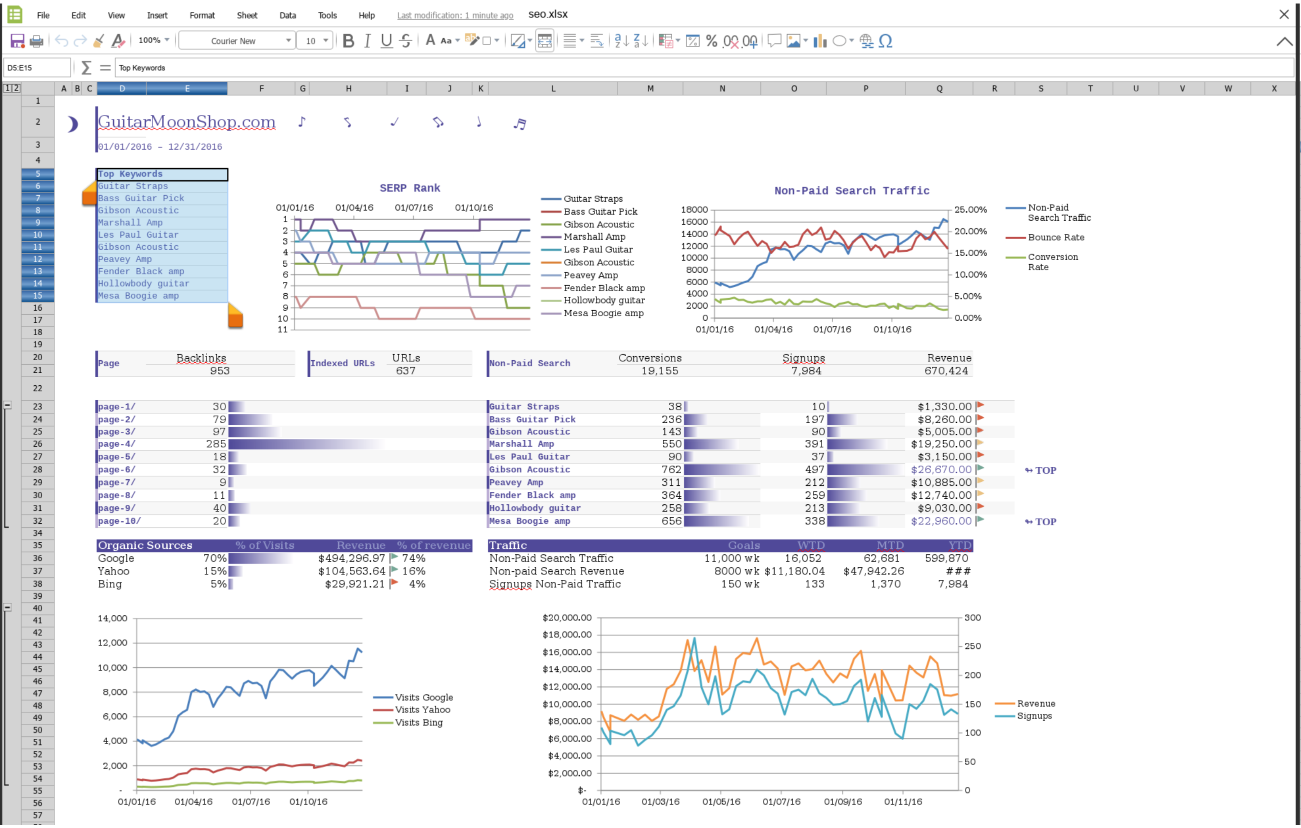
Online – old-style copy/paste: text → CSV import dlg.



