



**Linux display and video:
one problem, three solutions,
many puzzled developers**

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Problem Definition



Problem Definition



graphics / video



Problem - Purpose

format
memory/deep pipeline
device/CPU



Problem - Source

rotation
scaling
composing



Problem - Processing

X11
Wayland
DirectFB
Raw API



Problem - Stack

DRM FBDEV V4L2



Problem - API



(mis)conceptions



FBDEV is the only
practical solution for
embedded platforms



(mis)conceptions

DRM requires a
complex userspace
stack



(mis)conceptions

Drivers should
implement multiple
interfaces



(mis)conceptions

Frame Buffer Device



Origins

Video 4 Linux 2



Origins

Direct Rendering Manager



Origins



Present

	DRM	FB	V4L2
Dynamic Allocation	Yes	No	Yes
Multiple Buffers	Yes	panning	Yes
Import	dmabuf	No	userptr
Export	dmabuf mmap	mmap	mmap



Memory Management

	DRM	FB	V4L2
KMS	Yes	Yes	Yes
Formats	4CC	RGB 4CC	4CC
Enumeration	Yes	No	Yes
Negotiation	No	No	Yes



Mode Setting

	DRM	FB	V4L2
Overlays	Yes	No	Yes
Rotation	Yes	No	Yes
Scaling	Yes	No	Yes
Cropping/Panning	Yes	Yes	Yes

