Wayland and Weston: 8 years of production devices

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Hi, I’m Dan

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Open First

Hi, Dan! What are you talking about?

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  - … well, not entirely
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- **Can you learn anything from us?**

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Recap: a quick history lesson

Wayland timeline: pre-history

Sep 2008 — **First commit**
'A nano display server'

Oct 2008 — **First headline**
Phoronix spots the Git repository

Dec 2008 — **First contributor**
Ray Strode fixes RGB/BGR swap

Aug 2010 — **First protocol**
Protocol generated from XML

Aug 2010 — **First desktop**
wl_shell and wl_buffer added

Oct 2010 — **First post**
Mailing list on freedesktop.org

Wayland timeline: Stone Age

Nov 2010 — **First inception**
Nested Wayland backend added

Feb 2011 — **First dependency**
Wayland and Weston repositories split

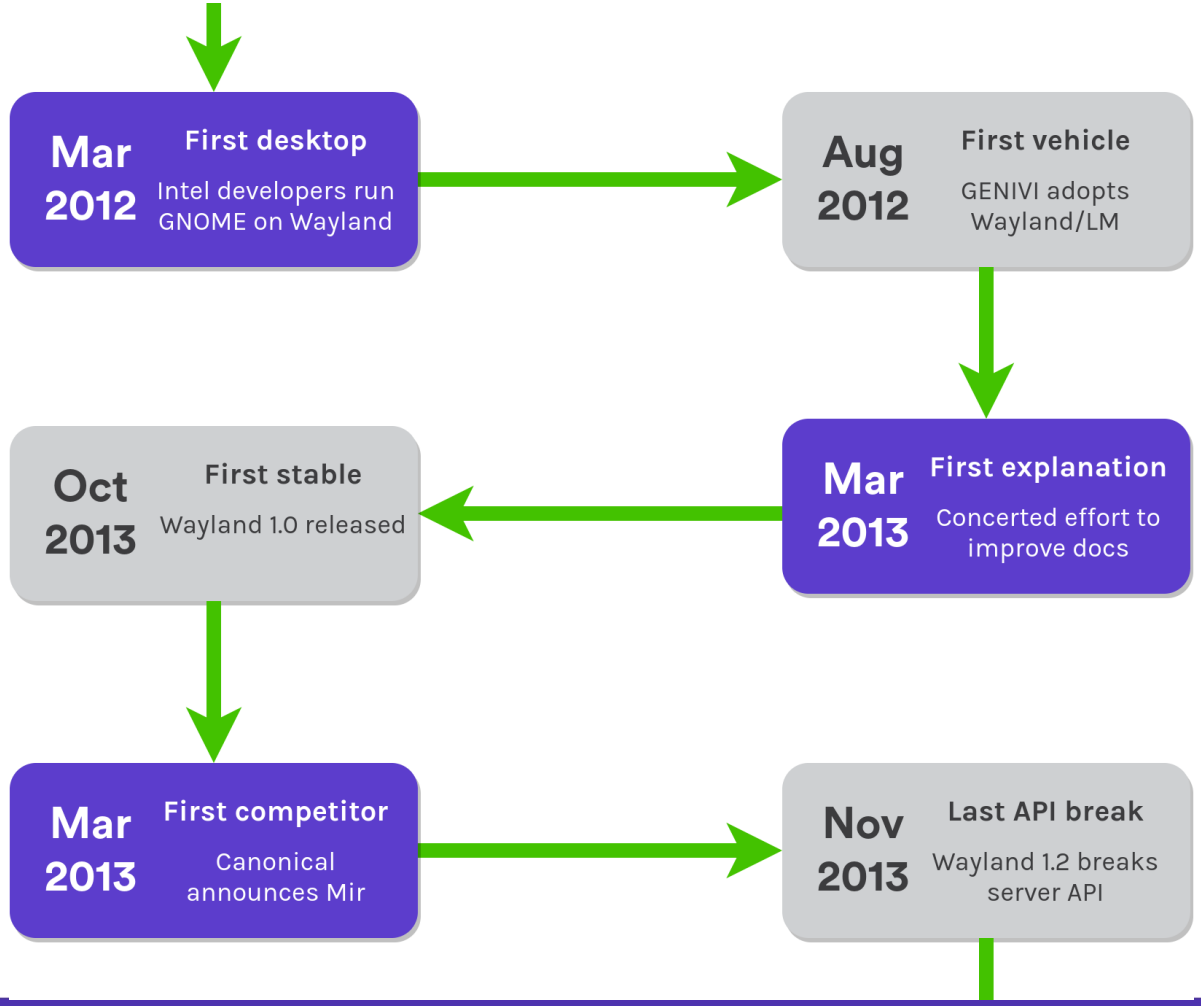
Mar 2011 — **First product**
Freebox ships to millions of users

