TPAC 2020

Web Support for New Device Features

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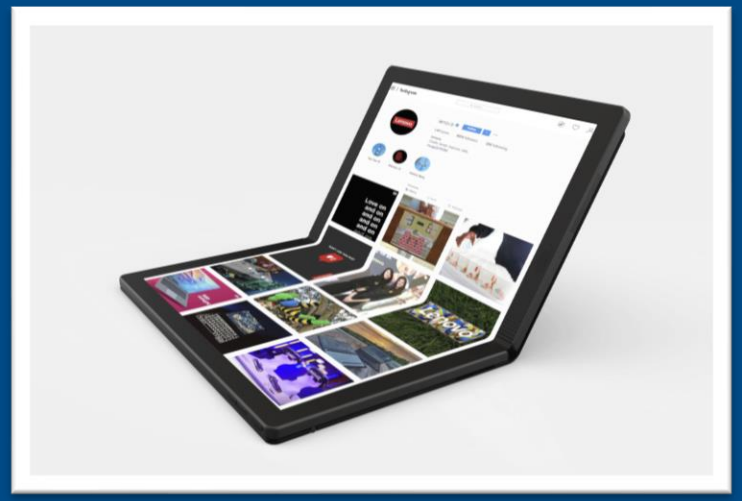
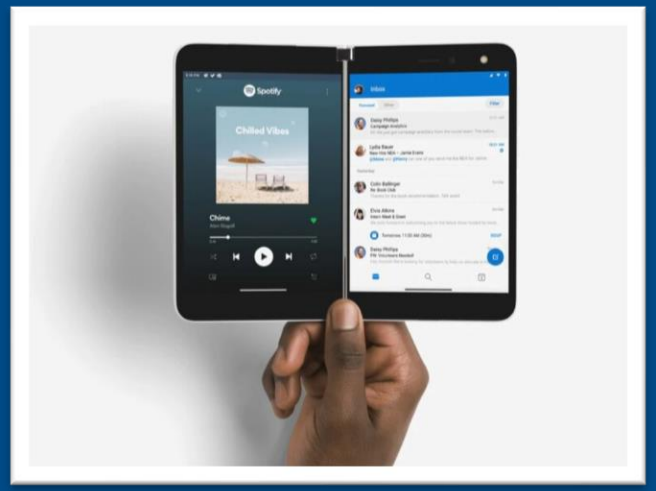
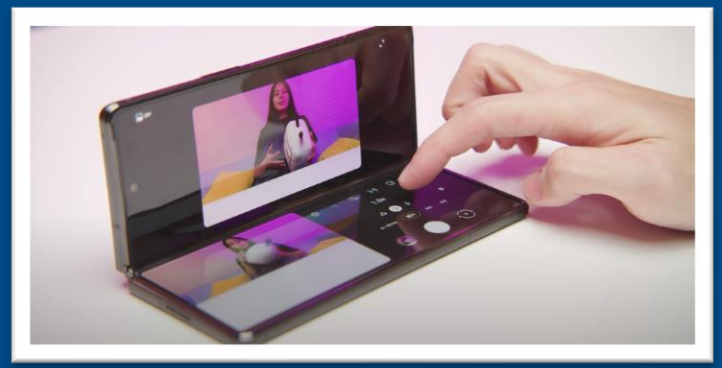
New form factors available today







Foldable Display Laptop: Intel Horseshoe Bend

17.3"Foldable OLED display
Posture based user experience
Speaker and camera switching