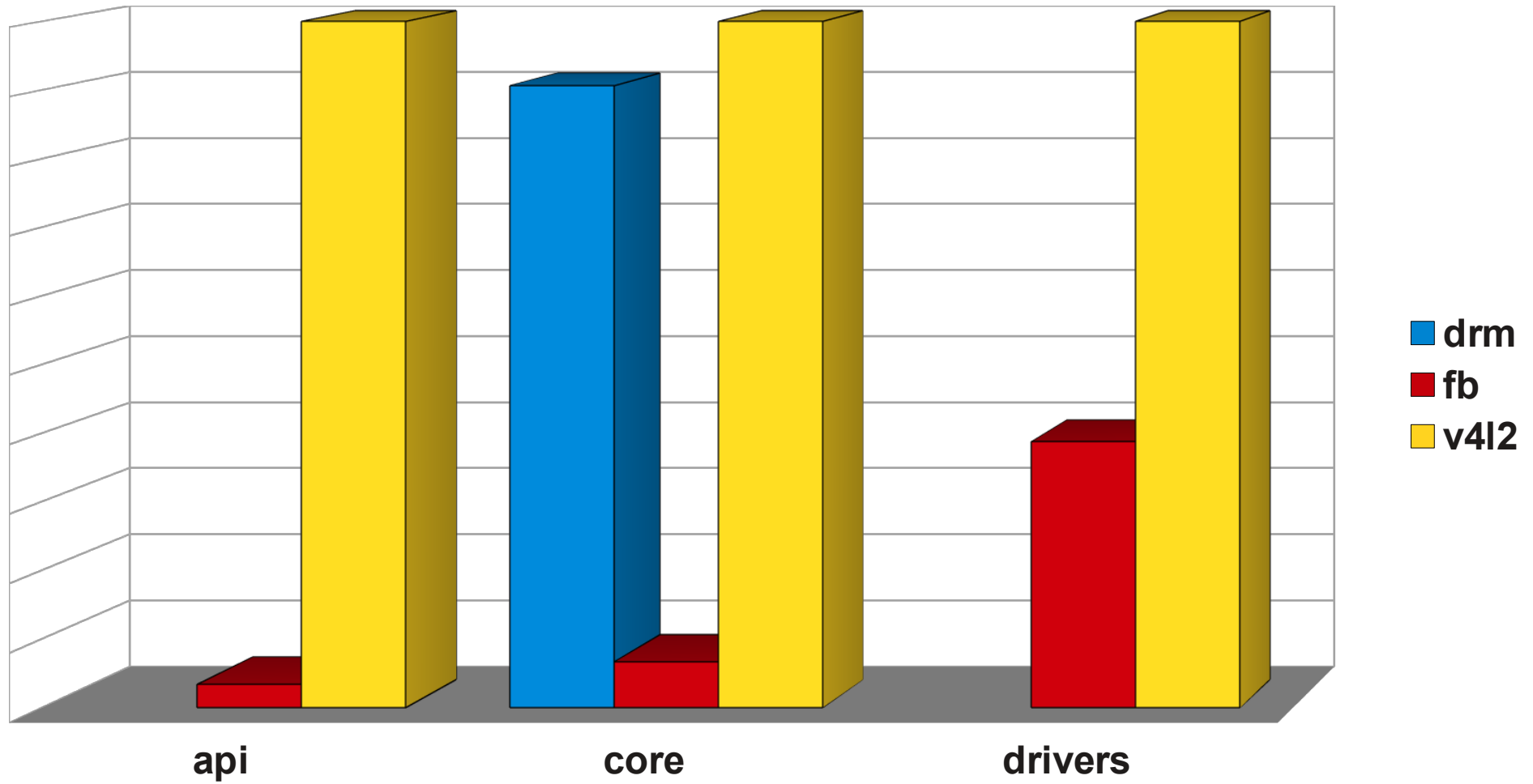


Transformations

	DRM	FB	V4L2
2D	No	Console	No
3D	Yes	No	No
Cursor	Yes	Yes	No
Composing	No	No	No

Acceleration





Documentation

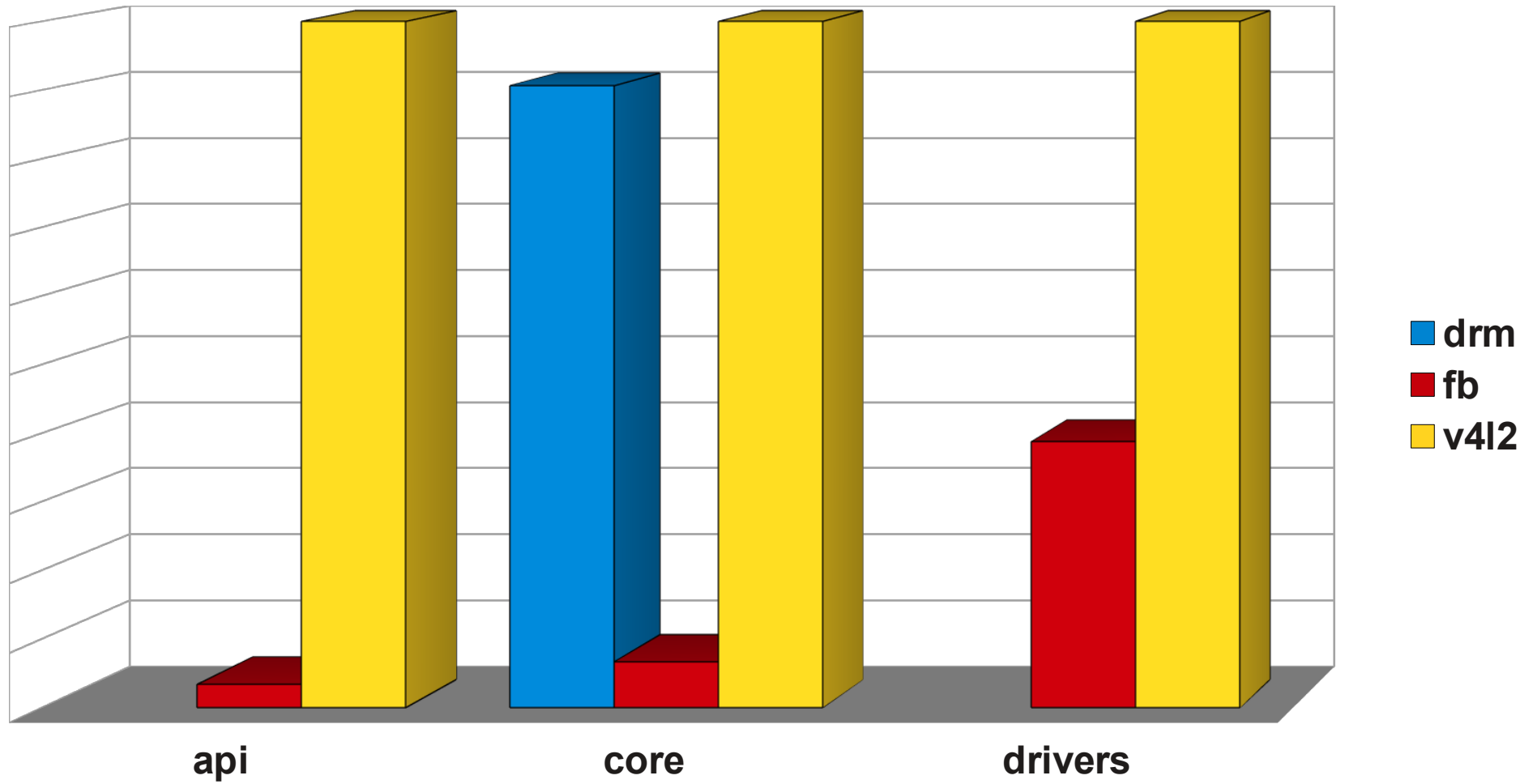
“ The DRM core exports several interfaces to applications, generally intended to be used through corresponding libdrm wrapper functions. In addition, drivers export device-specific interfaces for use by userspace drivers & device-aware applications through ioctls and sysfs files.

