Camera Metadata Survey

VES Tech - Camera Metadata WG.

Sam Richards

VES
Visual Effects Society

VES Tech Camera Metadata WG.

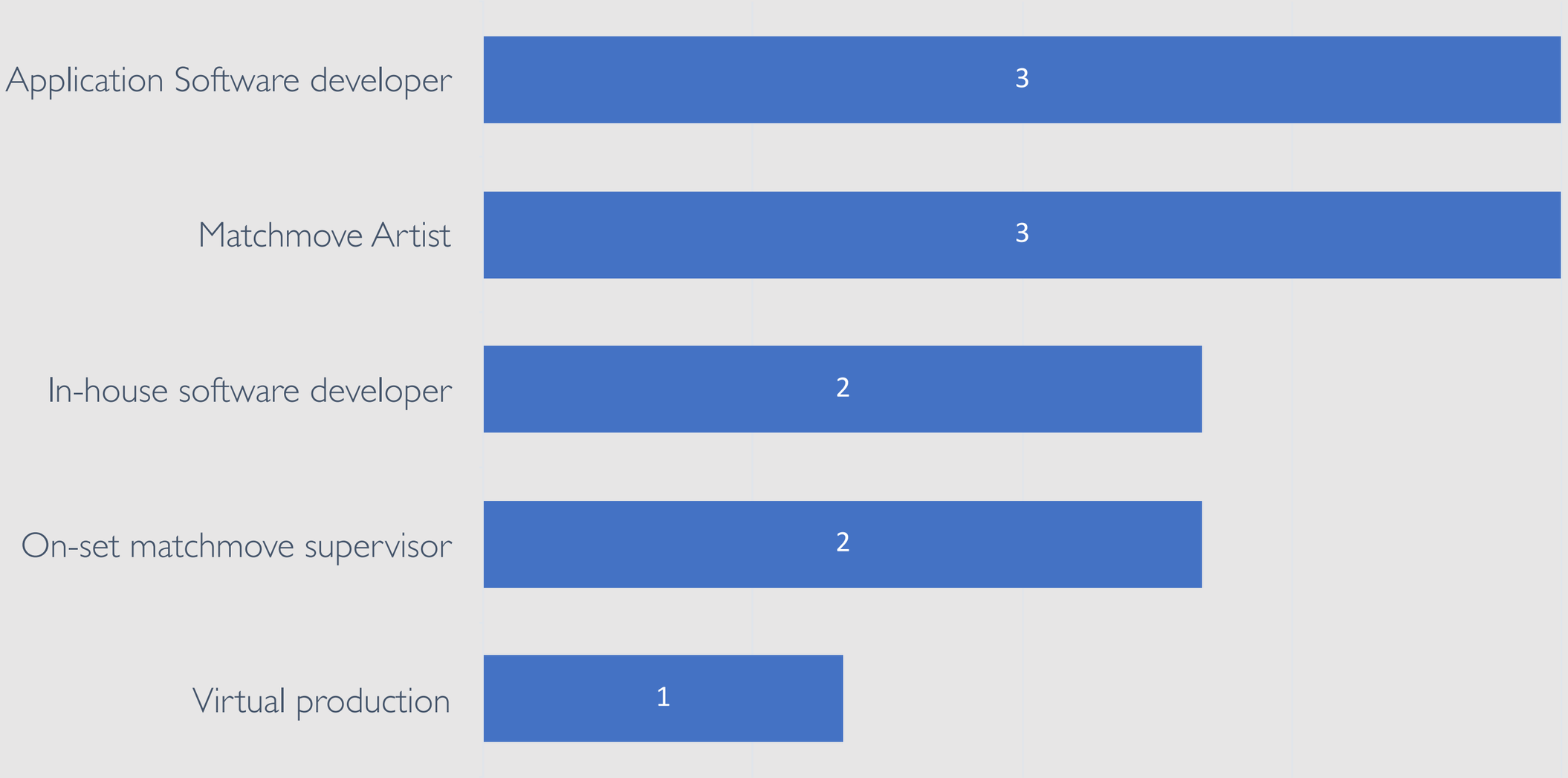
- Focus on how camera metadata is used in VFX pipelines.
- We are not a standards body.
- Working with other groups such as MovieLabs, so we don't diverge.
- Focus is conventional plate based, not virtual production.
- Identify VFX Artists who can guide us on what is needed.

- Members include: Joseph Goldstone, Sam Richards, Michele Sciolette, Dave Stump ASC, Cassidy Pearsall

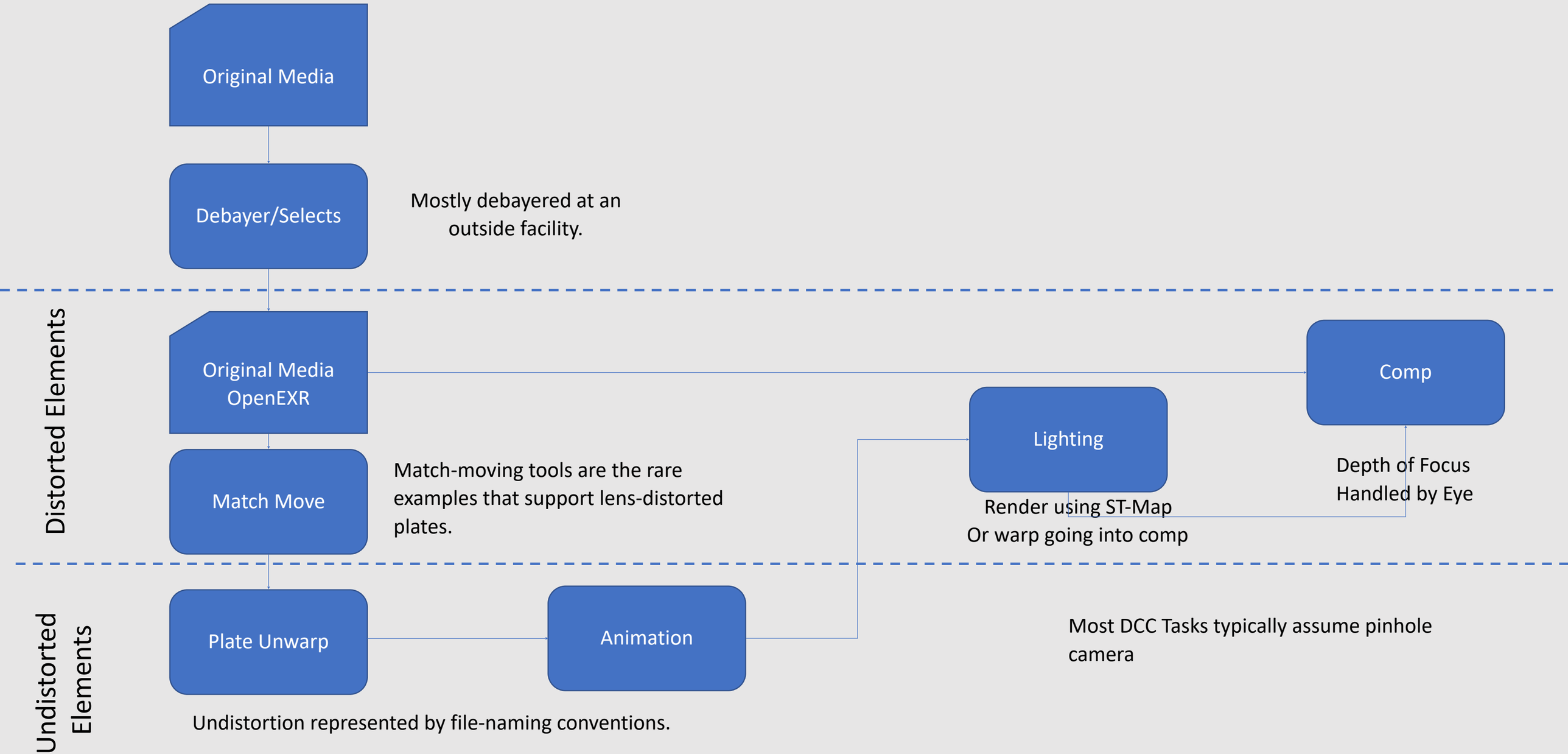
Camera Metadata Survey

- Developed a survey to help start discussion.

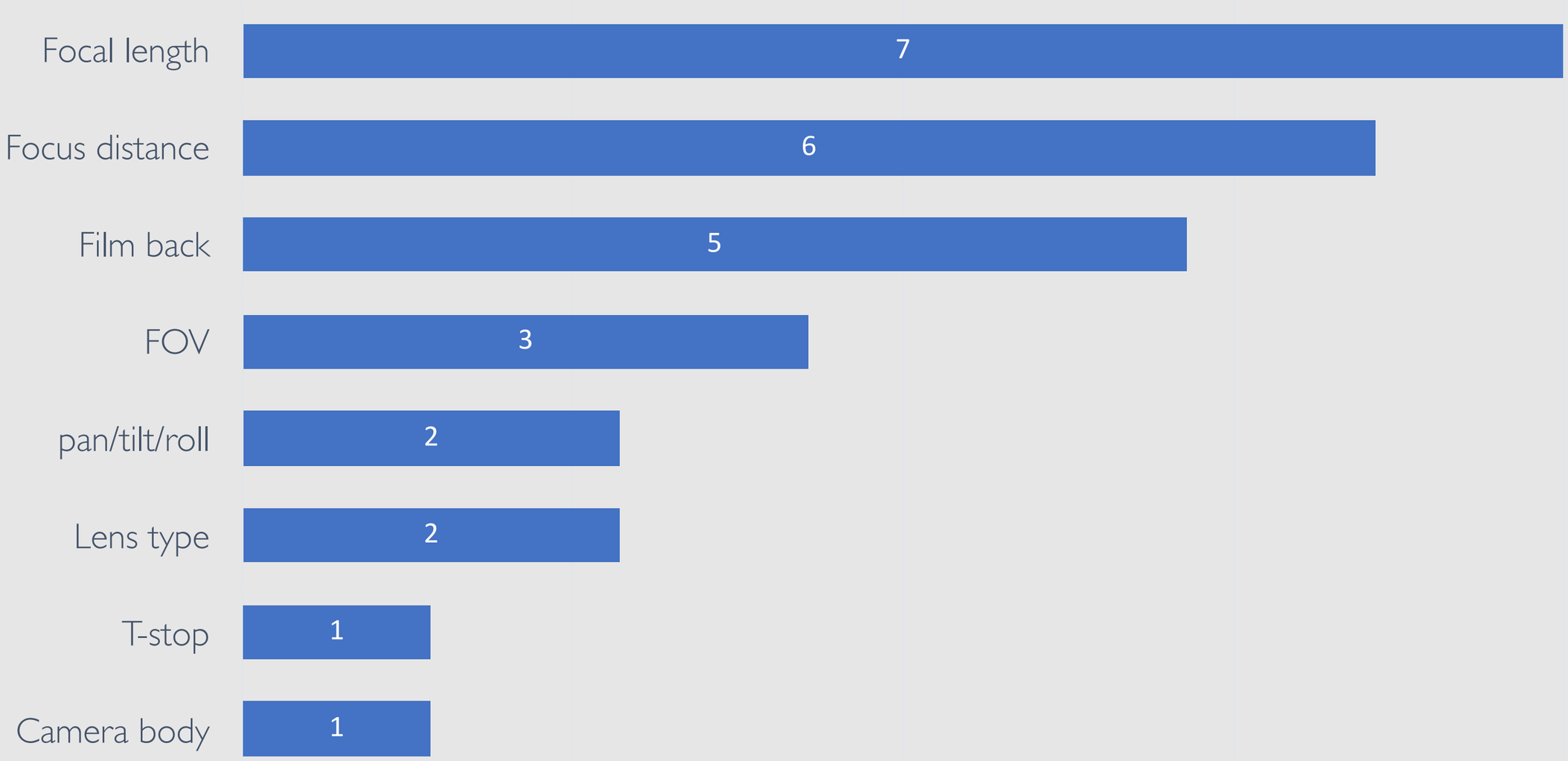
What best describes your professional role?