Hero mode: Table top
Primary use mode: Laptop

CLOSED
Ambient usages

LAPTOP

TABLE TOP
Desktop Experience

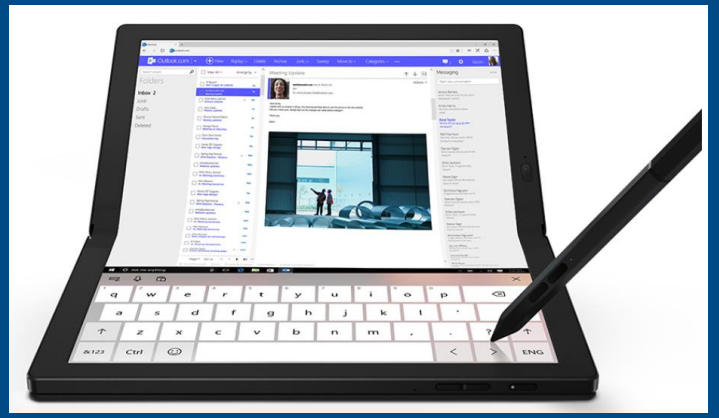
FLAT

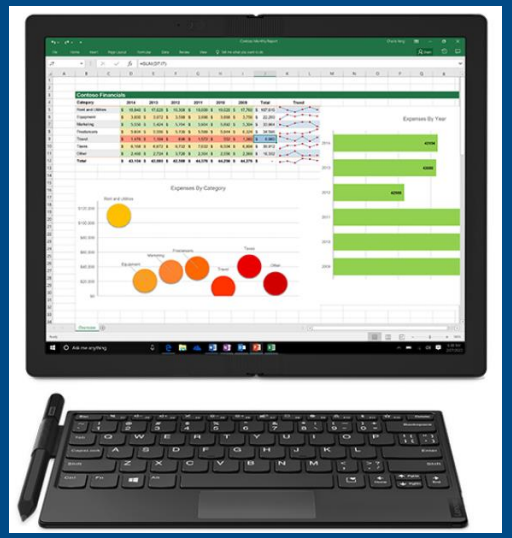
CANVAS

BOOK

Embedded video of Intel’s Horseshoe Bend concept platform removed to significantly reduce file size

Lenovo's X1 Fold [with Intel Processor Graphics]





https://www.lenovo.com/us/en/thinkpad-x1-fold

What is changing from past MID platforms?

Adaptability

- Posture-based
- Resource configuration
- Multiple usage scenarios

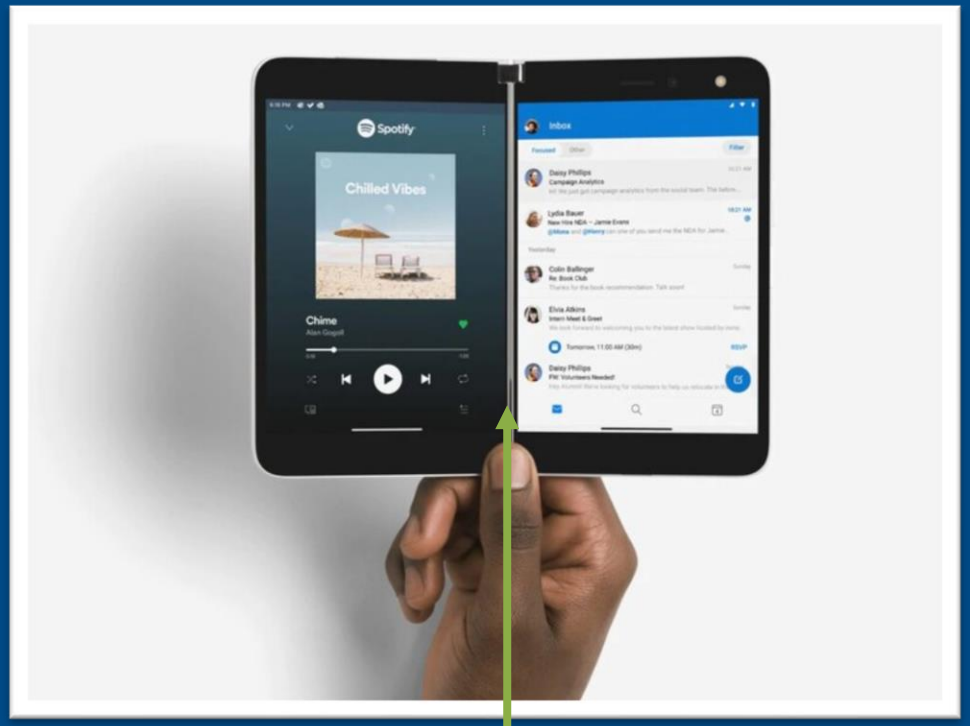
Challenge: consistency

- Posture determination
- Posture enforcement
- Single foldable Vs multiple internal