External interfaces include: memory mapping, context management, DMA operations, AGP management, vblank control, fence management, memory management, and output management.

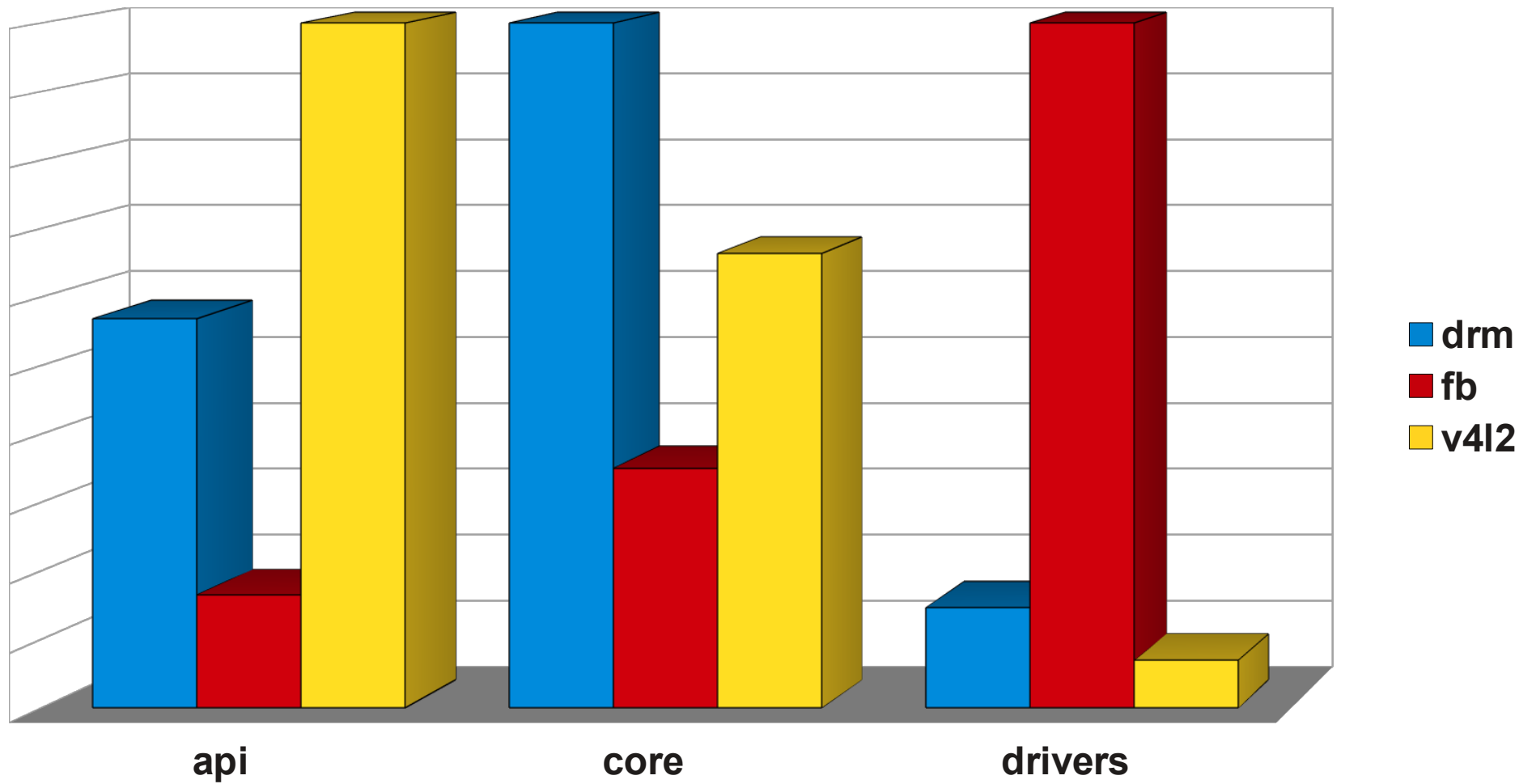
Cover generic ioctls and sysfs layout here. We only need high-level info, since man pages should cover the rest. ”