Jun 2011 — **First legacy**
Xwayland hosts X11 clients in Wayland

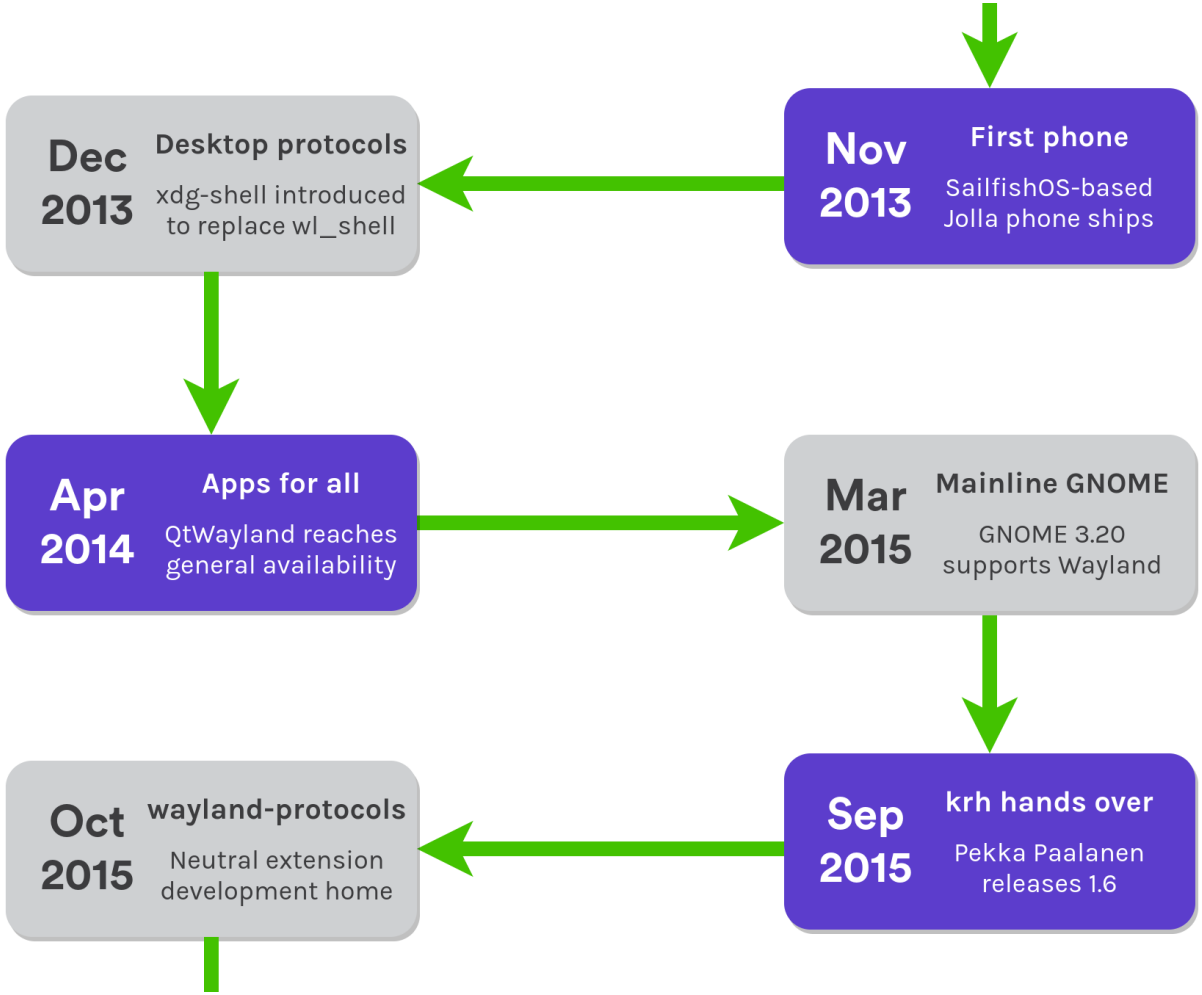
Feb 2012 — **First conference**
15 contributors meet pre-FOSDEM