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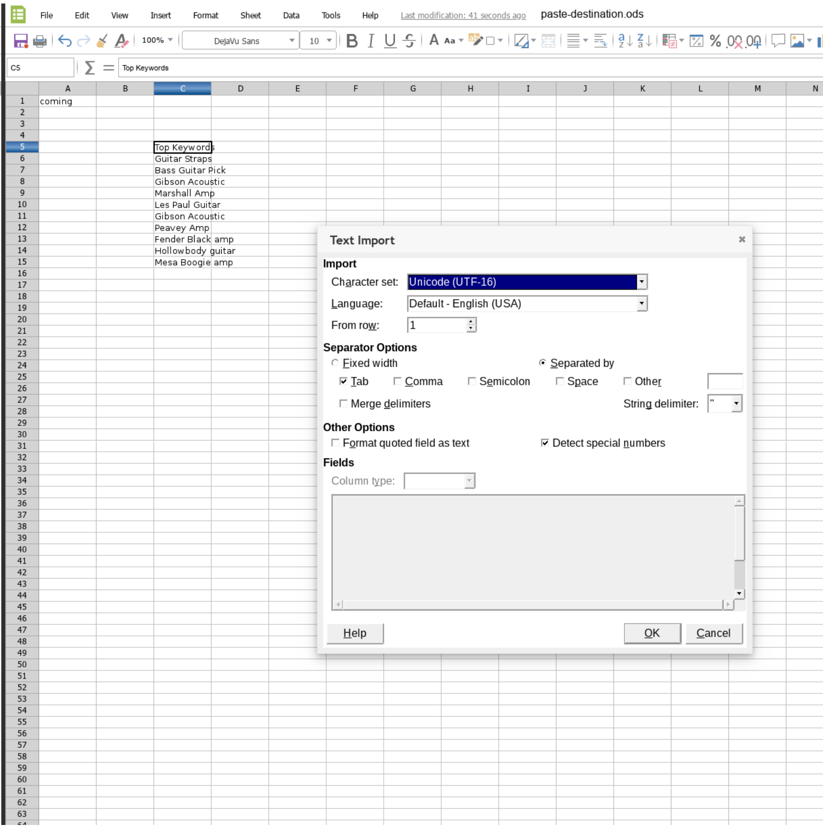

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coming

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Text Import

Import

Character set: Unicode (UTF-16)

Language: Default - English (USA)

From row: 1

Separator Options

Fixed width [✓ Separated by]

[✓ Tab] Comma Semicolon Space Other

Merge delimiters

String delimiter: "

Other Options

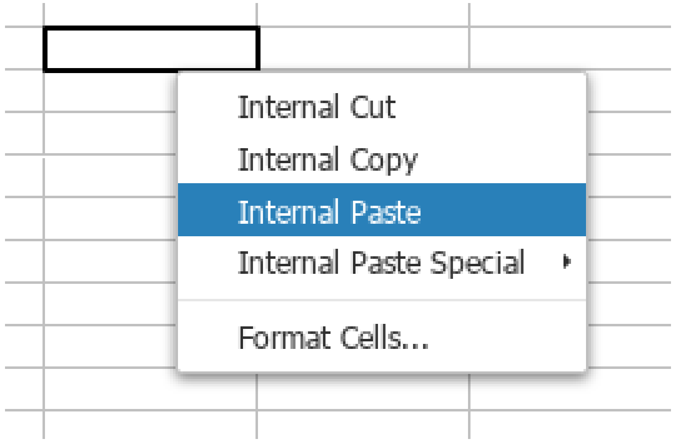
Format quoted field as text [✓ Detect special numbers]

Fields

Column type:

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.

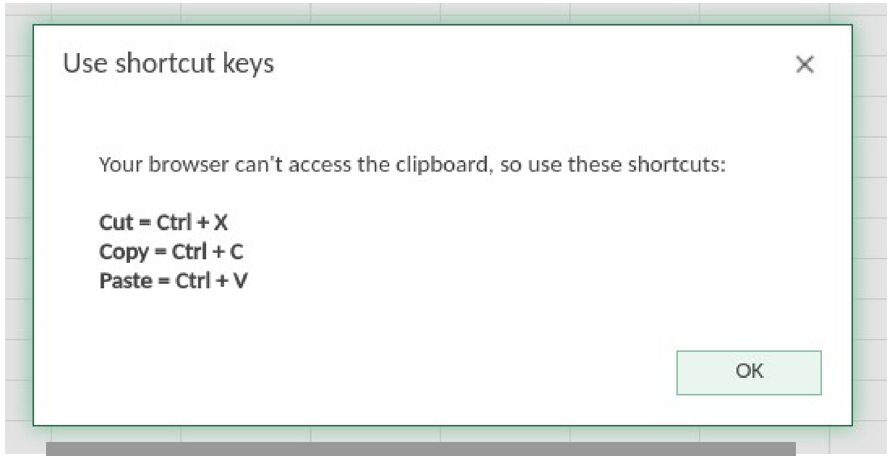


Web Clipboard technologies.