DRM API Documentation

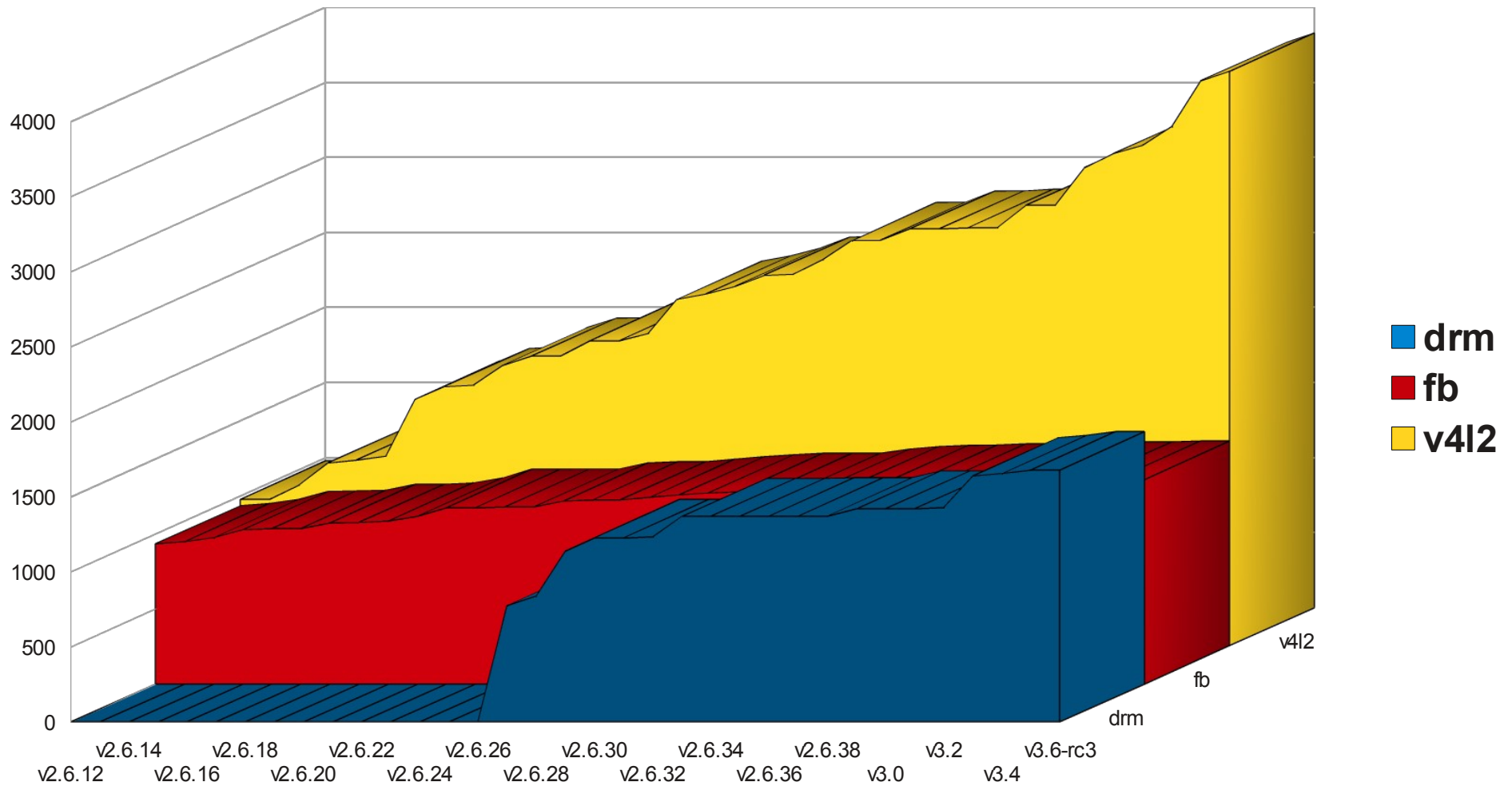


Documentation



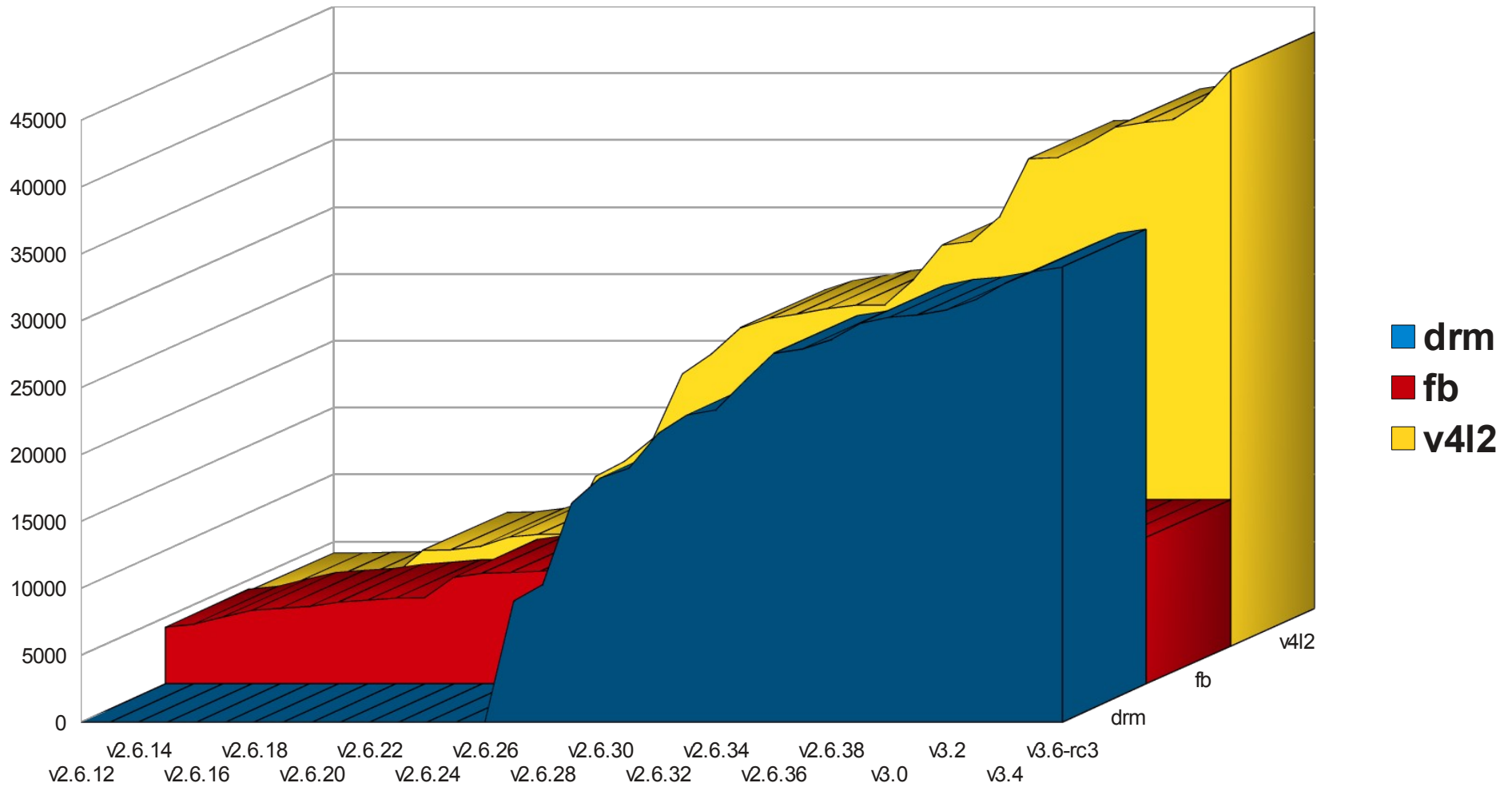
Code Size



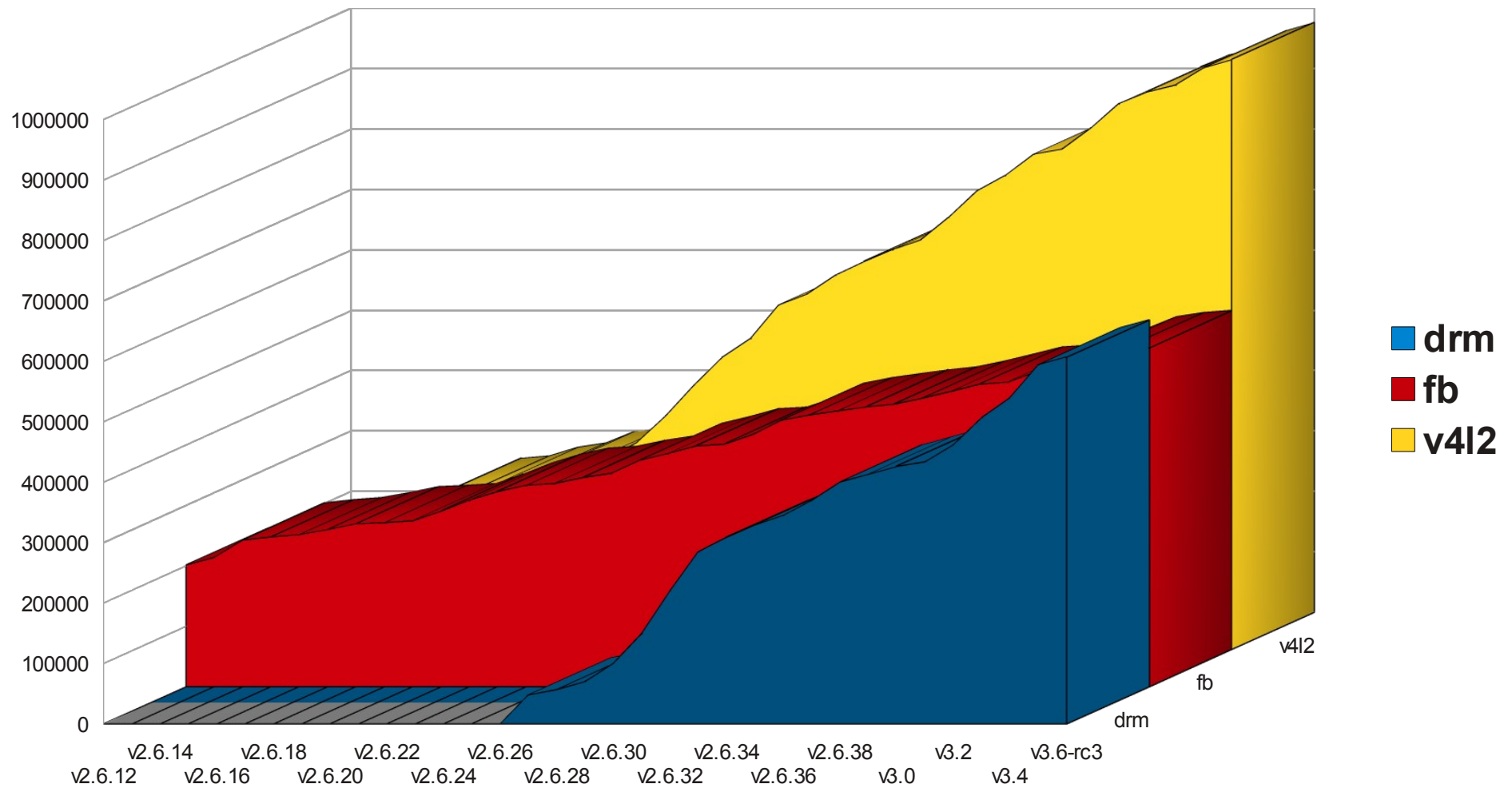


**IDEAS
ON BOARD**

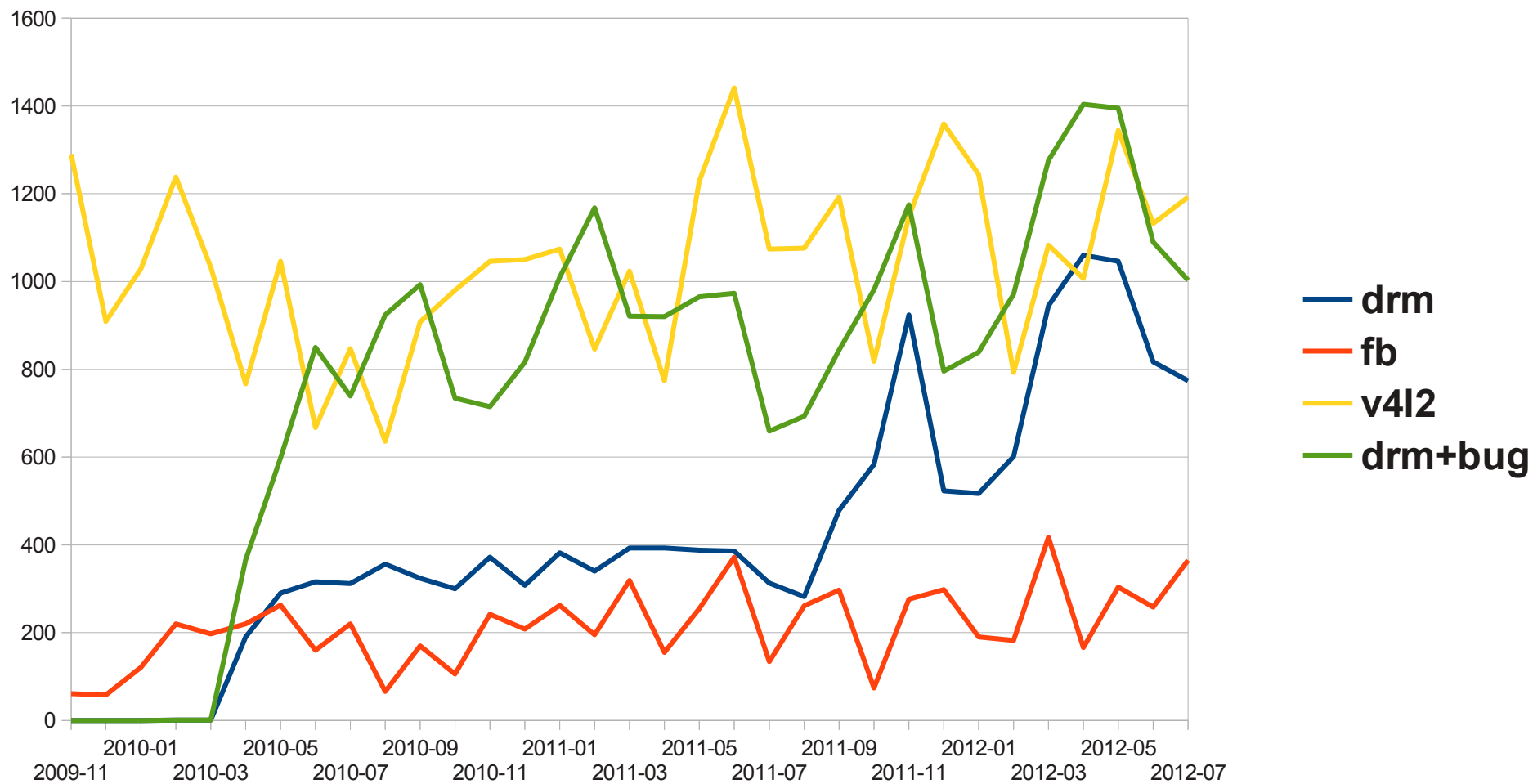
Cumulative Changes - API



Cumulative Changes - Core



Cumulative Changes - Drivers



Mailing List Traffic



Source: <http://www.flickr.com/photos/buckarooobay/3721809183/>

dmabuf



Work In Progress

dri2video

<https://wiki.linaro.org/OfficeofCTO/MemoryManagement?action=AttachFile&do=get&target=linux-video.pdf>

Targets: DRM



Work In Progress

panel & backlight

<http://lwn.net/Articles/512363/>



Work In Progress

Personal opinion

Flame war possible

Handle with care



Disclaimer

DRM needs to support
dumb devices better



~~(mis)~~conceptions

V4L2 still has use
cases



~~(mis)~~conceptions

FBDEV should be
deprecated



~~(mis)~~conceptions

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Contact

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