Pickling for Clipboard API

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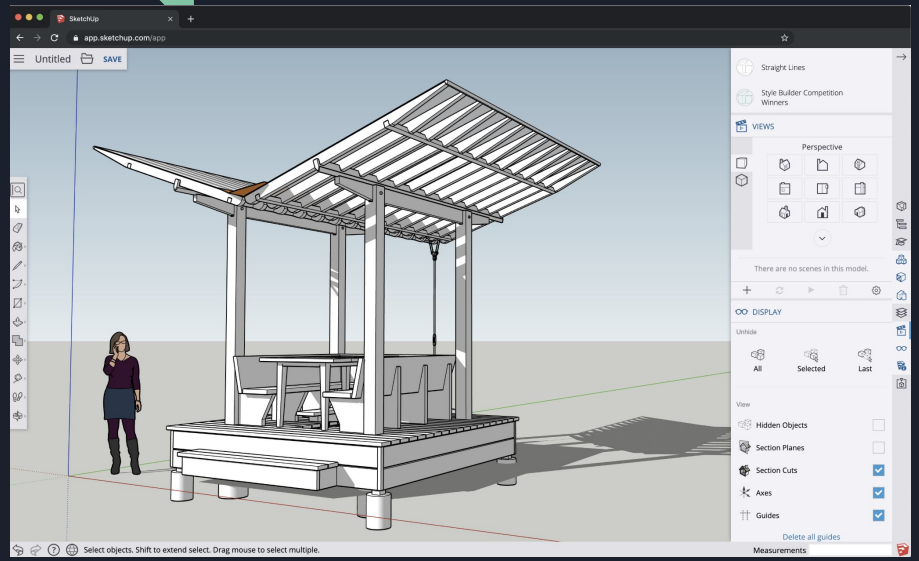
Agenda

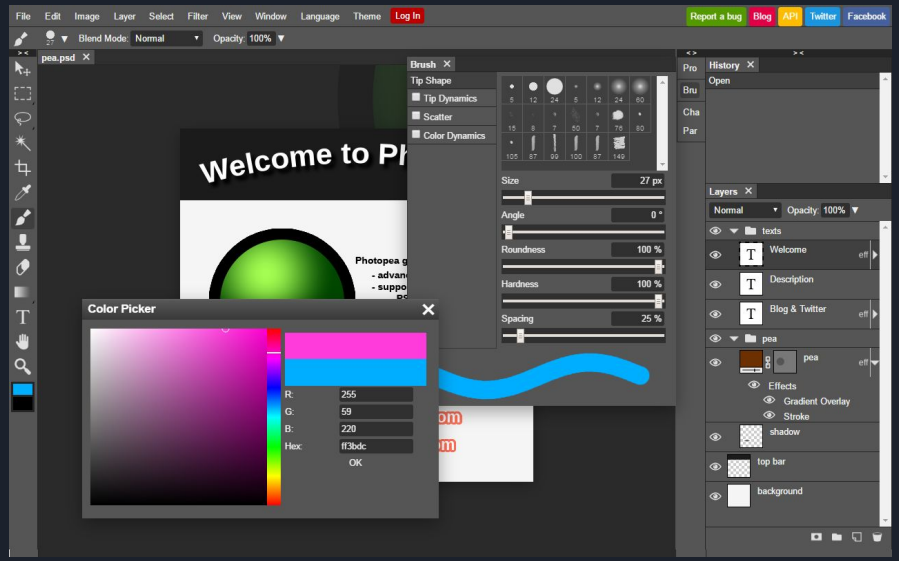
- Current Spec Status
- Problems
- Pickling design
- Questions?

Current Spec Status

- DataTransfer
  - Synchronous. Support for text, html, and images.
  - Blink and Webkit both implement an unstandardized and minimally documented custom format implementation (based on Pickling)...
- Clipboard API:
  - Asynchronous, promise-based API
  - Early 2019: Specified navigator.clipboard.{read,write}()
    - new ClipboardItem object instead of the previous synchronous DataTransfer concept.
  - Blink and Webkit both implement support for text, html, and images.
  - No support for custom formats