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.

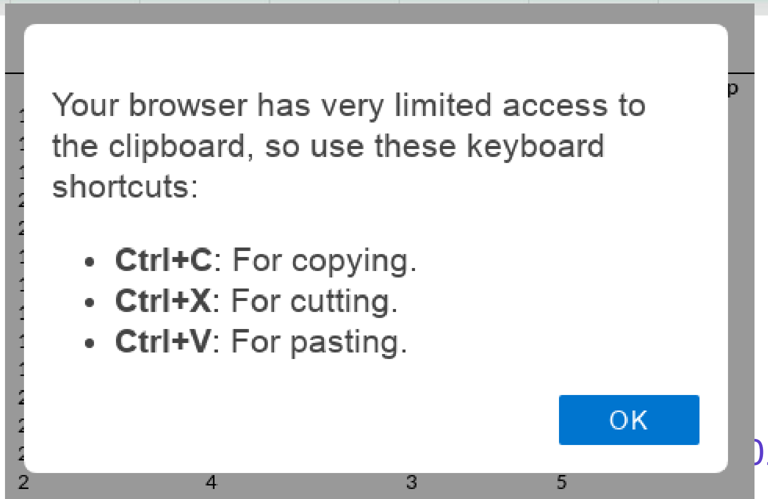


Use shortcut keys ×

Your browser can't access the clipboard, so use these shortcuts:

