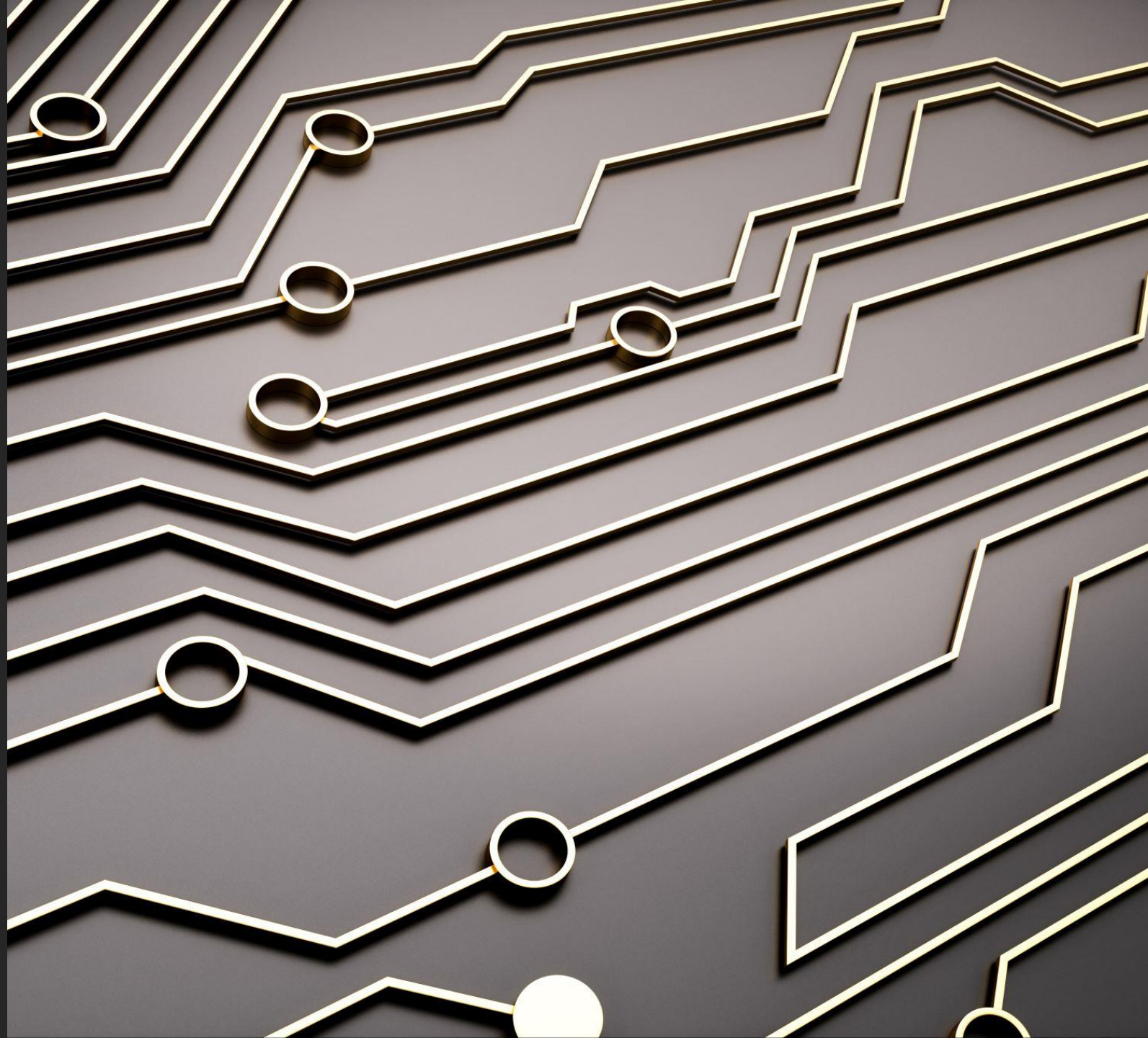

SSD FORMFACTOR COMMONALITY

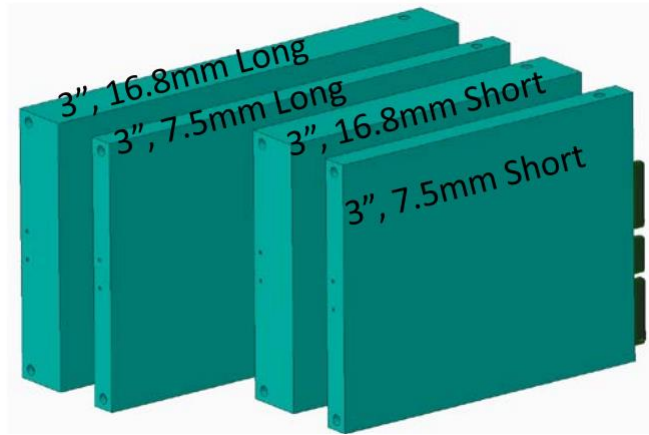
JASON ADRIAN

STORAGE HARDWARE ARCHITECT

MICROSOFT AZURE



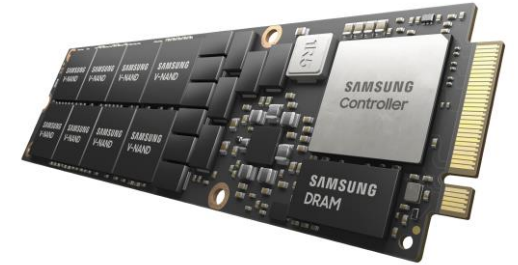
As flash gains more market-share, too many form-factors emerged!



E3 – 4 variants



E1.L – 2 variants



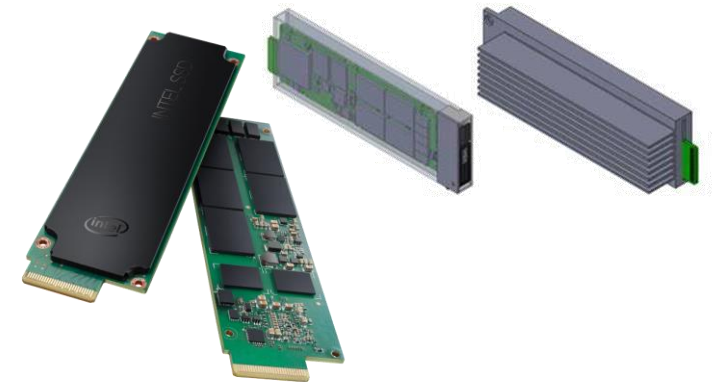
NF1



m.2 – 3 consumed variants



U.2 – 2 variants
U.3 ??



E1.S – 4 variants

Everyone benefits from reducing the form-factor sprawl

SSD Consumers:

- Vendors can easily build 1-2 variants, instead of 3+, higher likelihood the product you need is in an available form-factor. Can enable faster time to market.
- Higher likelihood that someone else is also using this SSD – less risk of finding all the bugs yourself
- Volume upside/downside is easier with multiple consumers
- Can result in lower prices if everyone is consuming a smaller number of unique products.

SSD Designers:

- Reduced risk - build a product that can be adopted by multiple consumers
- Lower investment into unique SKUs