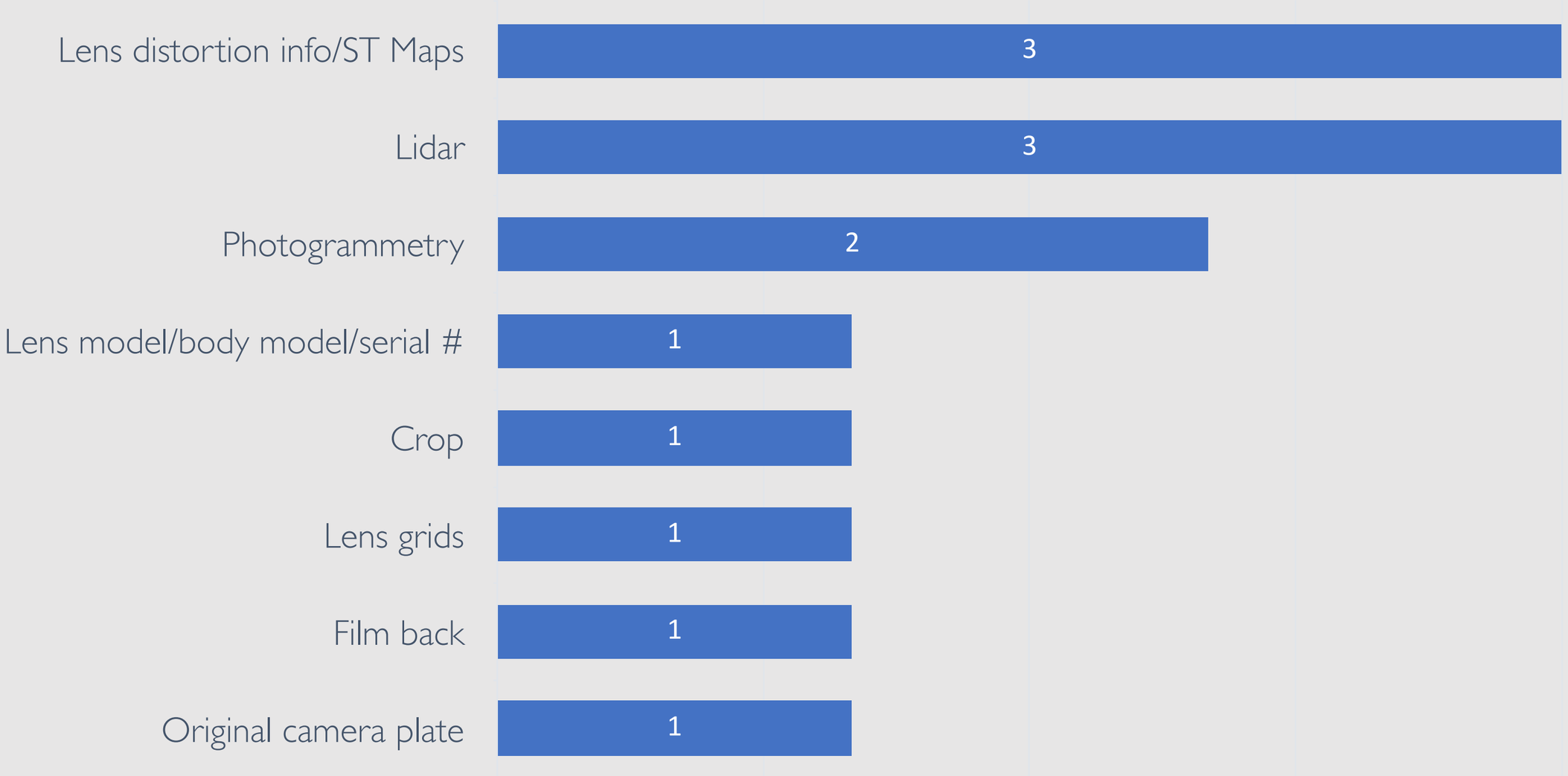
General Workflow


Original Media
Debayer/Selects
Mostly debayered at an outside facility.
Distorted Elements
Original Media OpenEXR
Comp
Lighting
Match Move
Match-moving tools are the rare examples that support lens-distorted plates.
Depth of Focus Handled by Eye
Render using ST-Map
Or warp going into comp
Undistorted Elements
Plate Unwarp
Animation
Most DCC Tasks typically assume pinhole camera
Undistortion represented by file-naming conventions.

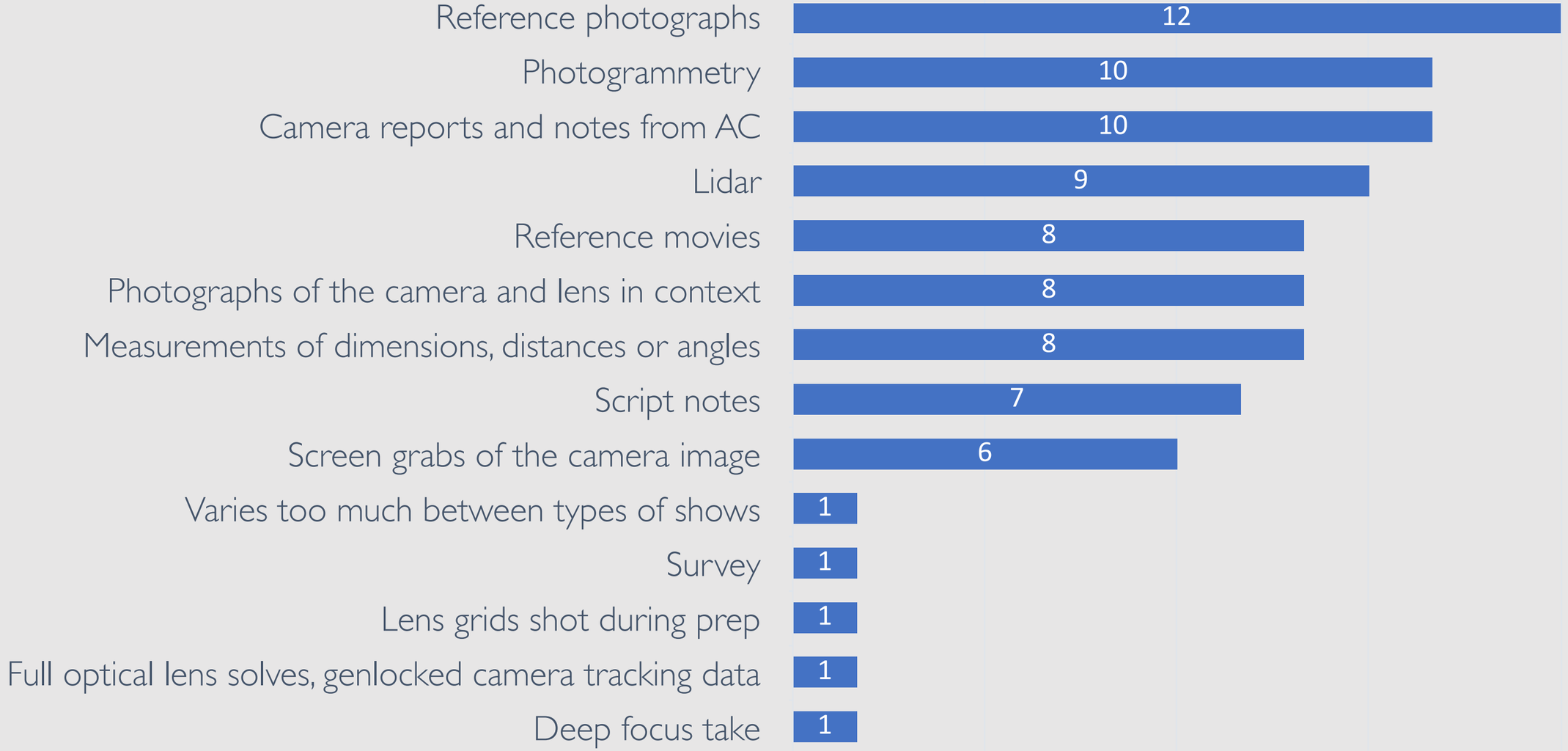
What metadata would you need to be able to deliver the best possible result?



