



Silicon Slip-Ups: The Ten Most Common Errors Processor Suppliers Make (Number Four Will Amaze You!)

Phil Lapsley

Vice President, BDTI

lapsley@bdti.com



- Engineering consulting company focused on embedded AI and vision
- Founded 32 years ago – we've seen a thing or two

Technology Suppliers

- Processor evaluation
- Tools evaluation
- Usability analysis/evaluation
- Competitive analysis
- Reports and white papers
- Technology strategy consulting

Systems Companies

- System requirements, specs
- Algorithm design
- Processor selection
- Software development
- ...

1

If you work for a **semiconductor** vendor...

Please don't make these mistakes (either "ever" or "ever again" 😊).

2

If you're **selecting** a **processor** to use in your product...

Please think about these things during your selection process.

3

If you're **either** of the above...

BDTI can probably be of some help. (So this is crazy, but call us, maybe?)

Slip-Up #1: Not Answering “Why Would I Use This?”

For example ...

- Your company has a new processor ...
 - But no benchmarks ... or crappy benchmarks
- Your company has a new tool suite or deep-learning framework ...
 - But no clear statement of what it does better than anyone else’s does
 - Or such a statement, but no proof, explanation, or example



Why? Why would I use this?

Slip-Up #3: Incomplete (Or No) Model Zoo

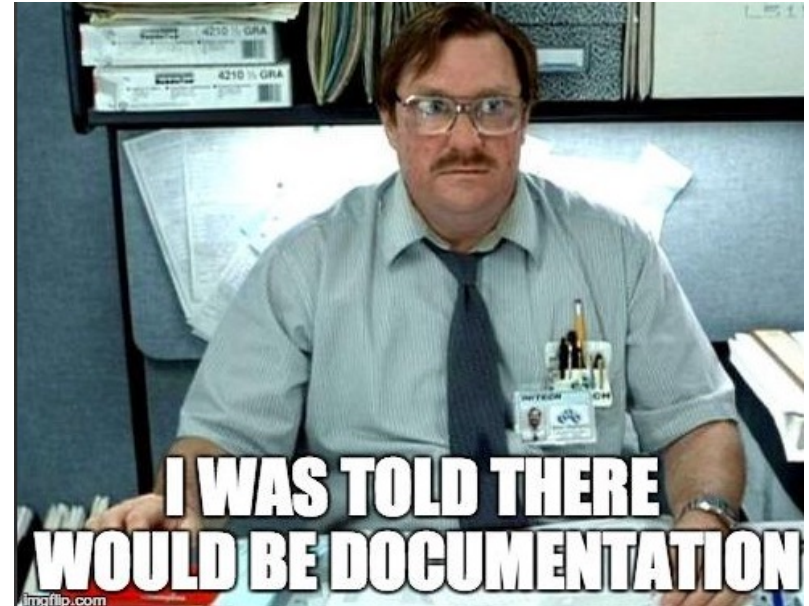
- Your customers want to run AI models on your processor.
- **Please, help them:** Give them a model zoo.
- I know: Every day brings new models, and you can't keep up.
- But you know what? There are a smaller number of workhorse models out there (e.g., MobileNet, YOLOv5, YOLOv8).
- It's amazing how many processor vendors don't have these models implemented and optimized on their chips.



Tough choices

(Meme courtesy ChatGPT... srsly.)

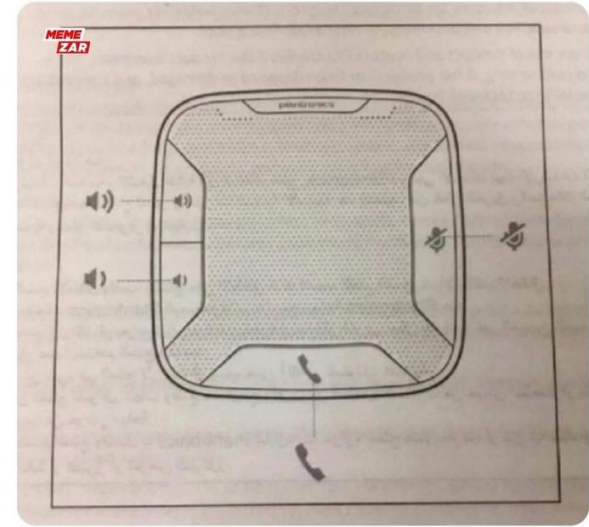
- One of the downsides of working at the cutting edge is ... sometimes you get cut
- Paper cuts via ...
 - Lack of documentation
 - Incorrect documentation
 - Out of date documentation
- This is particularly troublesome when the features being used are new, and key to your design
 - E.g., new NPU, new ISP, ...



Slip-Up #5: Too Much (or Unhelpful) Documentation!