Cut = Ctrl + X
Copy = Ctrl + C
Paste = Ctrl + V

OK

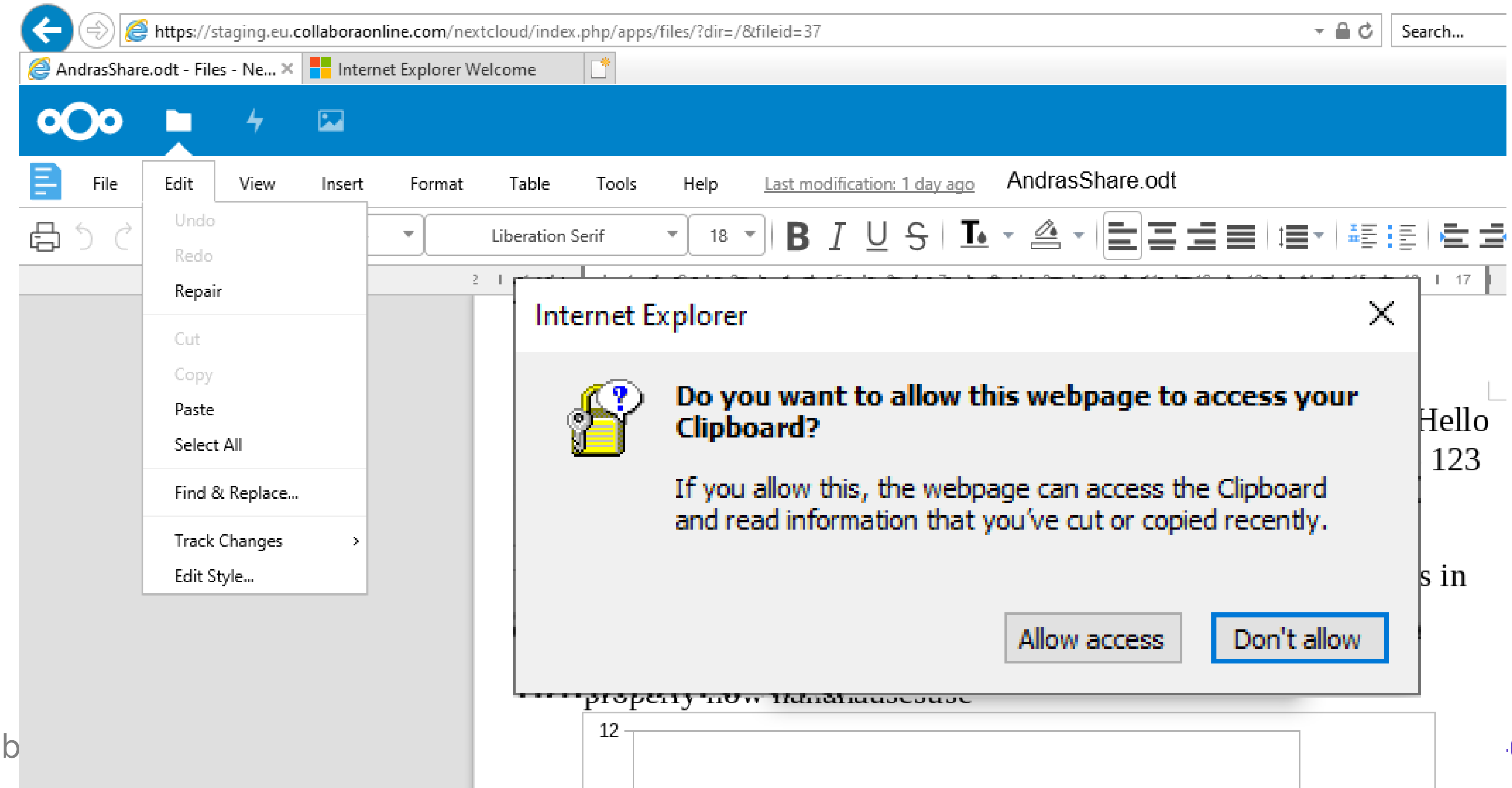


Your browser has very limited access to the clipboard, so use these keyboard shortcuts:

- **Ctrl+C**: For copying.
- **Ctrl+X**: For cutting.
- **Ctrl+V**: For pasting.

OK

IE11 – had a great initial approach:



Internet Explorer

Do you want to allow this webpage to access your Clipboard?

If you allow this, the webpage can access the Clipboard and read information that you've cut or copied recently.

Google Chrome / Docs – joined up thinking ?

Google Chrome's

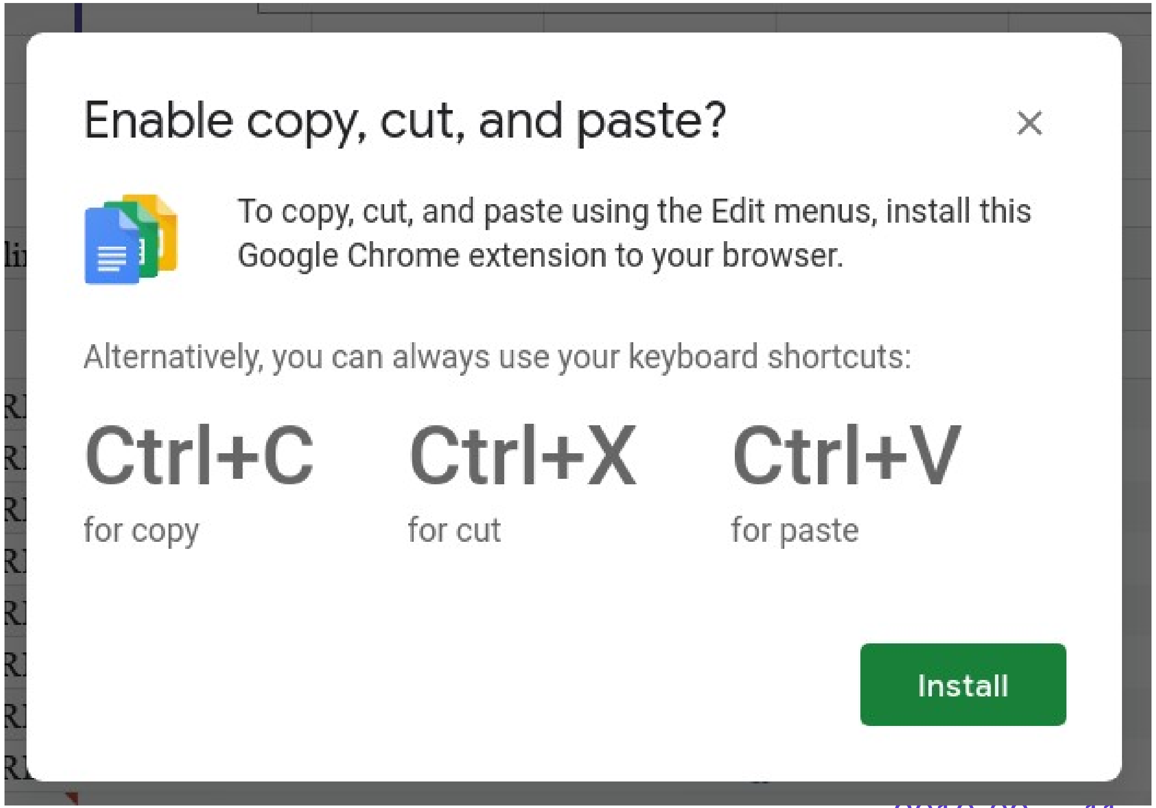
- Security team hardened by many issues → so rightly paranoid.