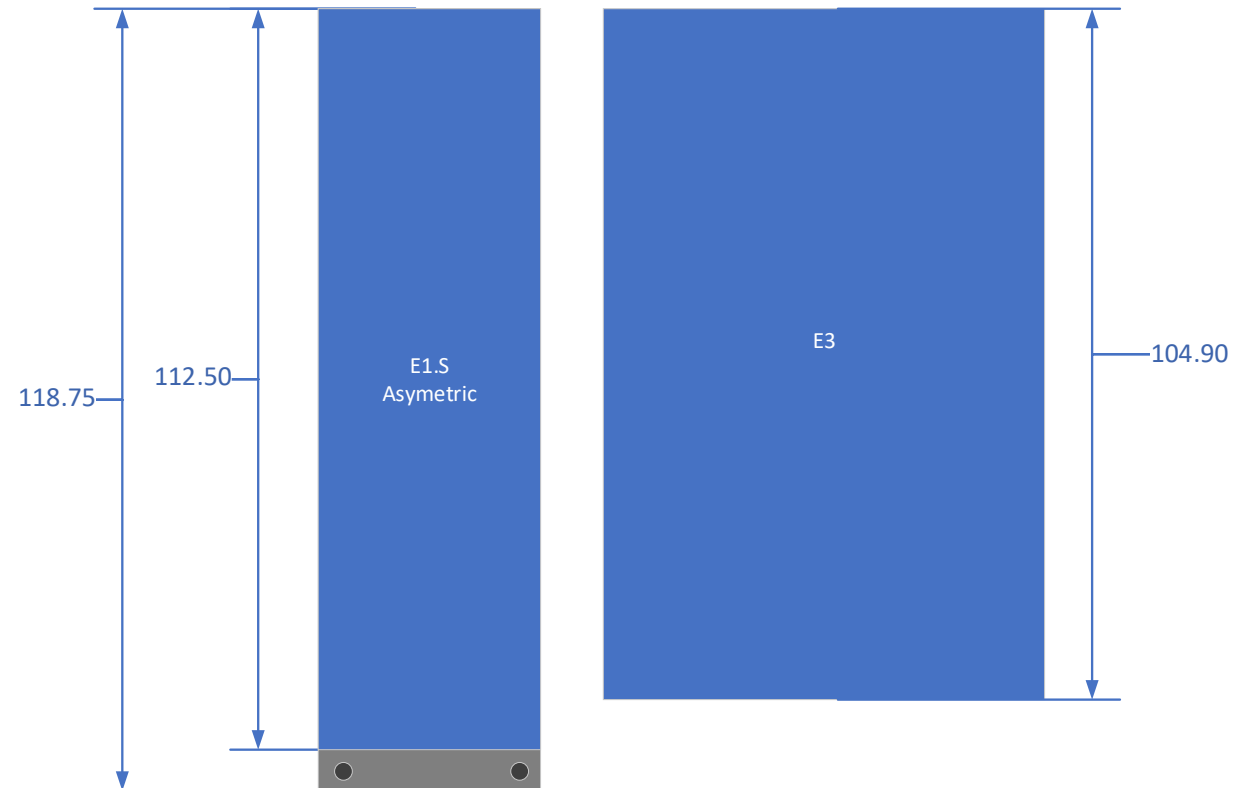
Can we reduce the variance in E1.S, E1.L, E3.S, and E3.L ?

Yes! But we need some compromises

Let's start by looking at E1.S and E3.S...

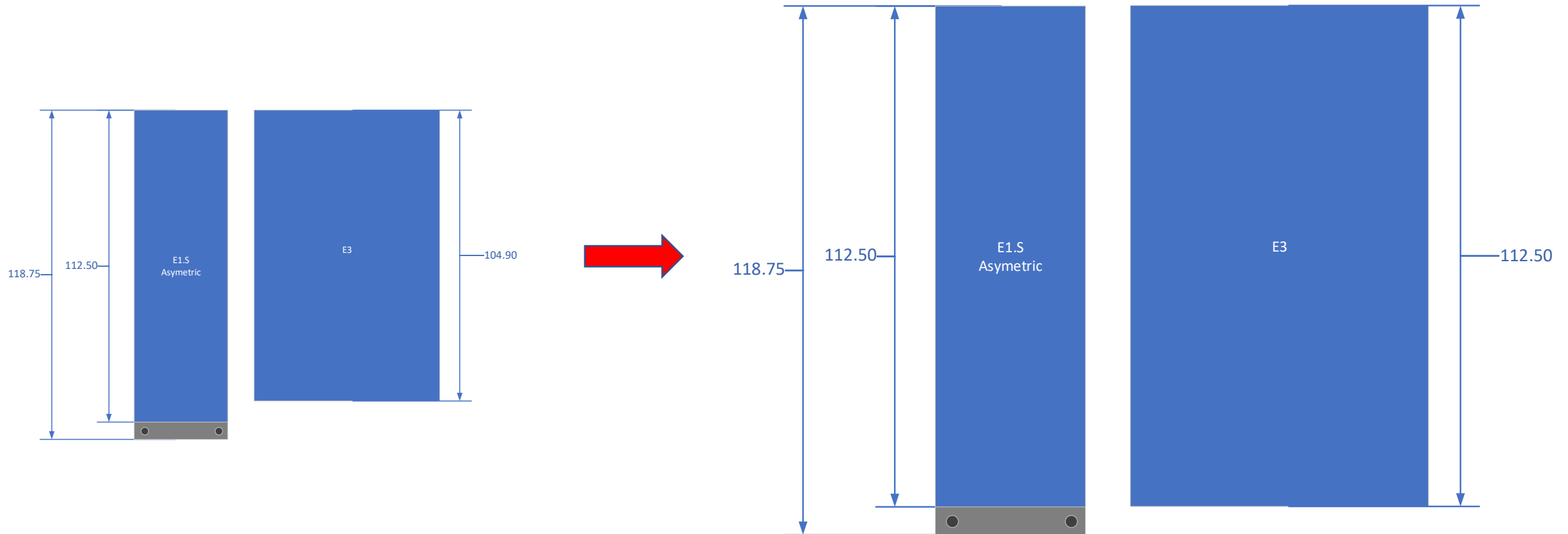
Let's talk depth...