ASUS Taichi: front and back display laptop

ASUS Zenbook Pro Duo: two asymmetric panels

Key differences between these devices



- Two internal screens (could be more in the future)
- Physical hinge that separates content
- Sharper fold
- 360 degrees hinge

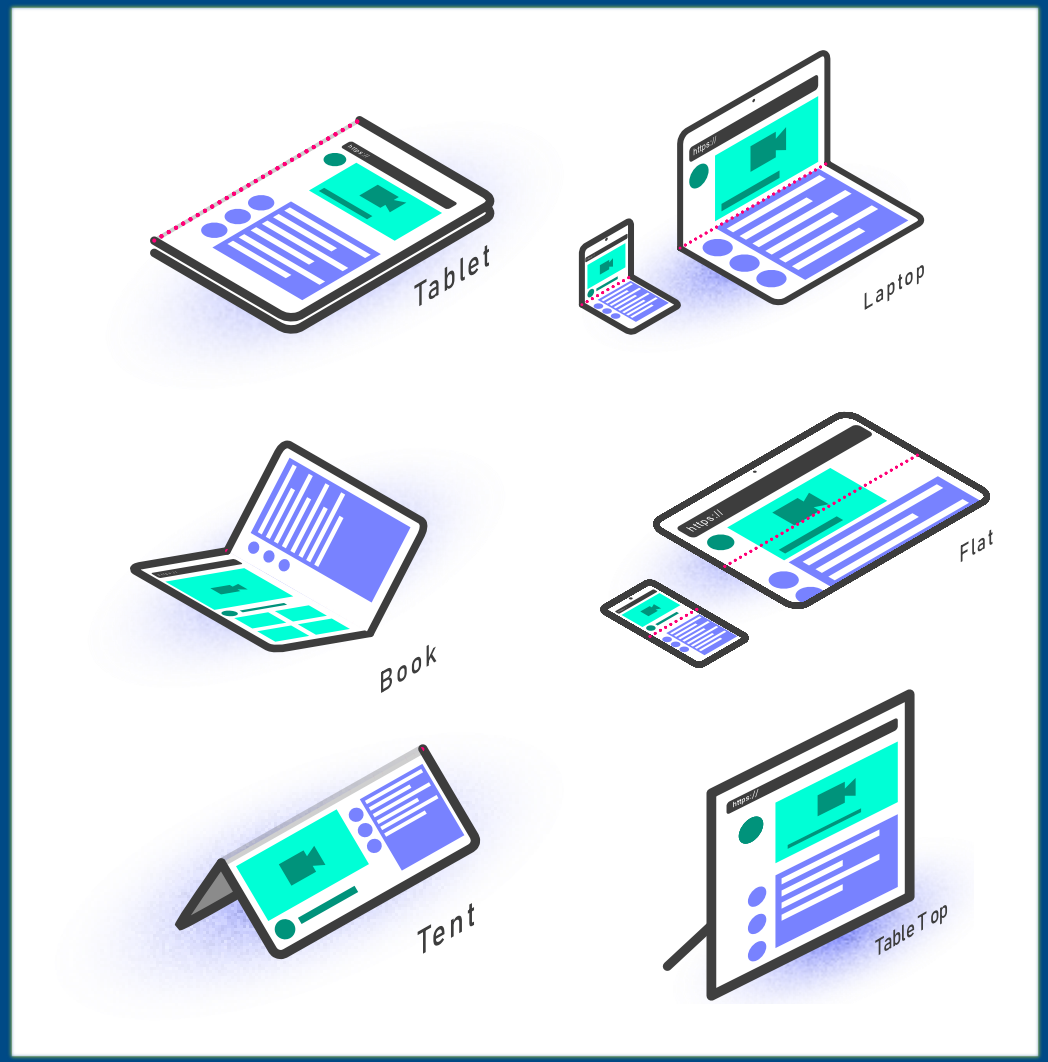
- Single internal foldable OLED screen
- No physical hinge
- Less acute fold
- As this time 180 degrees hinge