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 … ?



Enable copy, cut, and paste?

To copy, cut, and paste using the Edit menus, install this Google Chrome extension to your browser.

Alternatively, you can always use your keyboard shortcuts:

Ctrl+C for copy

Ctrl+X for cut

Ctrl+V for paste

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

Paste to another Online instance / window …

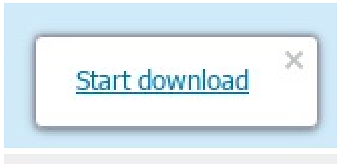
- Shortcut, no need to download via a custom meta-origin.

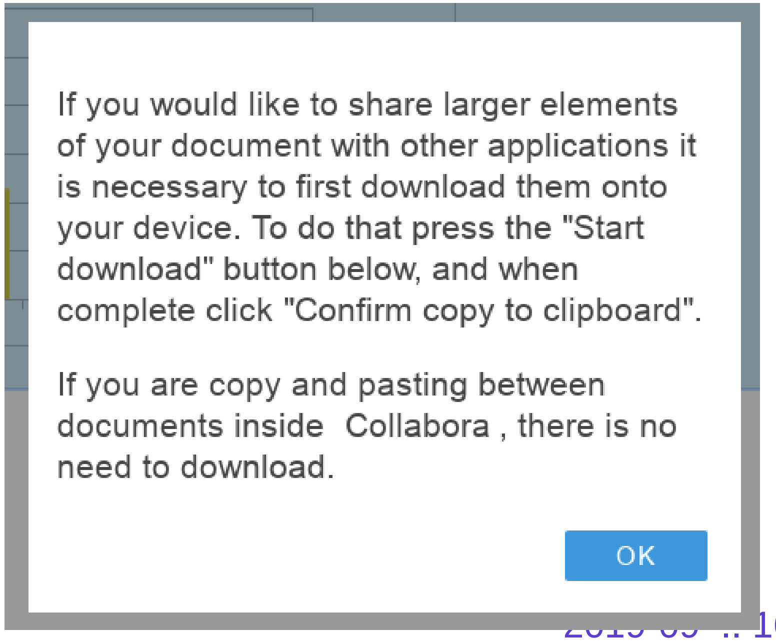
Complex cases

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

Try to explain the sorry situation to users:

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




If you would like to share larger elements of your document with other applications it is necessary to first download them onto your device. To do that press the "Start download" button below, and when complete click "Confirm copy to clipboard".

If you are copy and pasting between documents inside Collabora , there is no need to download.

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.