- E1.S and E3.S are close, but the depth of the PCB space is ~112mm vs ~105mm
- E1.S also has a protrusion for latch mounting



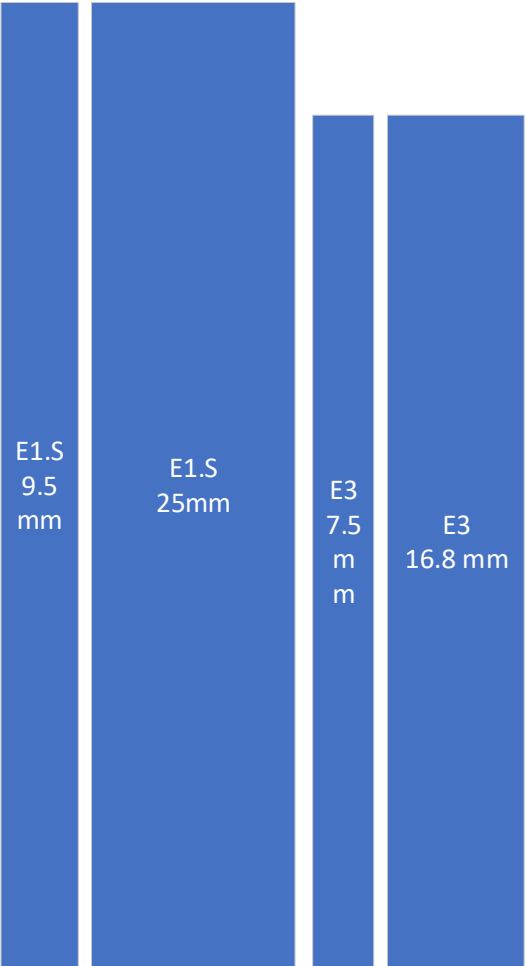
Let's talk depth... Proposal

- Extend E3.S to be the same length – PCB area only



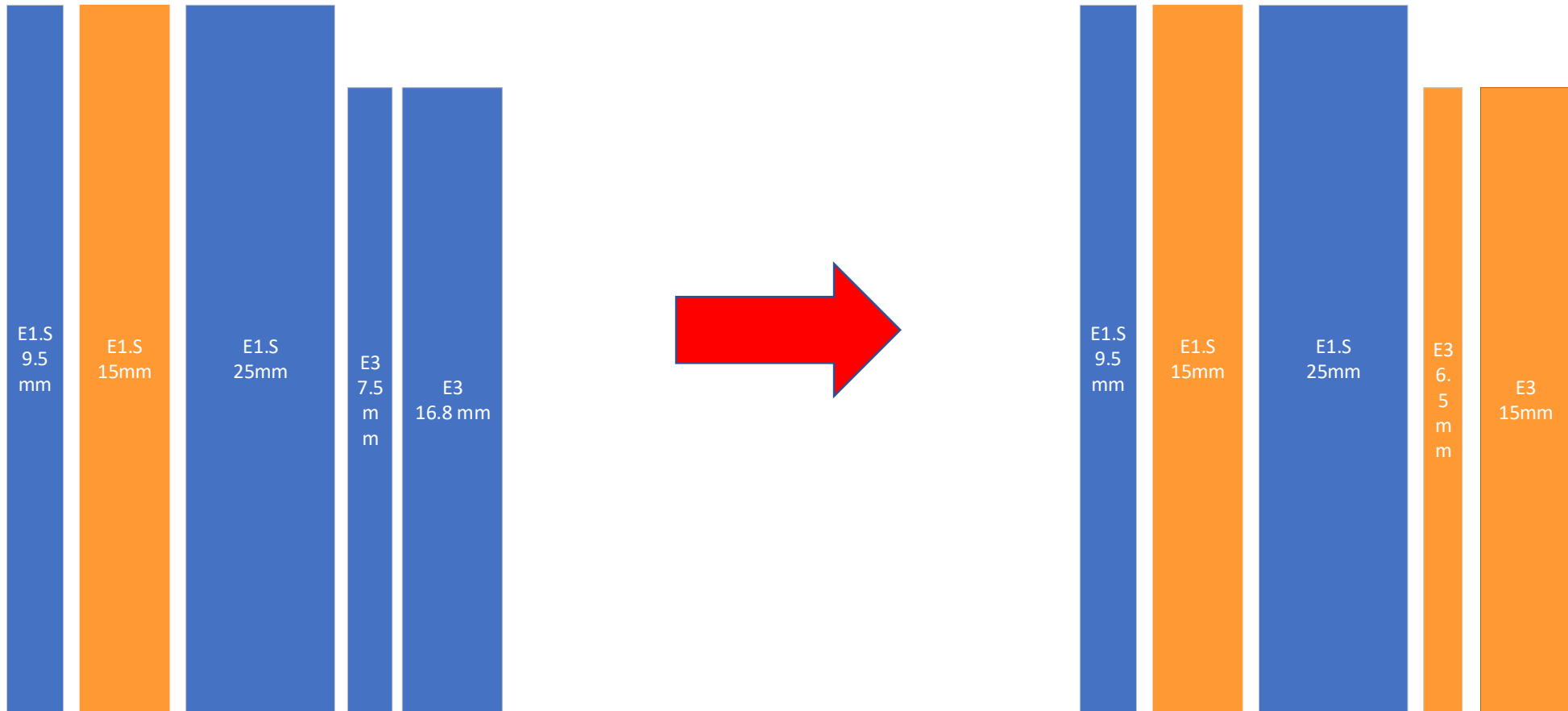
Let's talk thickness...

- E1.S and E3.S have no common thicknesses



Let's talk thickness... proposal

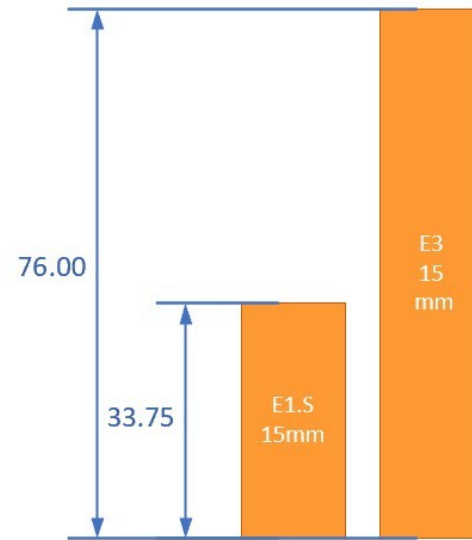
- E1.S consumers and producers are working on new thickness proposals, as 9.5mm is too thermally restrictive, and 25mm does not enable high density
- One proposal might be 15mm to enable ~30W E1.S SSDs. If so, make E3 15mm. The problem is that this forces the thin variant to be 6.5mm which is challenging if even possible? Or, drop the double thickness restriction and keep the current 7.5mm height



Assuming we find common thickness and depth, better system design options are enabled....