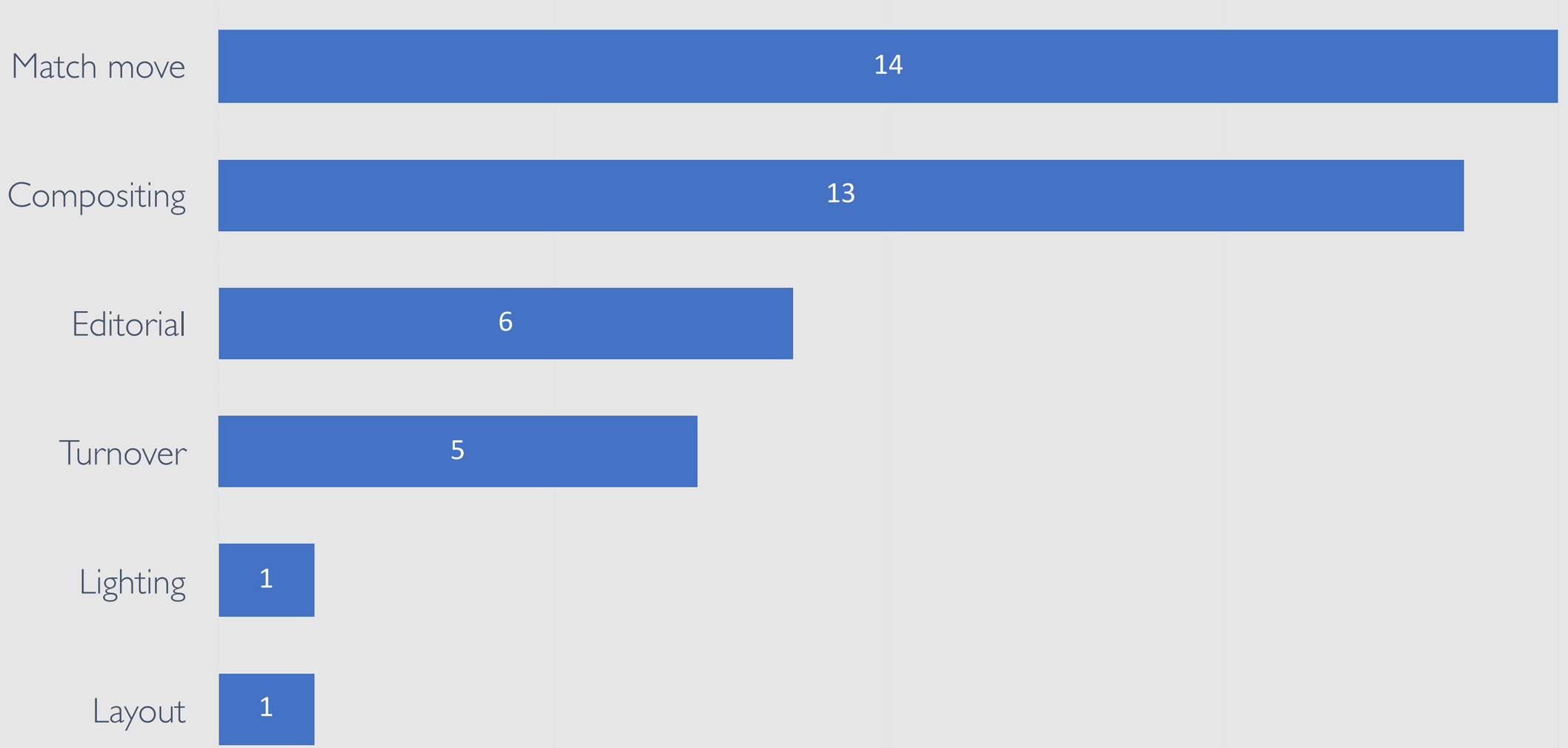
And what would you want to be able to deliver the best possible result?



gathered when a setup is ready for shooting, but before the first take starts? Select all that apply.