Multiple Internal Vs Foldable

	Multiple Internal	Foldables
# of Displays	2 (maybe more)	1
Visibility to OS	1 or 2 Display (OS dependent)	1 Display[1]
Visibility to apps	>=1 [Depends on display configuration]	
Seam	Physical	Virtual[2]
Touch Controller	Two independent	One

1. Could be > 1 virtual displays
2. Optional SW enforced bezel

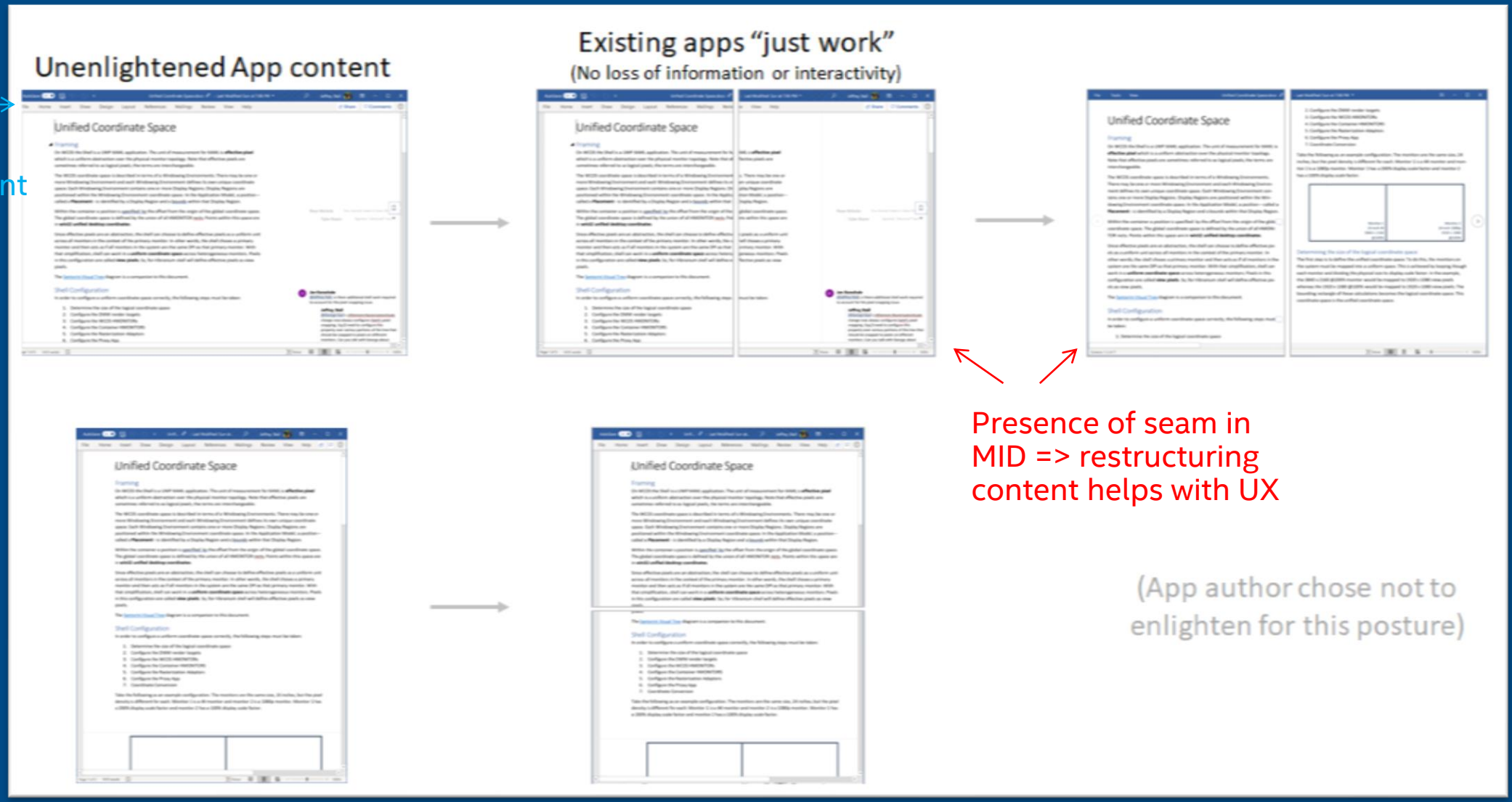
Platform Design and Postures



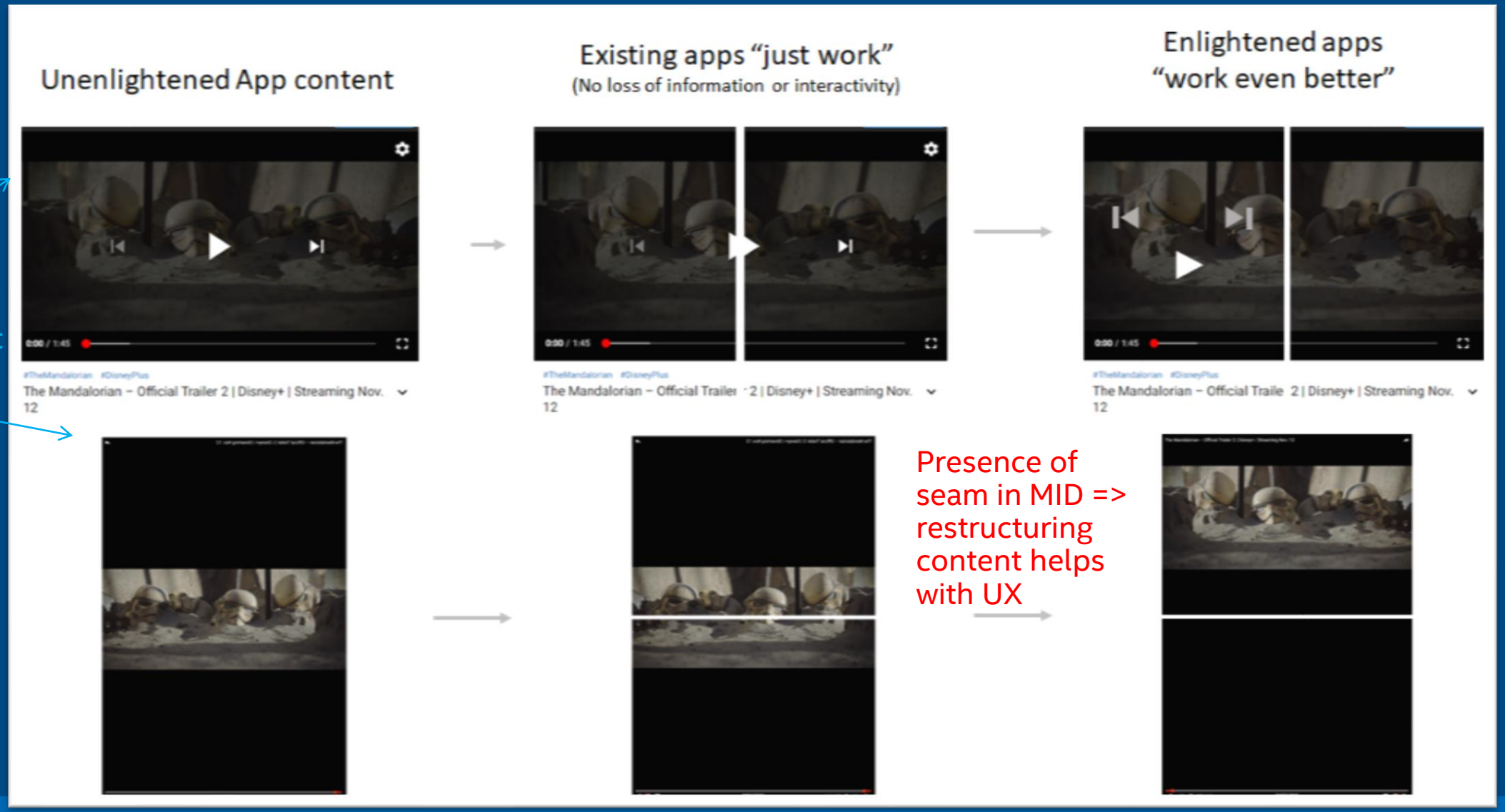
- Software layers do not prevent any of these postures in either MID or foldable platforms
- Panel technology considerations make some easier on MID
  - Acute folds
- Some others map more naturally on foldable since there is no seam
  - Single frame buffer