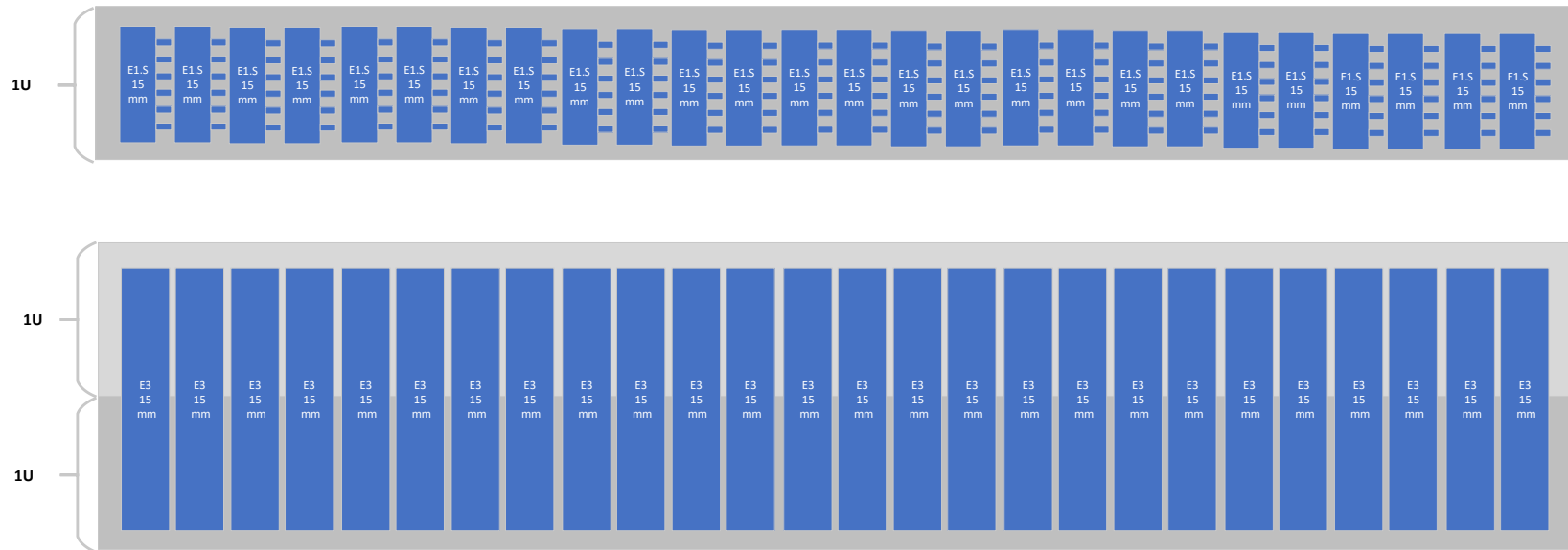


Top Down



Front View

- By sharing a common thickness, for example 15mm, one can now build a single motherboard that could be used in both a 1U and a 2U chassis. In the 1U, using E1.S, and in 2U, using E3.S

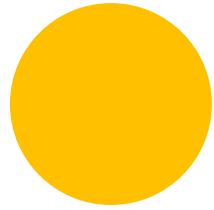
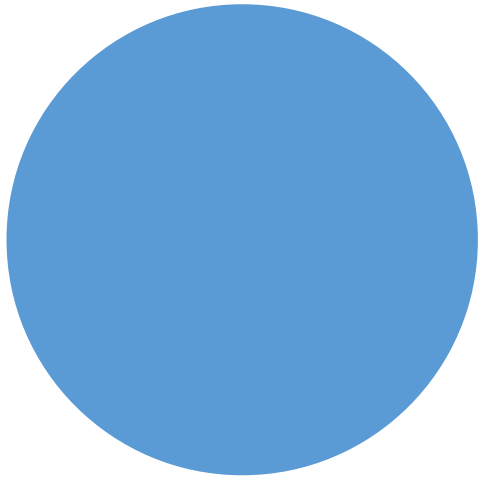


Potential

- By aligning E1 and E3 into the same depths and thicknesses, we have good common form factor options for the industry
- This de-risks chassis design, by allowing more commonality
- This de-risks suppliers building products
 - For example, an E1 PCB can go into an E3 carrier, or perhaps simply make the PCB wider without redoing all placement, etc.
- By working together we reduce the unique and divergent form-factors

Next Steps:

- Work with SNIA to propose these changes into the SFF standards



One more thing....



E1.S and E1.L height unification

- Why have 2 nearly identical standards with different heights?
- It's not too late to increase E1.S height to match E1.L
 - Current in-flight designs get more PCB space
 - If design are complete, simply add unused PCB space or adjust the SSD enclosure