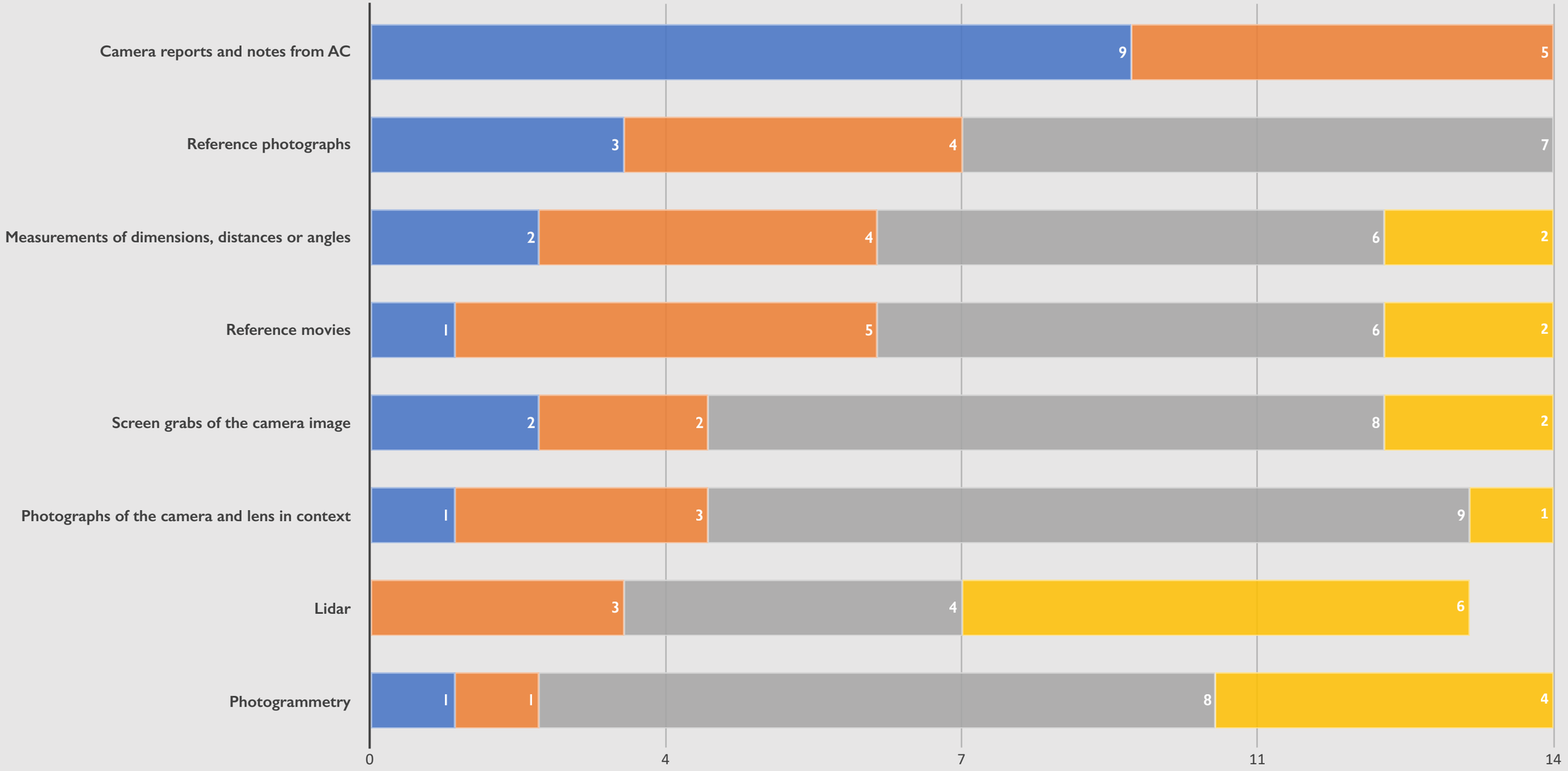


The above info is provided to

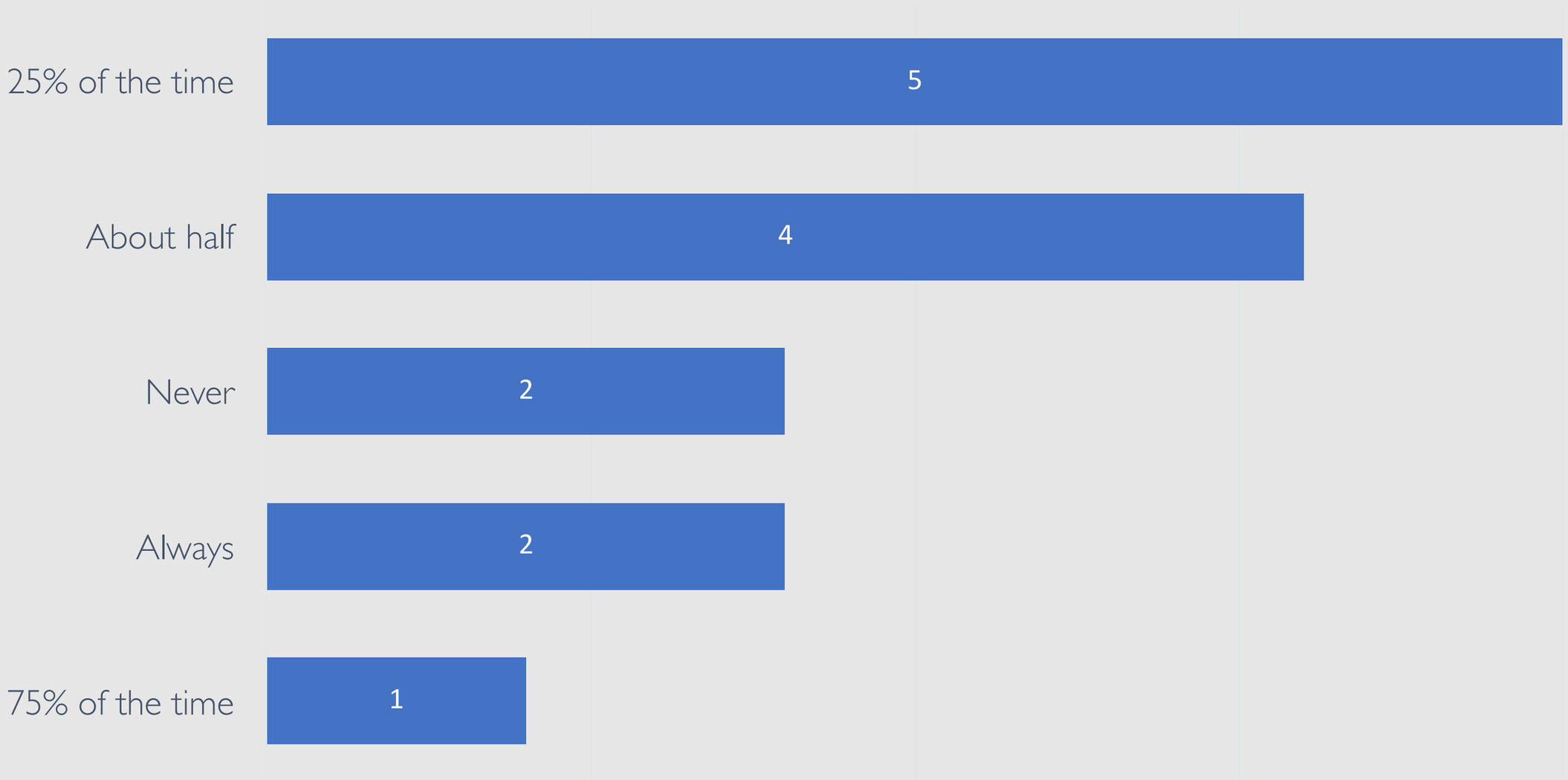


General Workflow | Focal Length | Lens Distortion | Lens Shading | Tilt/Roll/Pan

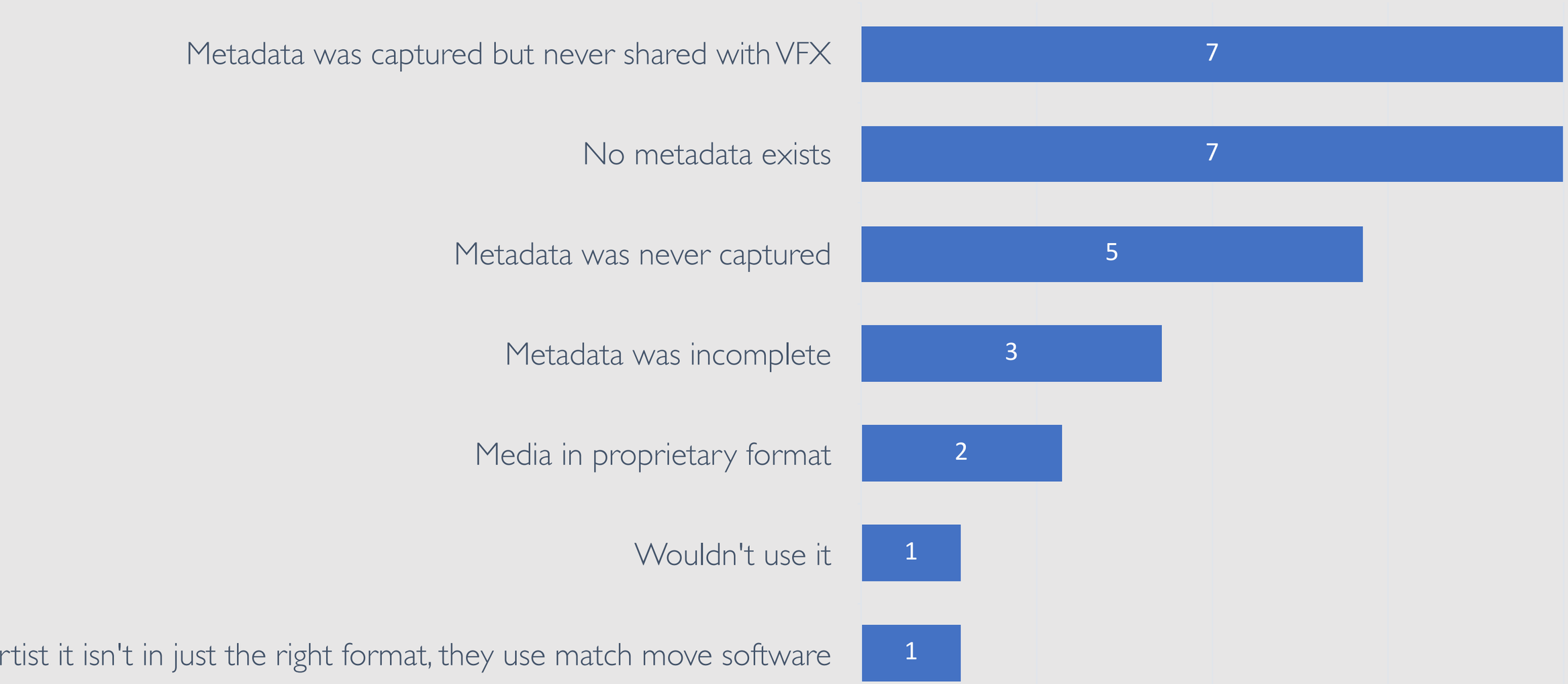
Info gathered per-take?



How often do you receive lens or camera metadata about a show you're working on?



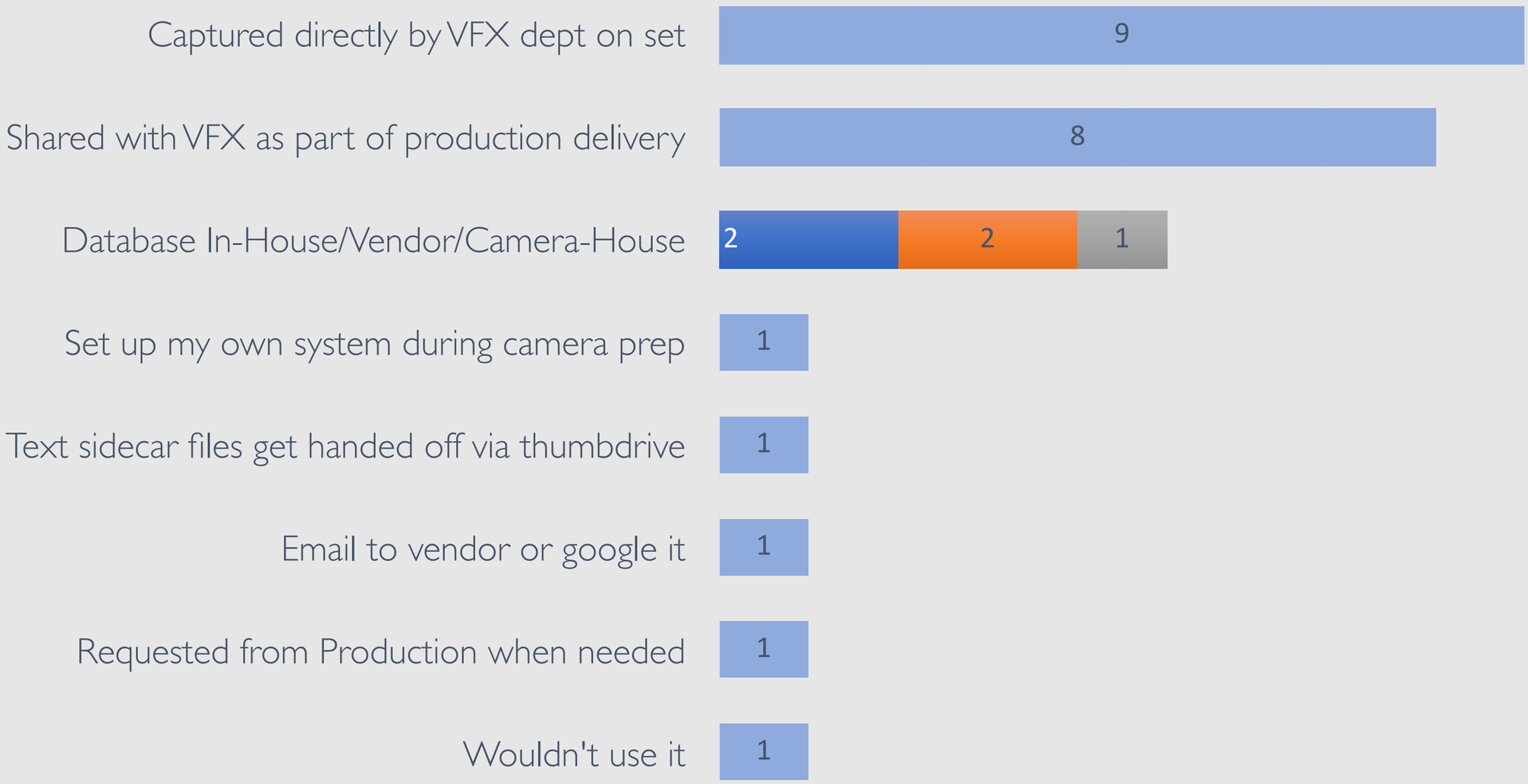
What are your biggest challenges around receiving lens or camera metadata?



How reliably do you trust the metadata you receive?

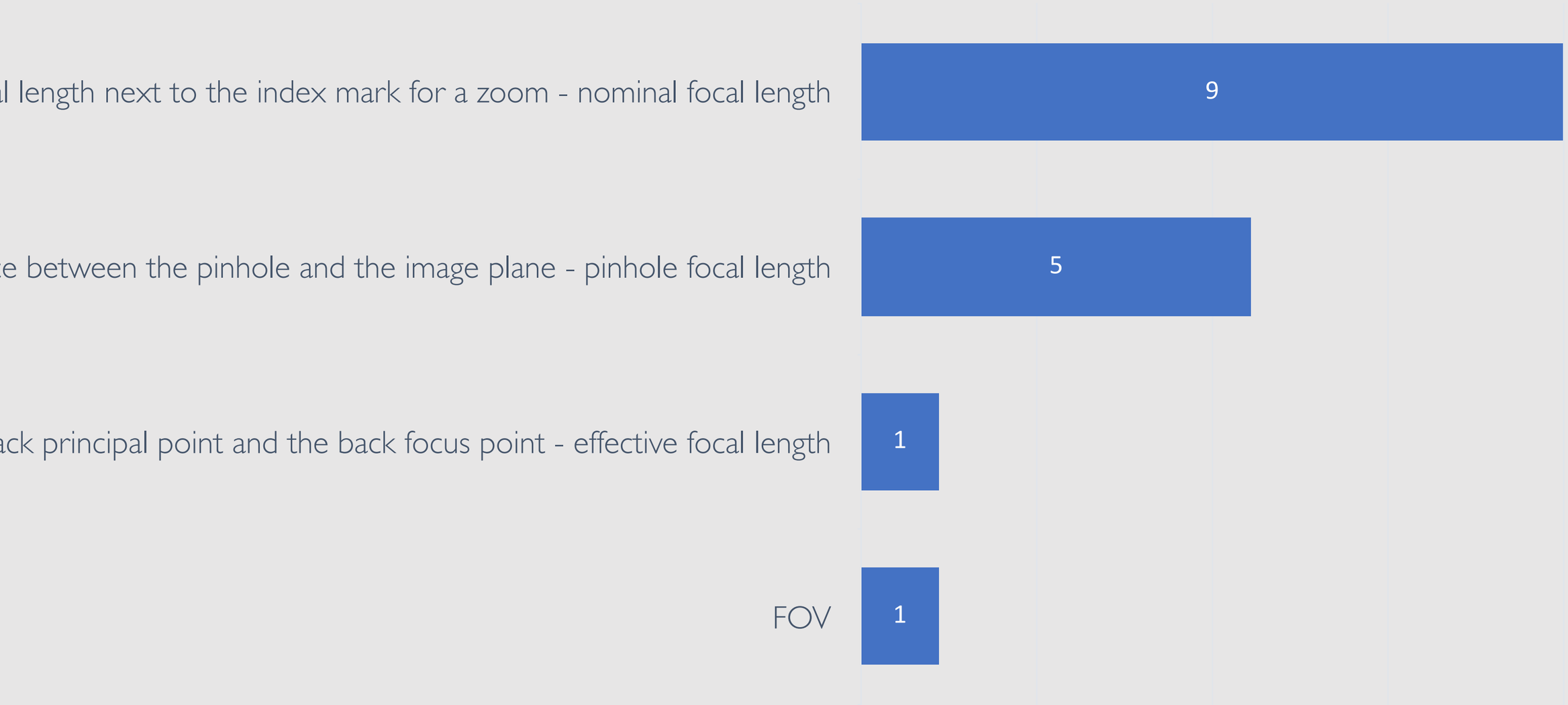
General Workflow | Focal Length | Lens Distortion | Lens Shading | Tilt/Roll/Pan

How do you usually receive information or metadata about a lens?