Feb 2012 — **First release**
Wayland 0.85 released

Wayland timeline: Bronze Age



Wayland timeline: Feudalism



Wayland timeline: industrial revolution

Feb 2016 — **Vulkan 1.0**
Vulkan has day-zero Wayland support

Mar 2016 — **sway 0.1**
Will later be built into wlroots

Jun 2016 — **libweston**
Weston split into reusable library

Sep 2016 — **Chrome Wayland**
ARC++ used for Android in ChromeOS

Apr 2017 — **Mir back to earth**
Mir is retired, Ubuntu to use Wayland

May 2017 — **xdg-shell stable**
Window management protocol stable

Wayland timeline: late capitalism

Feb 2018 — **Manhattan**
Atomic modesetting for Weston

Aug 2018 — **Move to GitLab**
Wayland and Weston move to GitLab for development

Apr 2019 — **Retiring Rust**
wlroots-rs gives up

Oct 2019 — **libliftoff**
Reusable KMS lib for compositors

Nov 2019 — **Governance**
wayland-protocols governance

Jan 2020 — **Wayland Meson**
Wayland core finally adopts Meson

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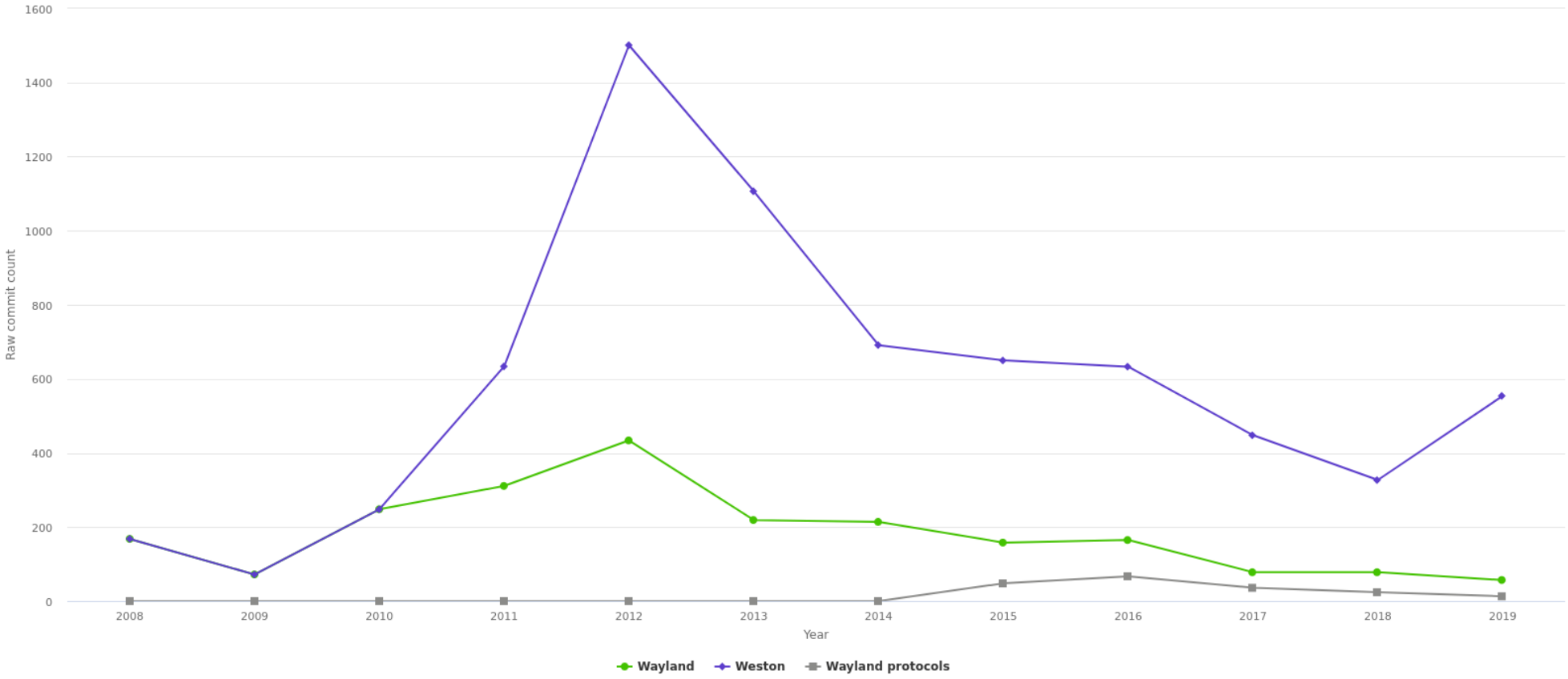
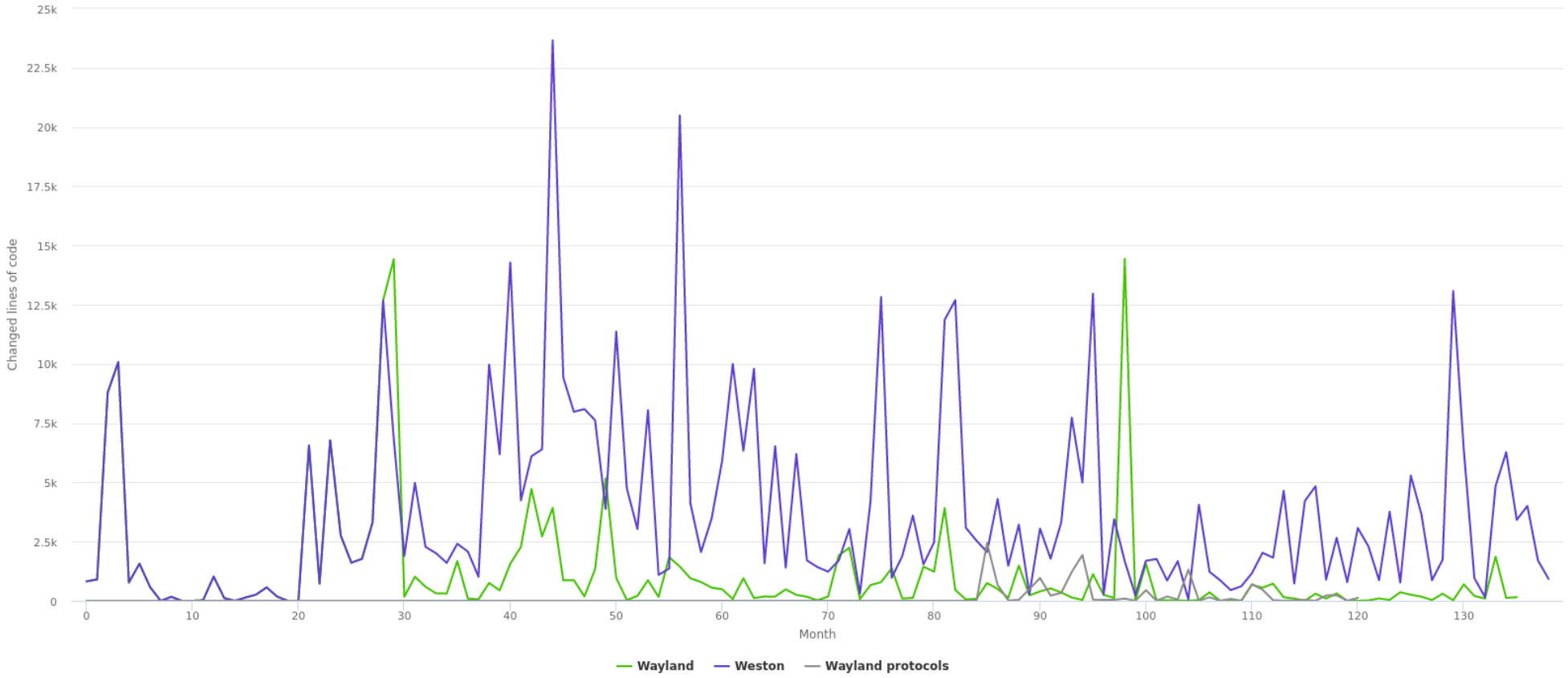
History by numbers