- You might think I'm whining now, given the last slide
- (You might be right.)
- But consider two examples:
 - Datasheet for a recent processor
 - Or three conflicting manuals for new processor AI/ML tools

Don't know what I'd do without this manual, was well worth the read 🙏

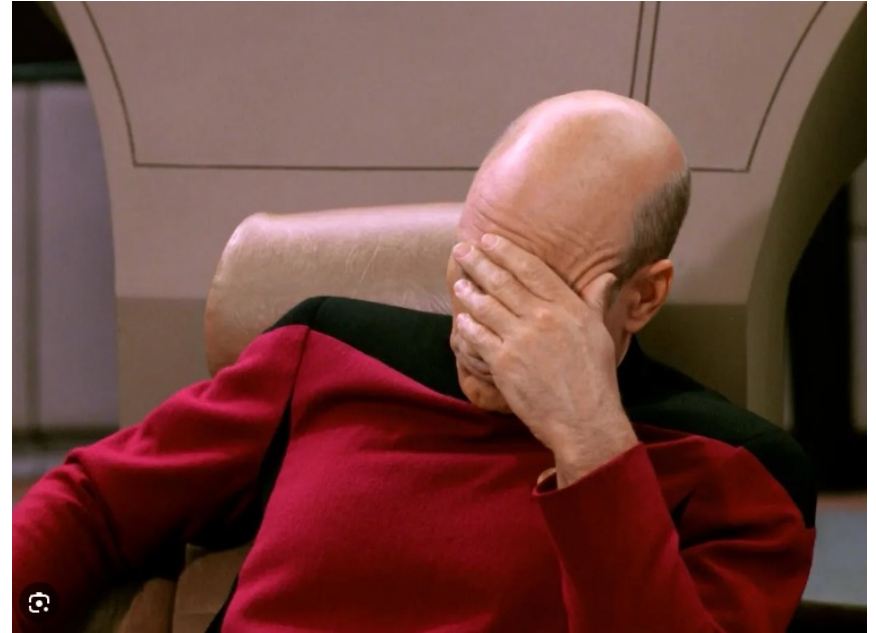


- How do I quickly get going using your new processor or tool?
- For computer vision, by “Hello world” I don’t mean `printf(“Hello world\n”)` but rather some typical AI/ML flow, e.g.:
 - Take in an image
 - Do some pre-processing on it
 - Run inference on it
 - Annotate output
 - Display it



Slip-Up #7: No Source Code ... Especially for Drivers

- Yay! That new processor is swell. Documentation is great! It has a hello world program! Great model zoo!
- It even runs Linux or Android!
- But ... there's no source code for ...
 - The ISP
 - The NPU
 - The GPU
 - That special peripheral that is key to your design



Slip-Up #8: Accelerators That Don't

- Yay! The new chip has an awesome integrated GPU or NPU!
- But ...
 - Its memory is too small to fit the models you care about... or ...
 - It doesn't support the ops your network needs... or ...
 - It only runs 4-bit quantized models ... or ...
- For whatever other reason, the accelerator performance ends up being way less than you'd hope for



- Often happens with cameras
 - “We offer out-of-the-box support for the Sony IMX123 and IMX456 image sensors!”
 - That’s great, but those aren’t the sensors I need in my application
 - “We support MIPI CSI-2!”
 - But only two lanes, and our dev kit didn’t bring out all the pins anyway...



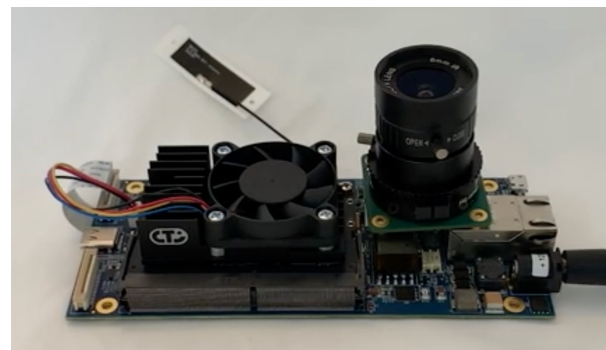
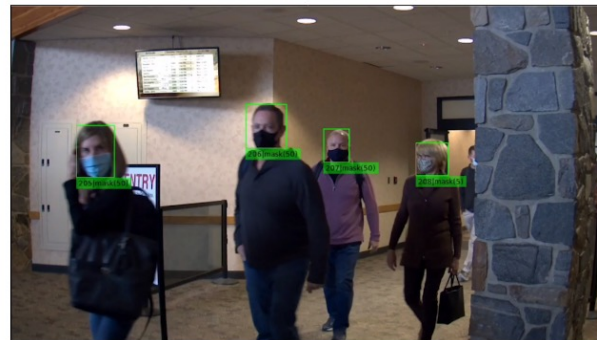
- “Oh, look, the vendor just released a new software update.”
- “Should I install it? Mmm. Could be dangerous. On the other hand, it has that key feature I need for my project, that they’ve been promising.”
- “Ah well. It’s a dot-release, how bad could it be?”
- (Famous last words.)



My project, post-upgrade

A Success Story: NVIDIA Jetson Nano

- We did a fun project for NVIDIA during the pandemic.
- They hired us to build a real-world product with the Jetson Nano, and let them watch.
- The result was MaskCam, a smart camera that can detect the portion of people in its field of view wearing facemasks.
- Immensely valuable for their product team: they got to see, up close, how people actually used their documentation, tools, and hardware.
- Resulted in some nice marketing for them.



- Thanks for listening to me rant, I feel better now. :-)
- More seriously:
 - **Semiconductor vendors**, we know it's hard making SoCs and software tools. They're immensely complicated. Hopefully these slipups give your engineers and product managers food for thought.
 - **Systems companies**, we know it's hard choosing a processor. Hopefully these give you, too, something to think about.
 - **Both of you**: please let us know if we can help.
- Thank you!



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Questions?

(Curious how BDTI might be able to help you?
Please email Phil at lapsley@bdti.com)