Focal Length

Which of these most closely models how your artists think of focal length:

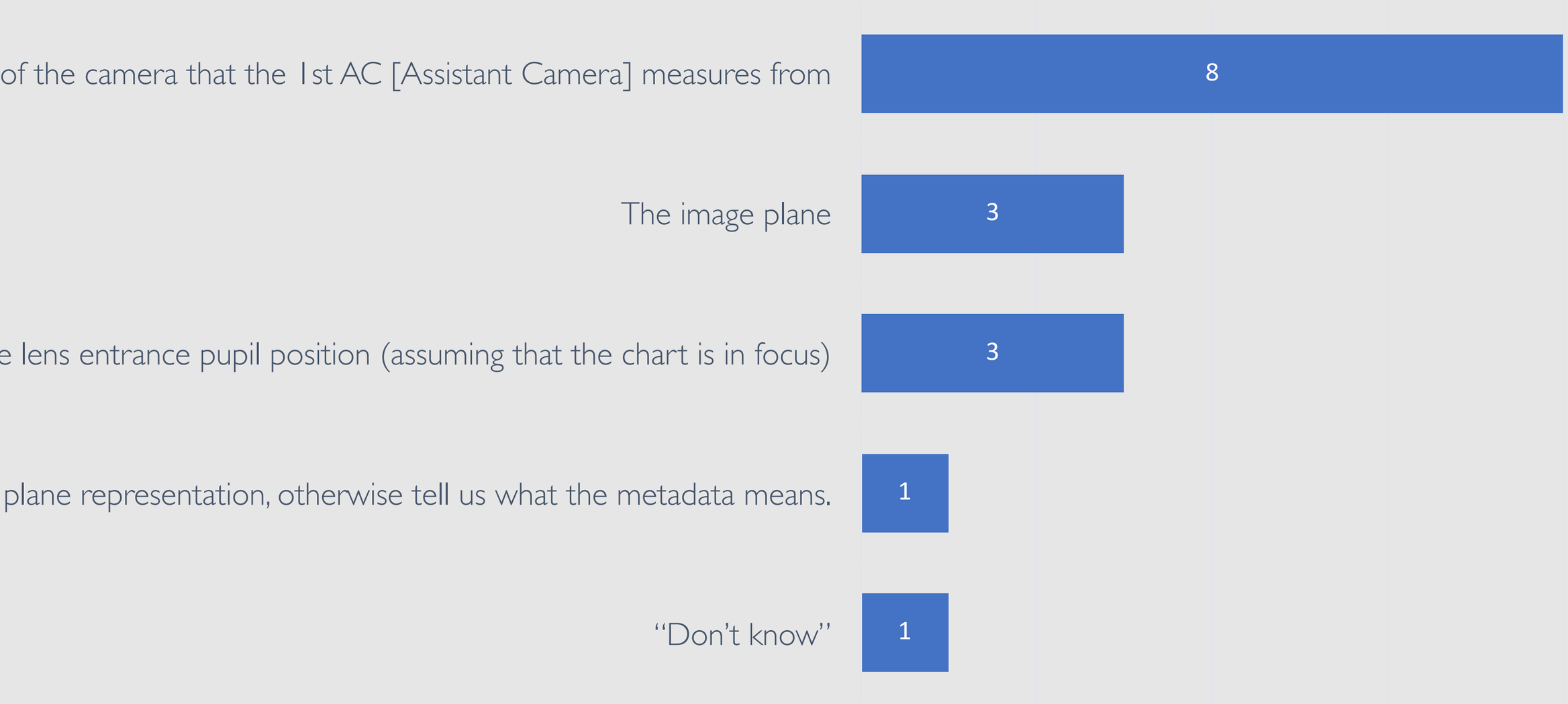


Focal Length

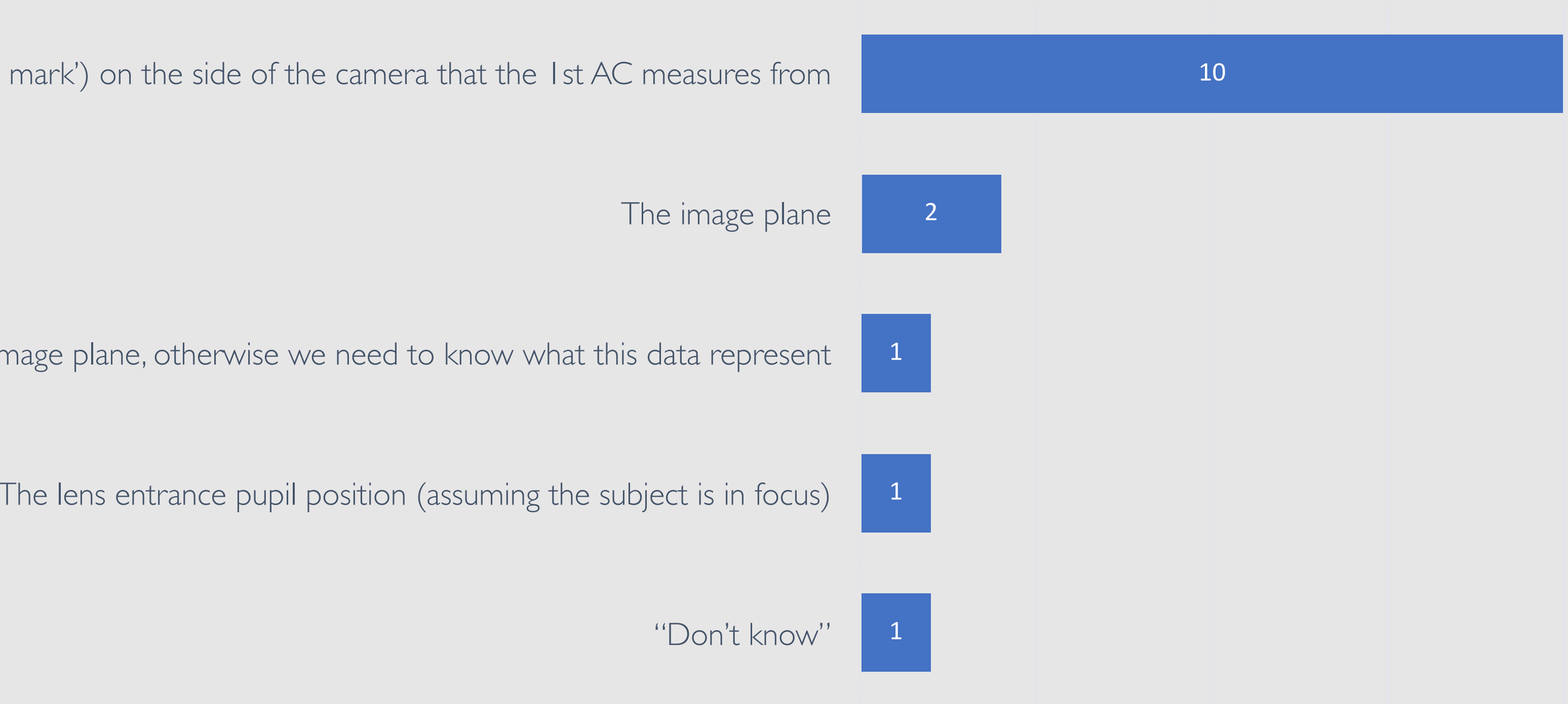
- Pinhole focal length - used by CG Artists
- Nominal focal length - used on the lens label
- Effective focal length - used in lens distortion mapping

These three are NOT the same.

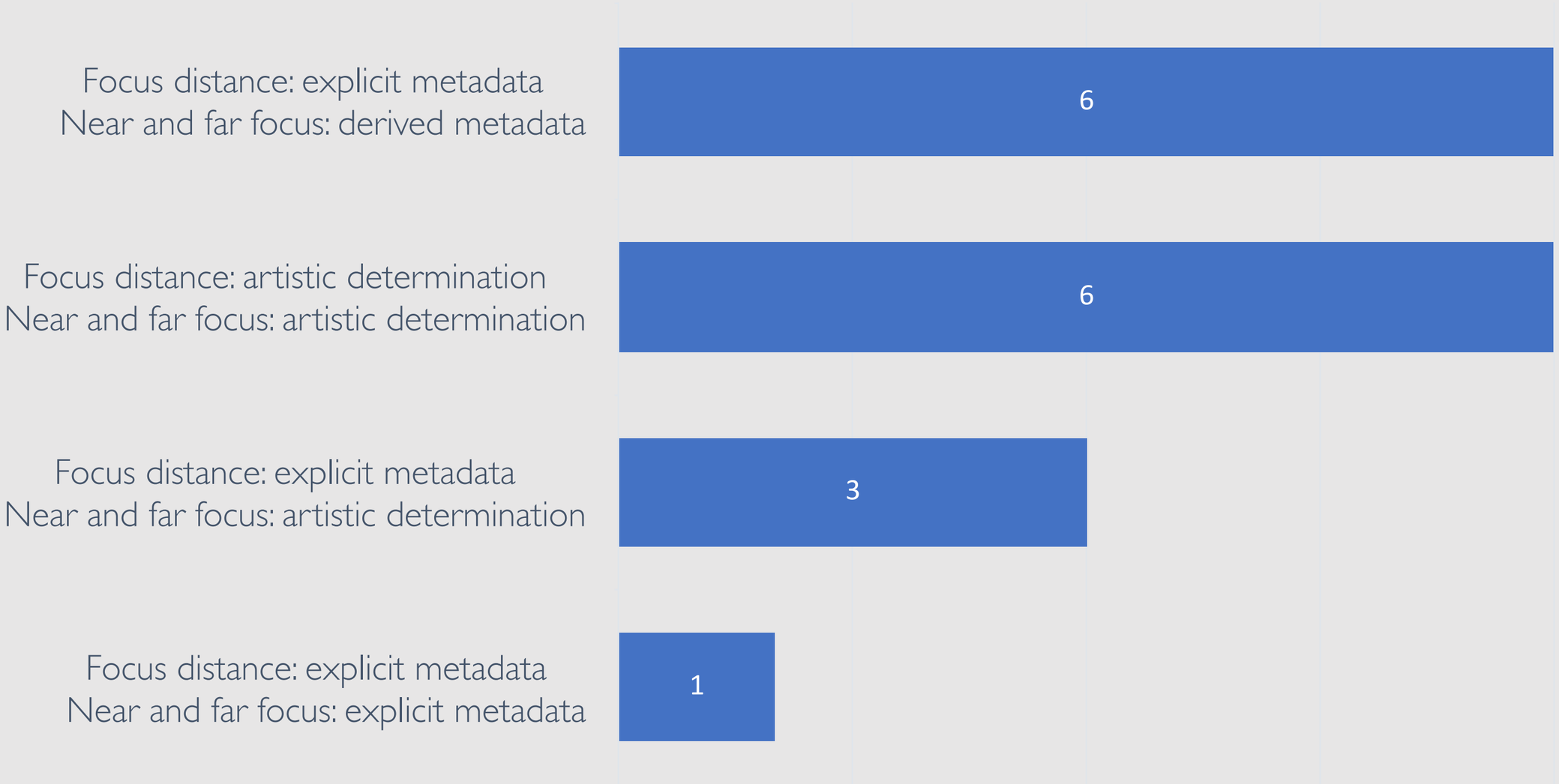
Focus distance being defined between the subject and what position?