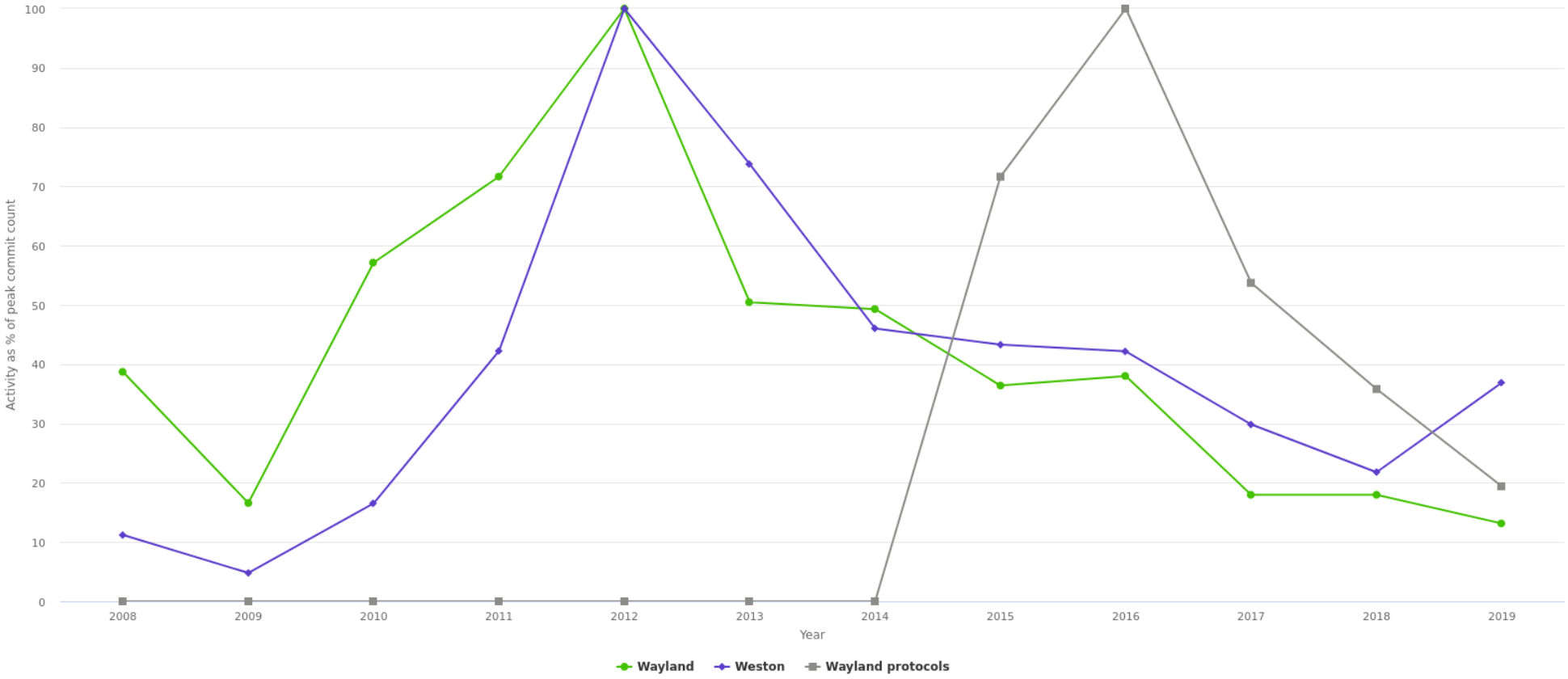
Commits over time



Changes over time (LoC per month)



Commits over time (commit count as % of peak)