Problems - niche formats

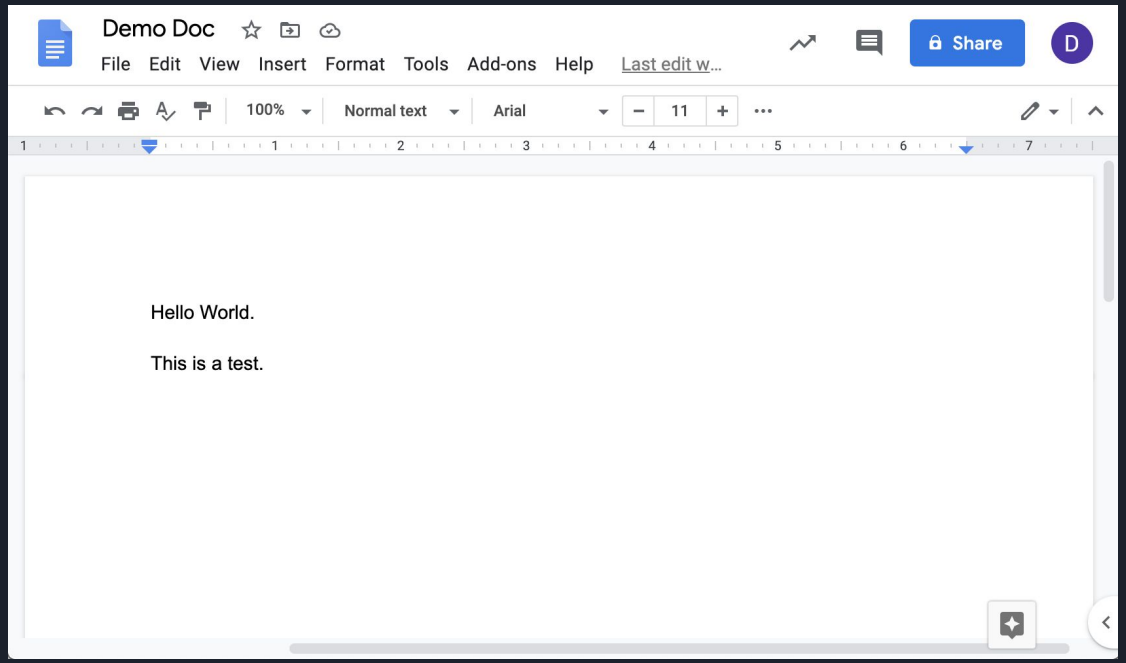




CAD design web apps (SketchUp)
Niche, custom formats (CAD formats)

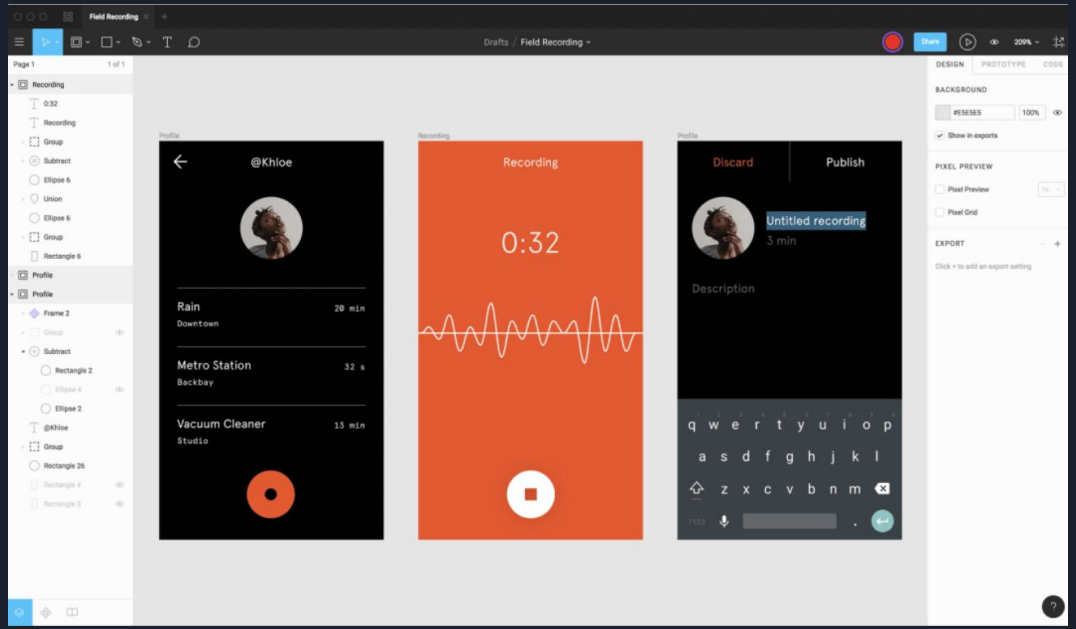
Image editor web apps (Photopea)
Niche, custom formats (images with layers)