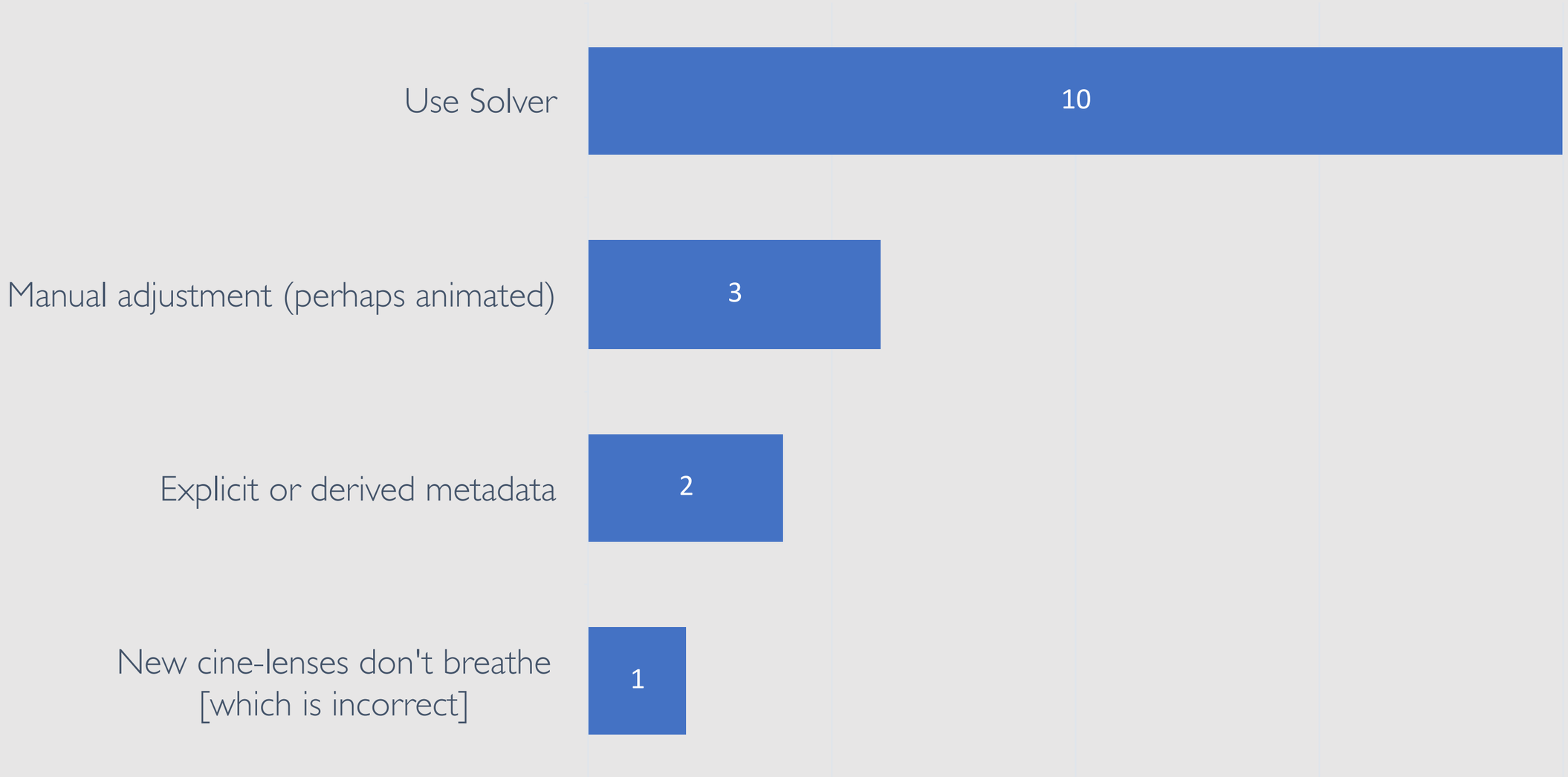
What do seems to be the actual focus distance metadata coming back from the set?



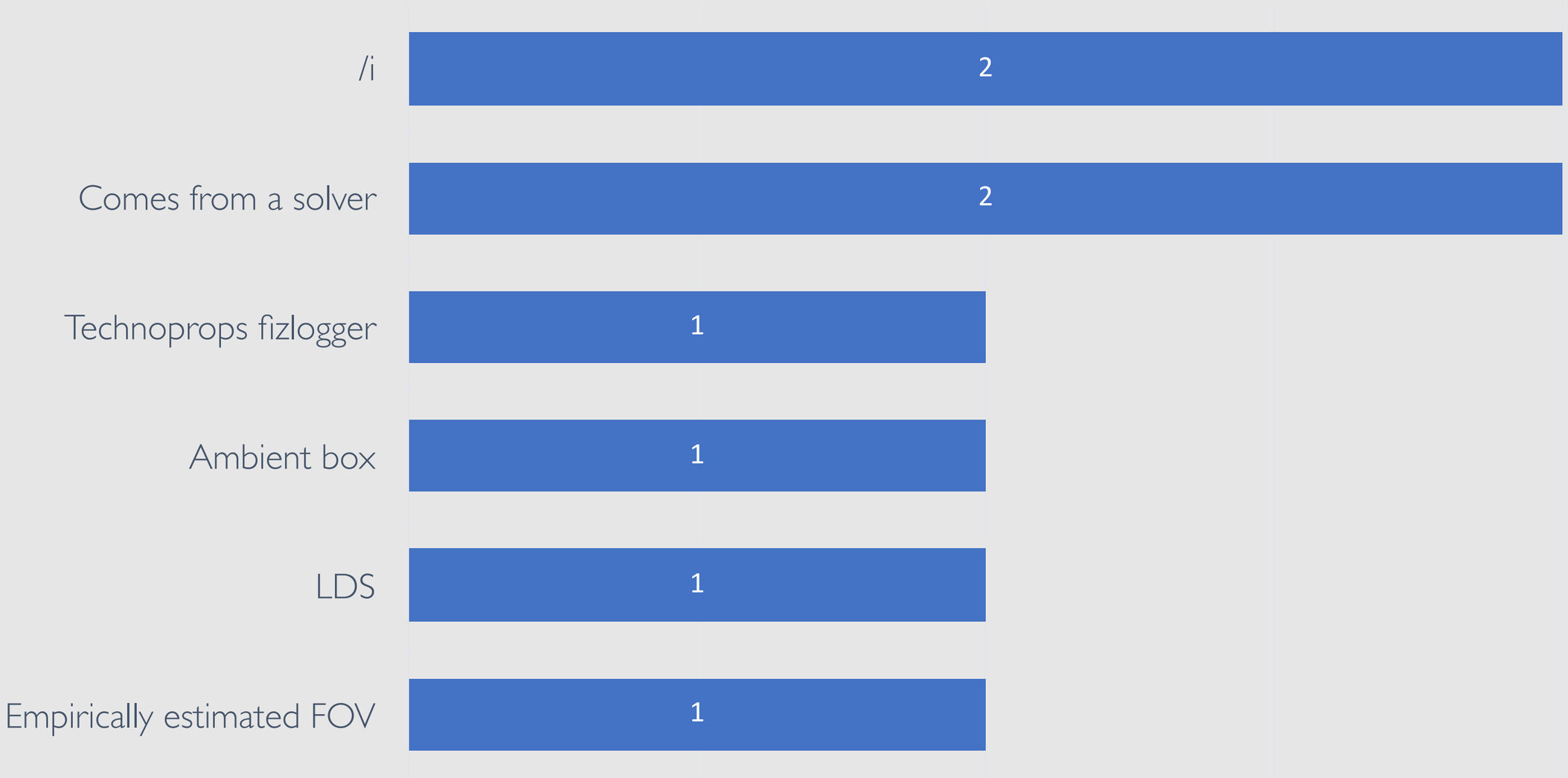
What is your sophistication level regarding depth of field information?



the image goes into or comes out of focus; in other words, the lens breathes. How do you handle this?



FOV, please list the lens families giving you this metadatum and the way (LDS, /i, external Ambient box, etc.) ...you get it:



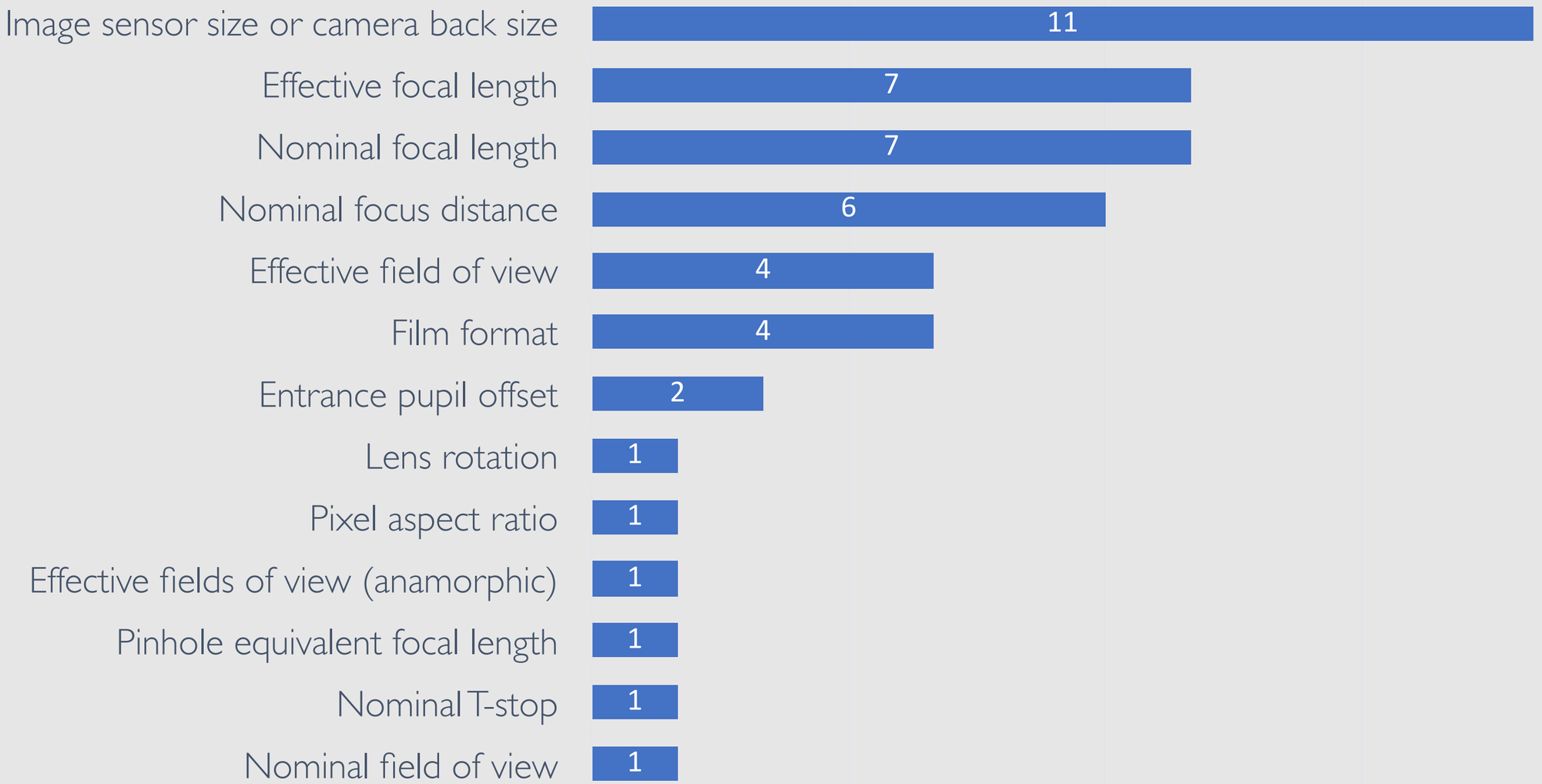
Lens Distortion

- Typically removed either with in-house tools or DCC App
- Ideally lens is characterized with camera body or bodies on which it will be mounted.
- Internal lens filters ignored.
- Characterized using a lens-grid, either portable or mounted.
- **Acceptable residual distortion highly application dependent (0.5 to 10 px)**