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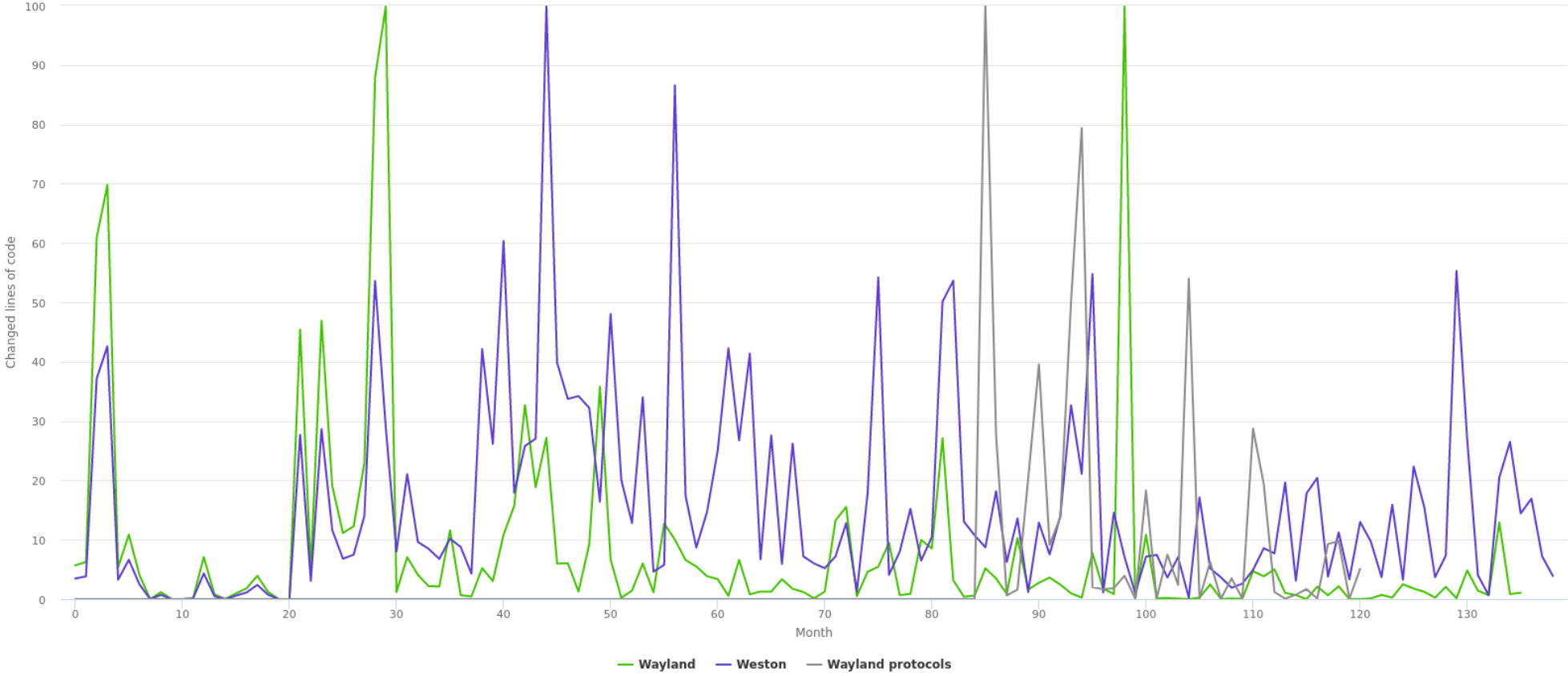

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Where are we now?