Problems - proprietary formats



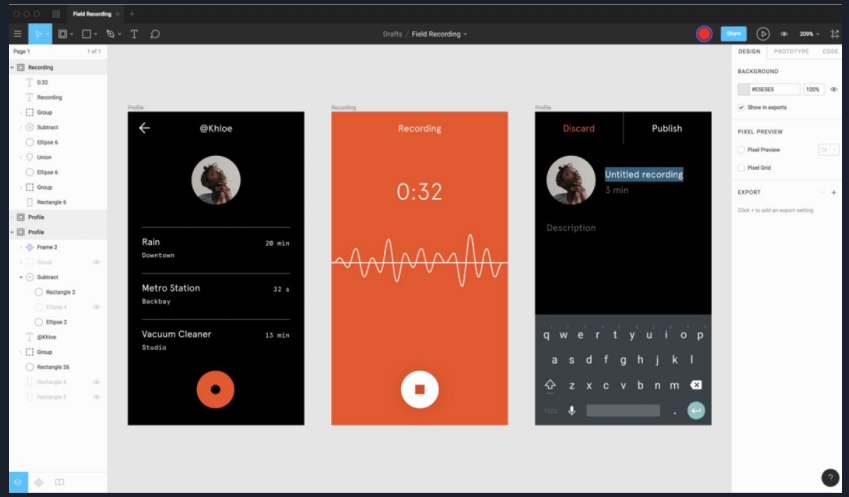
Document editors (Google Docs)
Proprietary formats (document formats)

Problems - metadata

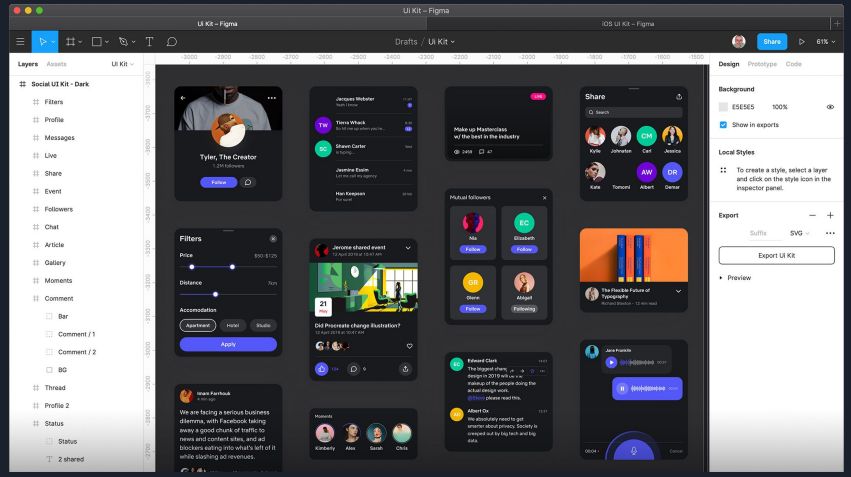


UX design web apps (Figma)
Formats untouched by sanitization (Images with all metadata preserved)

Problems - interop with native



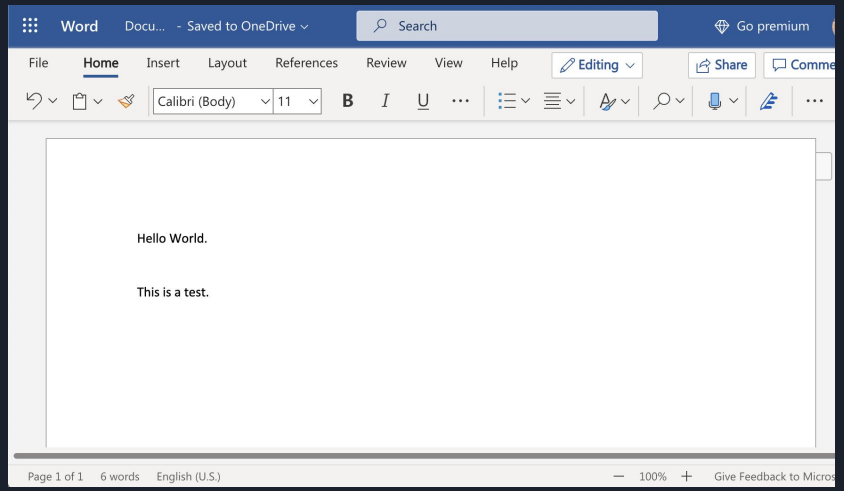
Figma (or other sites)