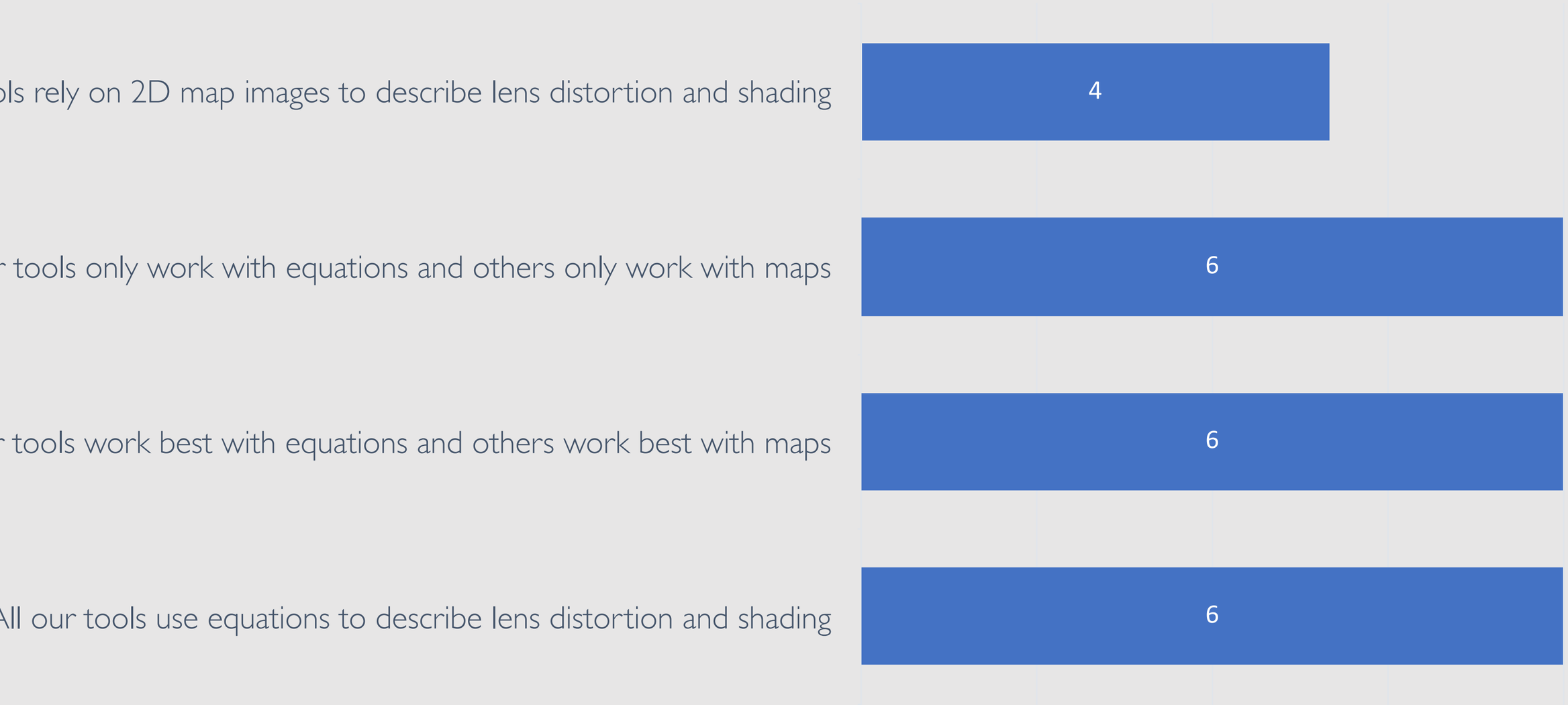
Lens Distortion Interpolation.

- Typically distortions are measured for a limited number of focus distances and interpolated.
- Zoom lenses are similarly interpolated for different focal lengths.

Which of these are used in your lens distortion model?



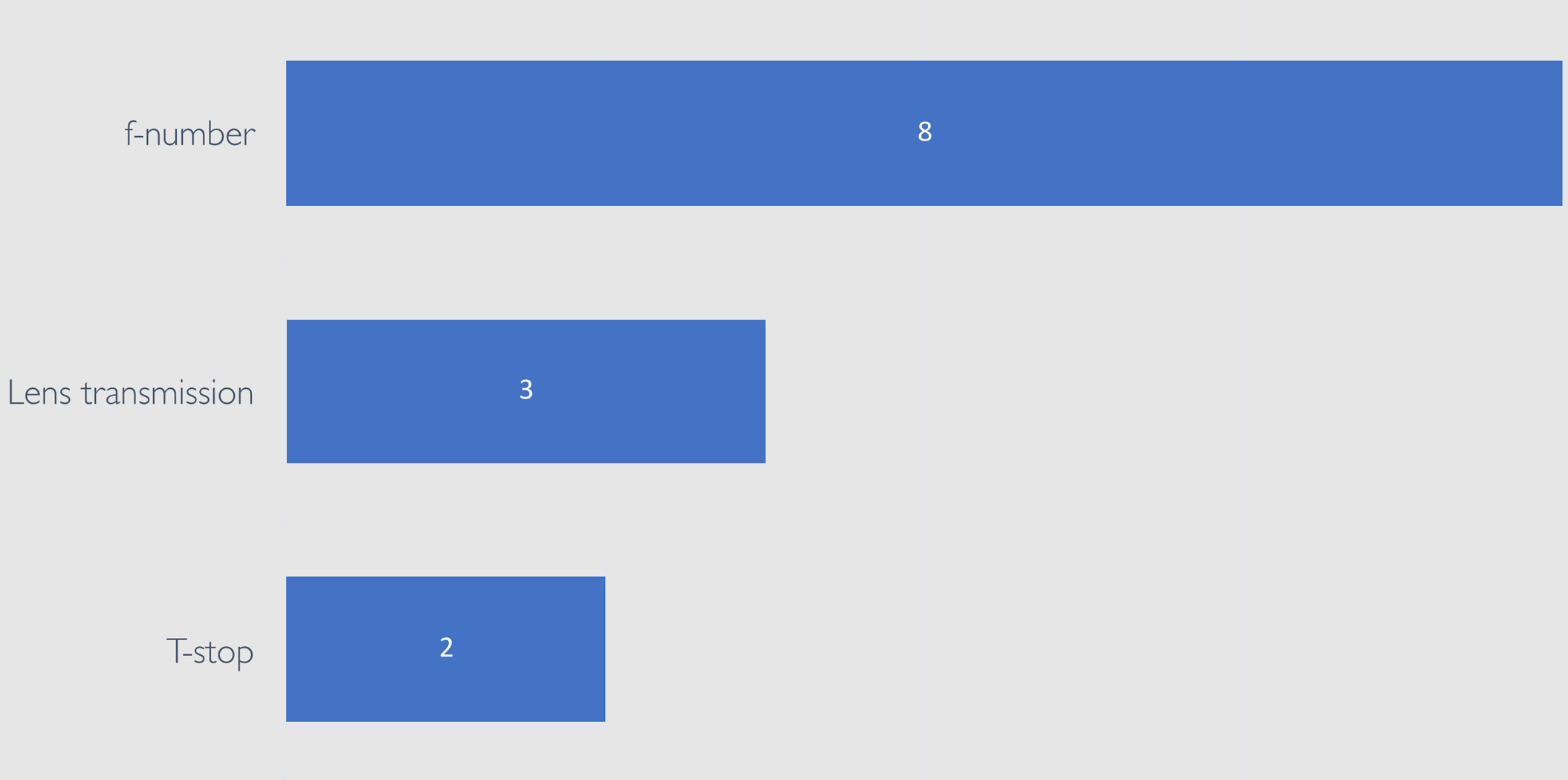
Lens equations vs. lens maps



Lens Shading

- Mostly the incorrect assumption is that the transmission is uniform across the lens.

Which of these do you use in your DCC applications? Check all that apply.



Tilt/Roll/Pan

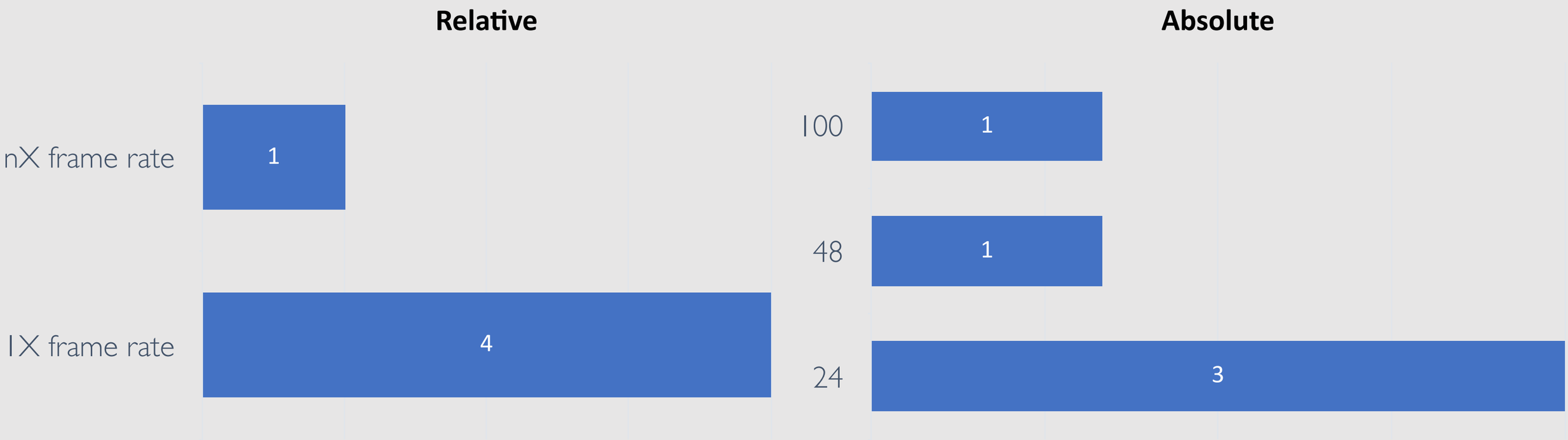
Tilt/Pan/Roll Accuracy.

- When asked what accuracy would be required, we mostly got an answer in the .001 to .01 range, with a number of respondents wanting sub-pixel accuracy.
- This seems reasonable if we expect the results to be used as an absolute and not discarded to get the solver to answer.