Wayland in 2020

- Well, we basically won
- Multiple distributions shipping Wayland sessions by default
- Only realistic choice for single-use products (digital signage, IFE, IVI, kiosk, STB/DTV, etc)
- Mature offering but transition to maturity has been hard
- Rebuilding community around those lines

Where is the development?

- At first, fast and frantic development in central components
- Then it moved to the users as people implemented it
- Small period of re-centralisation as we came to mature the core and share extensions
- Most development now largely moved away back to users
- Core Wayland changes mostly limited to bugfixes
- Another period of heavy extension development probably coming

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What did we do right?

Don’t be all things to all people

- Remember the goals and axioms of your project
- Keep your focus: concrete examples and usecases in mind
- Don’t be afraid to say no to scope creep!
- Early abstraction is death: compare X11/Wayland input systems
- But …

~~Don't~~ be all things to all people

- Leave yourself open to building out elsewhere
- Allow others to build on your common infrastructure and extend
- Wayland core is extremely light and doesn't have so much functionality
- But lightweight stackable extension mechanism means other usecases can be supported outside the core
- If they're a good idea, can bring them back in later

Be conscious of the world around you

- Optimise for your ideal world: for Wayland, this is the open-source ecosystem with upstream drivers
- Allow for others to experiment with your stack, maybe in a suboptimal way (e.g. fbdev, NVIDIA)
- Push out to other communities, make enablement happen
- Make it as easy as possible for users and developers to try it out

Extensibility and versioning

- Learn from us and Telepathy
- Have a good versioning strategy from the get go, which allows you to iterate and extend
- Make forwards compatibility easy, protocol breaks hard
- Define a clear deprecation path

Leadership transitioning

- Wayland was krh's baby
- Stepping back was gradual and gentle, allowing other contributors to grow into larger roles
- If you weren't looking closely, you almost wouldn't notice he stepped away
- Project is still healthy and thriving

Burn down your own castle

- When we started, X11 was the only option: had all render, display, input, etc support tied up in it
- The history of Wayland is the history of generic Linux display infrastructure
  - GBM, KMS, dmabuf, Mesa EGL, libinput, libxkbcommon, libliftoff
- Anyone can now create their own window system
- Doing this keeps you honest: allows others to experiment outside your bounds, and challenge you

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What did we do ... less right?

Clear and accessible information

- Reference and examples and narratives are all different
- Talk people through it visually
- Don’t have inaccessible and esoteric doc tools
- Presentations are really helpful to define your narrative
- But for concrete stuff, you need written docs
- Information vacuum is death: don’t let comment sections define your project

Toolkits beat midlayers

- libweston has the best compositor infrastructure
- But has historically had the worst user-facing API
- wlroots picked up enormous userbase from people who tried libweston and gave up
- Should’ve taken the lesson from the protocol: hand people toolkits they can use to build upon

Clear path for community

- Turns out if you have a really high barrier to entry, you get very few contributors
- Worked well in early days with focused corporate support from Collabora, Intel, Red Hat building Wayland from scratch
- Worked really badly with more diffuse community just trying to make Wayland work in their thing
- Transition to maturity was really hard
- Need to empower people where appropriate

Testing and validation plans

- Write tests, not test suites
- Build deep, not wide: make sure your test infrastructure is flexible and adaptable so building tests on top is easy
- Give people as few excuses to avoid testing as possible!

Know your time

- Wayland's history covers many ages and stages of development and maturity
- Development approaches which were helpful in one age might not be helpful for the next
- Take a from-scratch look at your users and the world around you
- Make sure your processes are appropriate for your times

Thank you!