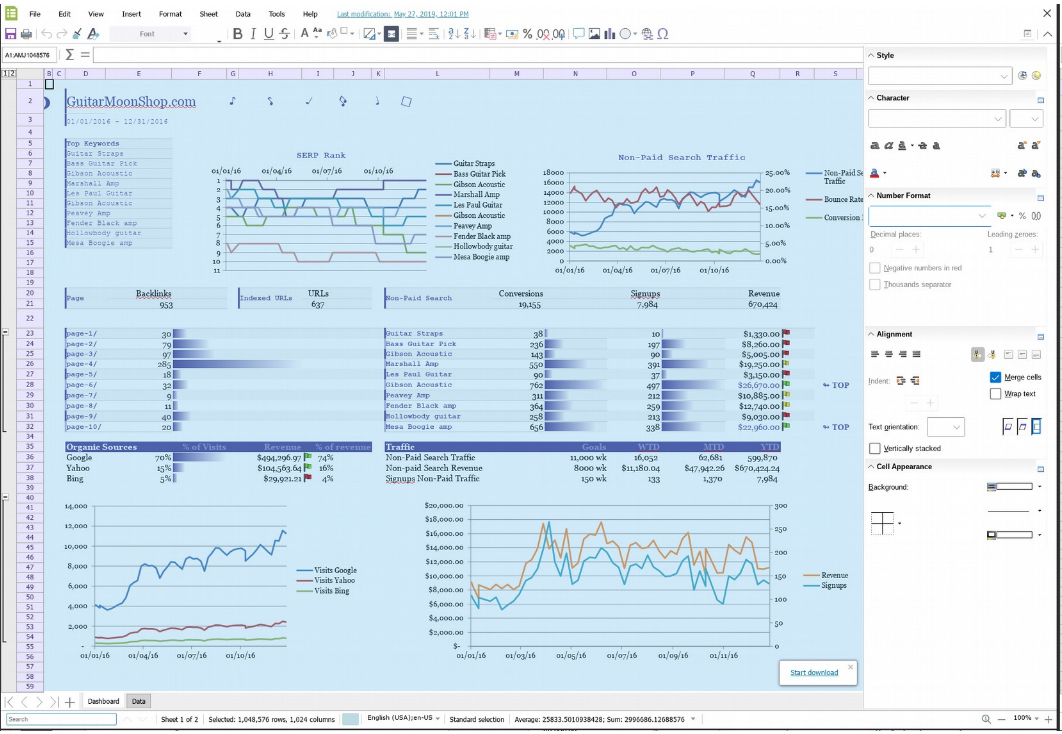
Infrastructure to make this work

- 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 ...



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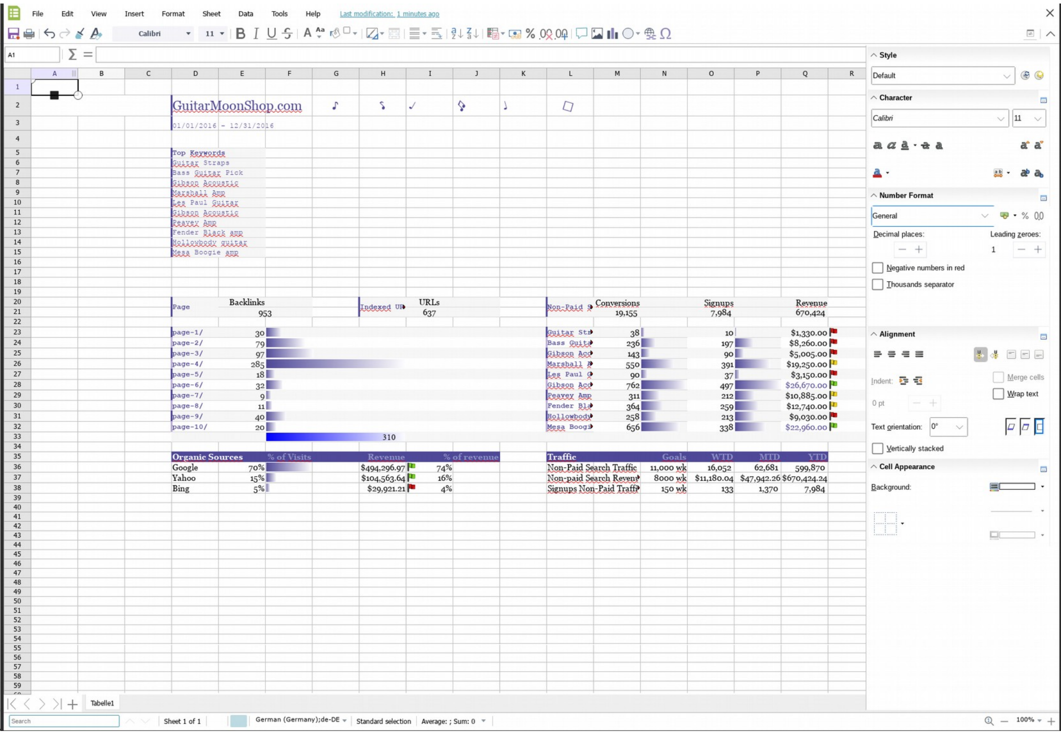
Start download