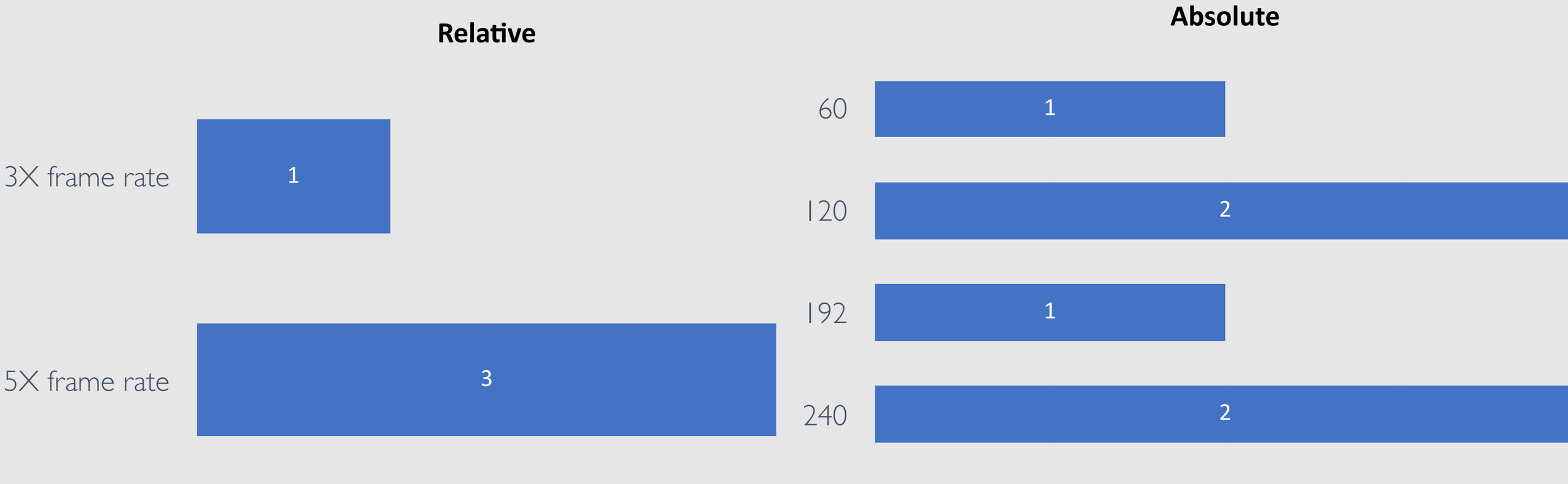
Sensor Update Frequency.

- The minimum update frequency was 24fps
- There seemed some preference towards typically getting at least a 2x sample rate of the FPS.
- Not a clear consensus on what would be too much.
- Consensus on getting metadata for rotation order.
- 43% would prefer angles in quaternions.

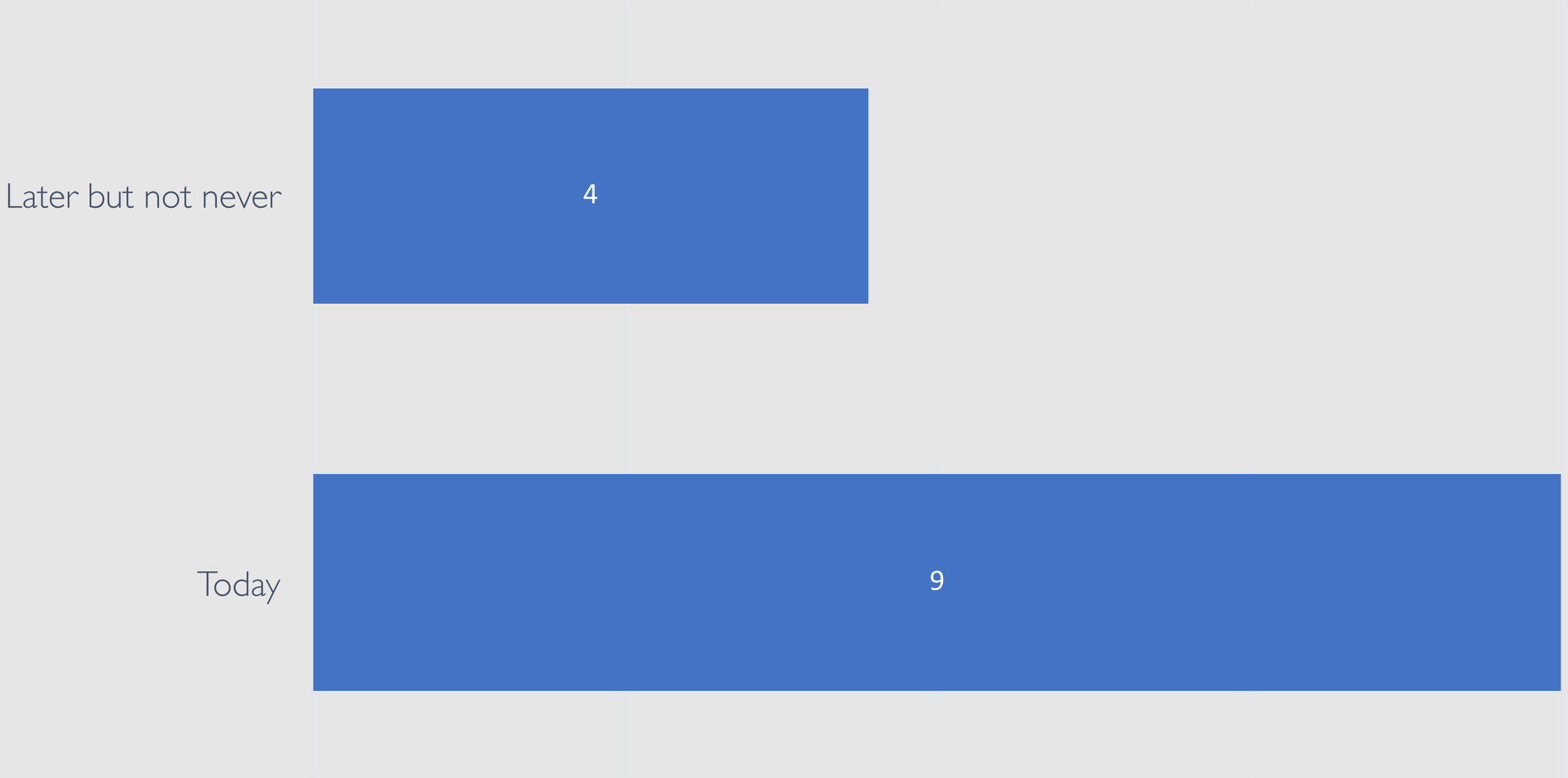
What is the minimum required update rate for low-level camera-body accelerometer, gyrometer and magnetometer data?



At what point would increasing the update rate for low-level camera-body accelerometer, gyrometer and magnetometer data feel like overkill?

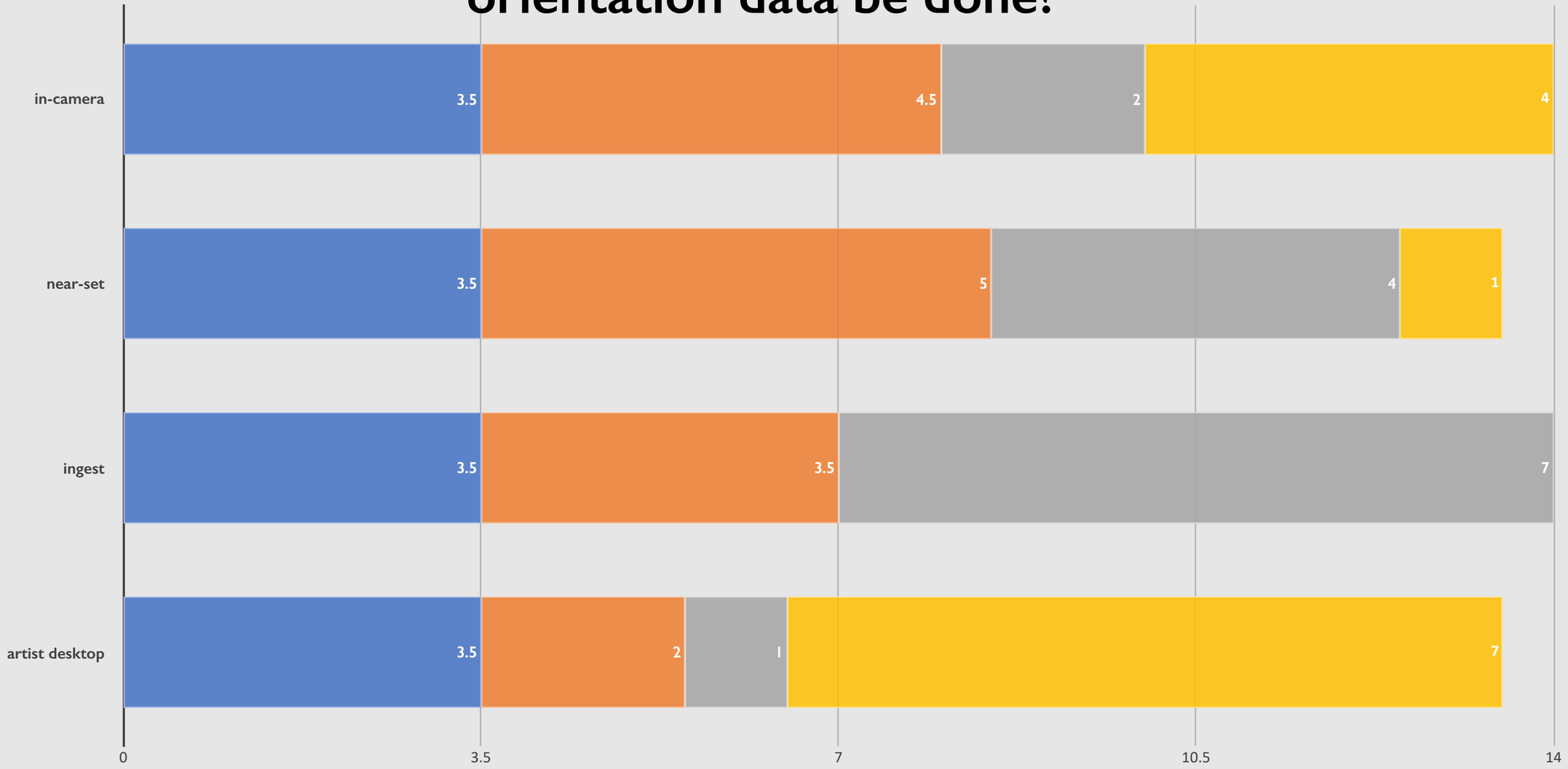


When would you see benefit from lower-level metadata such as lens accelerometer, gyrometer and magnetometer data?



General Workflow | Focal Length | Lens Distortion | Lens Shading | Tilt/Roll/Pan

Where should low level-sensor data be converted into high-level position and orientation data be done?



General Workflow | Focal Length | Lens Distortion | Lens Shading | Tilt/Roll/Pan

Future Work

- Circle of confusion vs. explicit near and far focus.

Contact Us

Email: ves-tech-camera-metadata@googlegroups.com