Seam Impacts Content Structuring

Lack of seam => single display content works for Tabletop posture in foldable



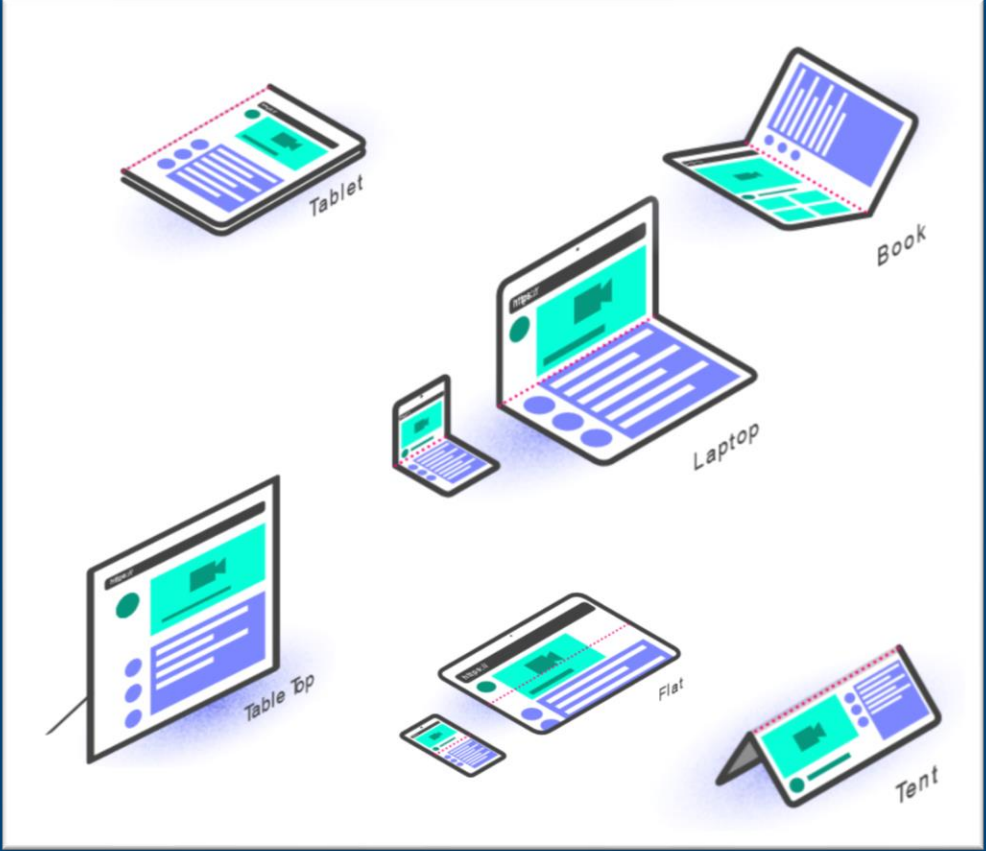
Video Example



Lack of seam => single display content works for tabletop posture in foldable

Presence of seam in MID => restructuring content helps with UX

MID Vs Foldable: Enablement needed

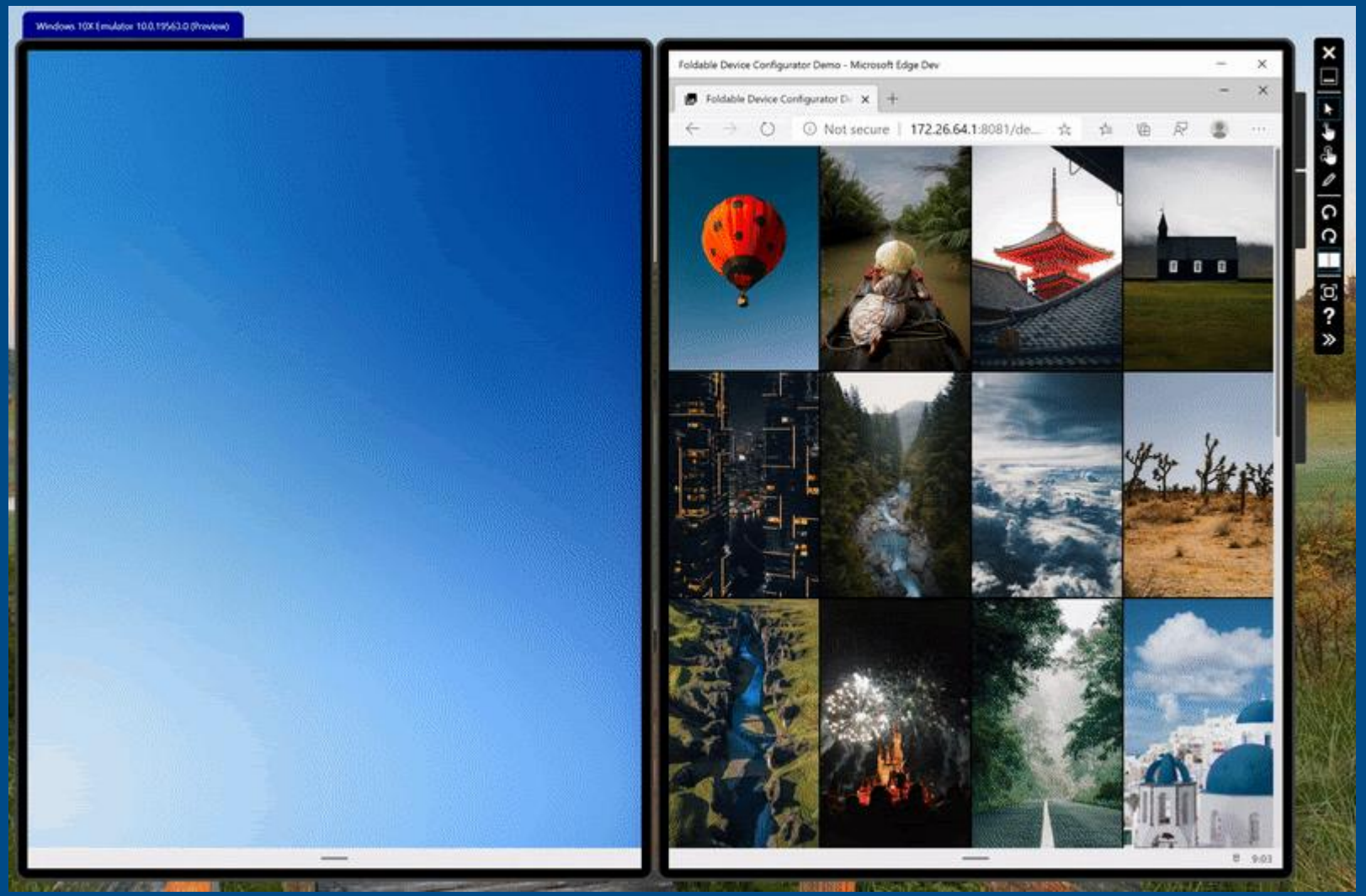


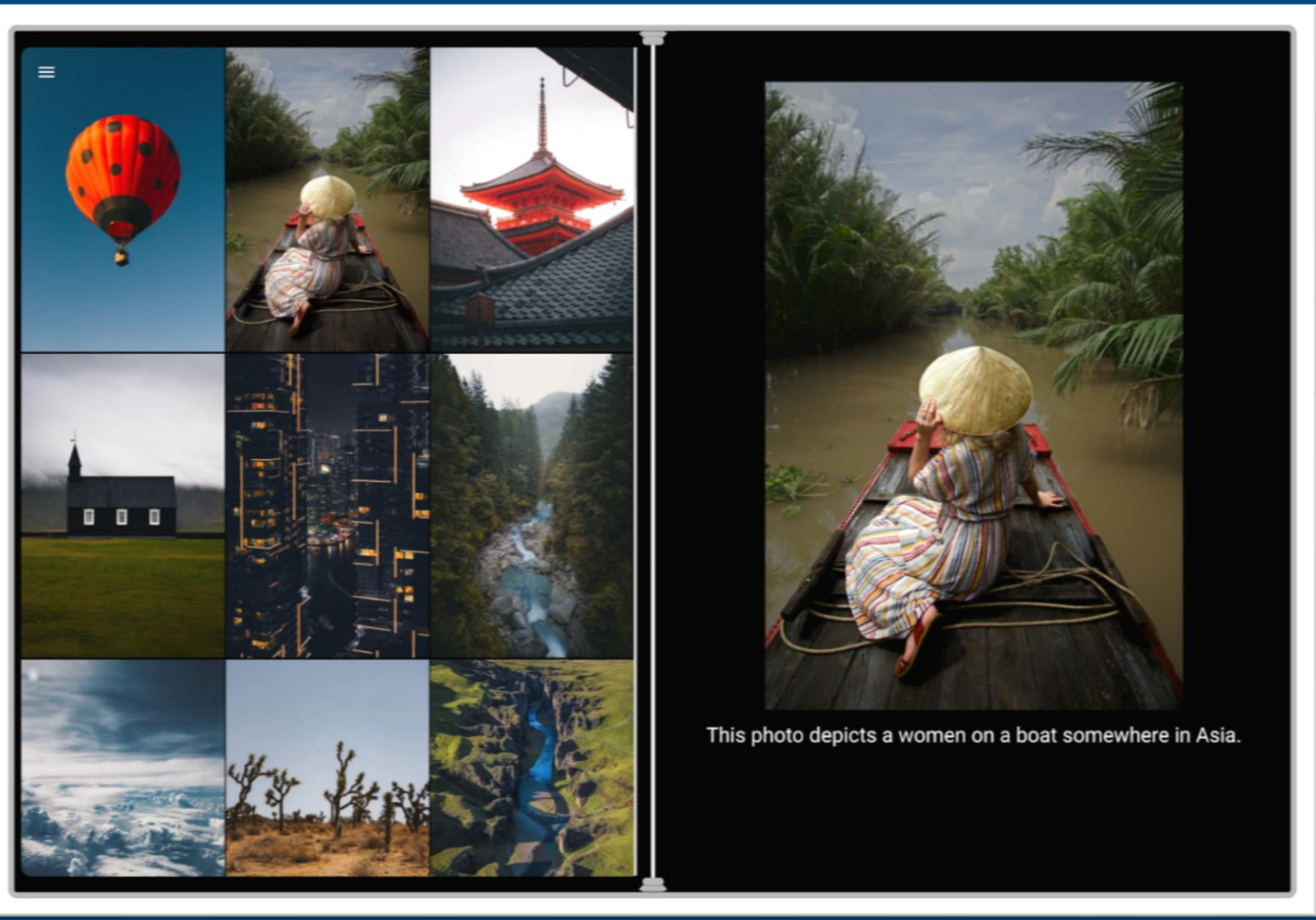
	Multiple Internal	Foldable
Tablet	Content in 1 display	½ display. Posture-based reduction in Frame Buffer
Laptop	Enlightened app/Rotated	Unenlightened app if no virtual hinge
Book	Enlightened	Unenlightened app if no virtual hinge
Table Top	Enlightened	Unenlightened
Tent	Enlightened app/Rotated	Posture aware / Rotated
"Half" Portrait (KBD occlusion)	Content in 1 display	½ display. Posture and occlusion aware

Beyond #displays, apps could benefit from information on platform type (MID Vs Foldable), posture, orientation, hinge, occlusion

Enable new UX patterns

UX Opportunities (Multiple Internal)




This photo depicts a women on a boat somewhere in Asia.

Current spec coverage

	Multiple Internal	Foldable
Postures		Screen Fold API
Physical Hinge/Seam	Window Segment/CSS Spanning	
Segment Geometries	Window Segment/CSS Spanning	
Fold angle		Screen Fold API

- APIs seem to be complementary if implemented in both variants of devices.
- Are we sending confusing message to developers by splitting into two APIs?

Summary & Next Steps

- MID is not the same as a foldable display
- Foldable display without a virtual hinge is like single display in some postures
- Foldable display with virtual hinge simulates MID [2 virtual displays]
- Dual Screen definition needs to have the ability to handle both MID and foldable display platforms