Dashboard Data

Sheet 1 of 2 | Selected: 1,048,576 rows, 1,024 columns | English (USA);en-US | Standard selection | Average: 25833.5010938428; Sum: 2996686.12688576 | 100%



File Edit View Insert Format Sheet Data Tools Help Last modification: 1 minutes ago

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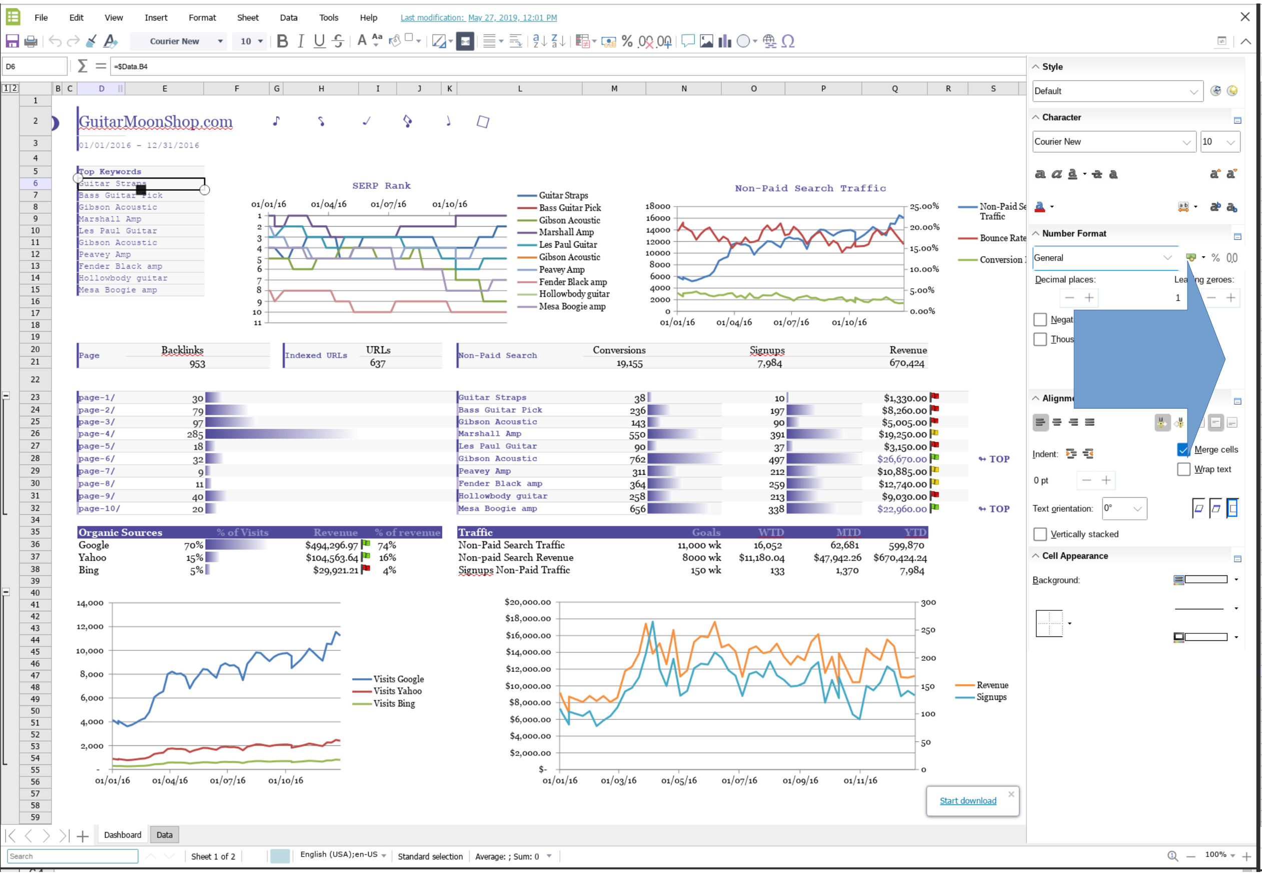
Tabelle1