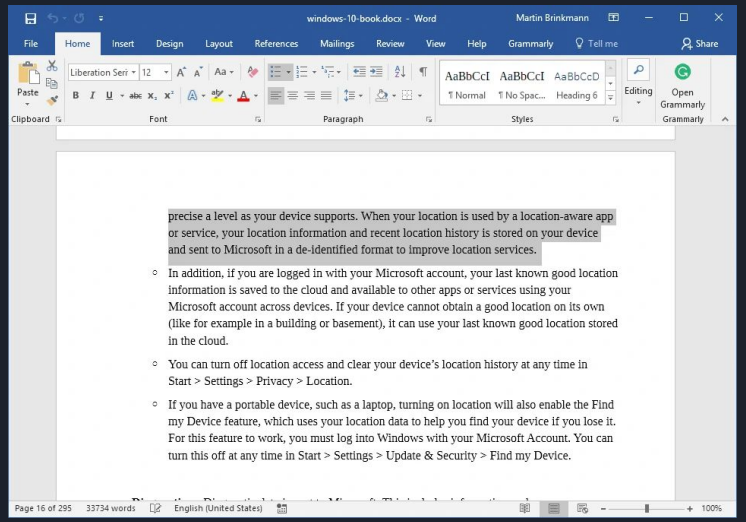
...with native app counterparts

Native apps interested in interop (Figma)
Interop with custom formats

Problems - interop with native



Office Online (or other sites)



...with native app counterparts

Native apps interested in interop (Microsoft Word)
Interop with custom formats

Pickling Design

- Provide web applications with access to custom formats.
  - Web-originated, so no interop (or RCE concerns) with legacy native apps.
  - Unsanitized, because formats are custom.
  - Native apps may opt in to using custom formats.
- Still recommend existing sanitized APIs for general use, for wide compatibility and safety.
- Context: Last year, Pickling was suggested when discussing raw clipboard.

Existing Write

```
const image = await fetch('myImage.png');
const text = new Blob(['this is an image'], {type: 'text/plain'});
const clipboard_item = new ClipboardItem({'text/plain': text, 'image/png': image});
await navigator.clipboard.write([clipboard_item]);
```

Pickling Write

```
// Pickling write example.
// This format 'text/plain' is recognized by the Clipboard API, so will be written as usual.
const text = new Blob(['text'], {type: 'text/plain'});
// This format 'text/custom' is not sanitized by the Clipboard API. It will be pickled if the
format is specified in the {direct: []} formats list.
const customText = new Blob(['<custom_markup>pickled_text</custom_markup>'], {type:
'text/custom'});

// Clipboard format ordering: Pickled formats will be written before sanitized formats by the
browser, since they're more "custom" and likely more targeted towards this use case.
const clipboardItem = new ClipboardItem({
  'text/plain': text,       /* Sanitized format. */
  'text/custom': customText /* Pickled format. This new format will be accepted and written
without rejection, as long as the new direct list contains this format. */
},
{direct: ['text/custom']} /* This new list specifies the pickled format 'text/custom'. */
);
navigator.clipboard.write([clipboard_item]);
```

Existing Read

```
const clipboardItems = await navigator.clipboard.read();
const clipboardItem = clipboardItems[0];
const text = await clipboardItem.getType('text/plain');
const image = await clipboardItem.getType('image/png');
```

Pickling Read

```
// Pickling read example. ClipboardItems returned by clipboard.read() may contain pickled
formats.
const clipboardItems = await navigator.clipboard.read({direct: ['text/custom']} /* This new list
specifies the pickled format 'text/custom' for all read ClipboardItems. */);
const clipboardItem = clipboardItems[0];

const textBlob = await clipboardItem.getType('text/plain');
// This format reads as a pickled format, only if it is included in the direct format list.
const customTextBlob = await clipboardItem.getType('text/custom');
```

Basic Protections

- Secure Context
- Active Frame
- Permission
- Consistent with many other new, “powerful” APIs
- User gesture, and optionally feature policy (recently renamed to permissions policy).

Proposed mapping

- Open to alternative mappings.
- Example: “custom/foo-format”
  - Windows:
    - Capital words separated by spaces.
    - Web Custom Foo-format
  - MacOS:
    - UTI reverse-DNS naming
    - com.web.custom.foo-format.
  - All other platforms (Linux, Android, ChromeOS, etc):
    - MIME types
    - application/web;type=”custom/foo-format”

Why map formats to native

- Sites should consistently use MIME types across platforms, to avoid platform-dependent code.
- Browsers should be able to interop with one another.
- Use consistent native formats between browsers.
- Different per platform, to follow platform conventions.
- Native applications may also opt in by implementing support for these formats.

Privacy Concerns (navigator.clipboard.read)

- Some sites may provide excess metadata or PII on the clipboard. This will be less transparent with pickled formats, which aren't pasted everywhere.
- Ex. Some image formats provide metadata with GPS and camera information.

Security Concerns (navigator.clipboard.write)

- Previous related raw clipboard proposal's arbitrary code execution concern alleviated.
- Some sites may place scripts on the clipboard. This will be less transparent with pickled formats, which aren't pasted everywhere.
- Ex. Pickled SVG or HTML might contain scripts.

Other

- Sorry, no public signals yet...

Questions?

- Open-ended overall, but please separate some concerns, such as read/privacy and write/security, into separate topics.
- Please also provide feedback on API shape.