Sheet 1 of 1 | German (Germany);de-DE | Standard selection | Average: ; Sum: 0 | 100%

Afterwards + explicitly copying charts:



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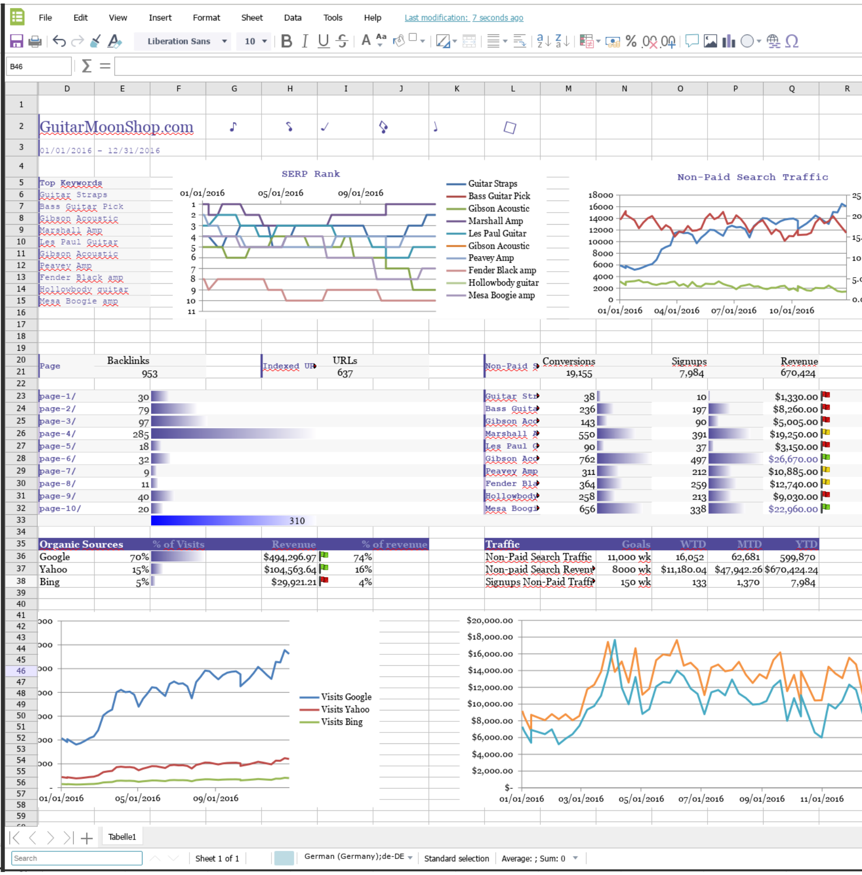
Organic Sources	% of Visits	Revenue	% of revenue
Google	70%	$494,296.97	74%
Yahoo	15%	$104,563.64	16%
Bing	5%	$29,921.21	4%

Traffic	Goals	WTD	MTD	YTD
Non-Paid Search Traffic	11,000 wk	16,052	62,681	599,870
Non-paid Search Revenue	8000 wk	$11,180.04	$47,942.26	$670,424.24
Signups Non-Paid Traffic	150 wk	133	1,370	7,984



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.

Collabora Productivity

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