

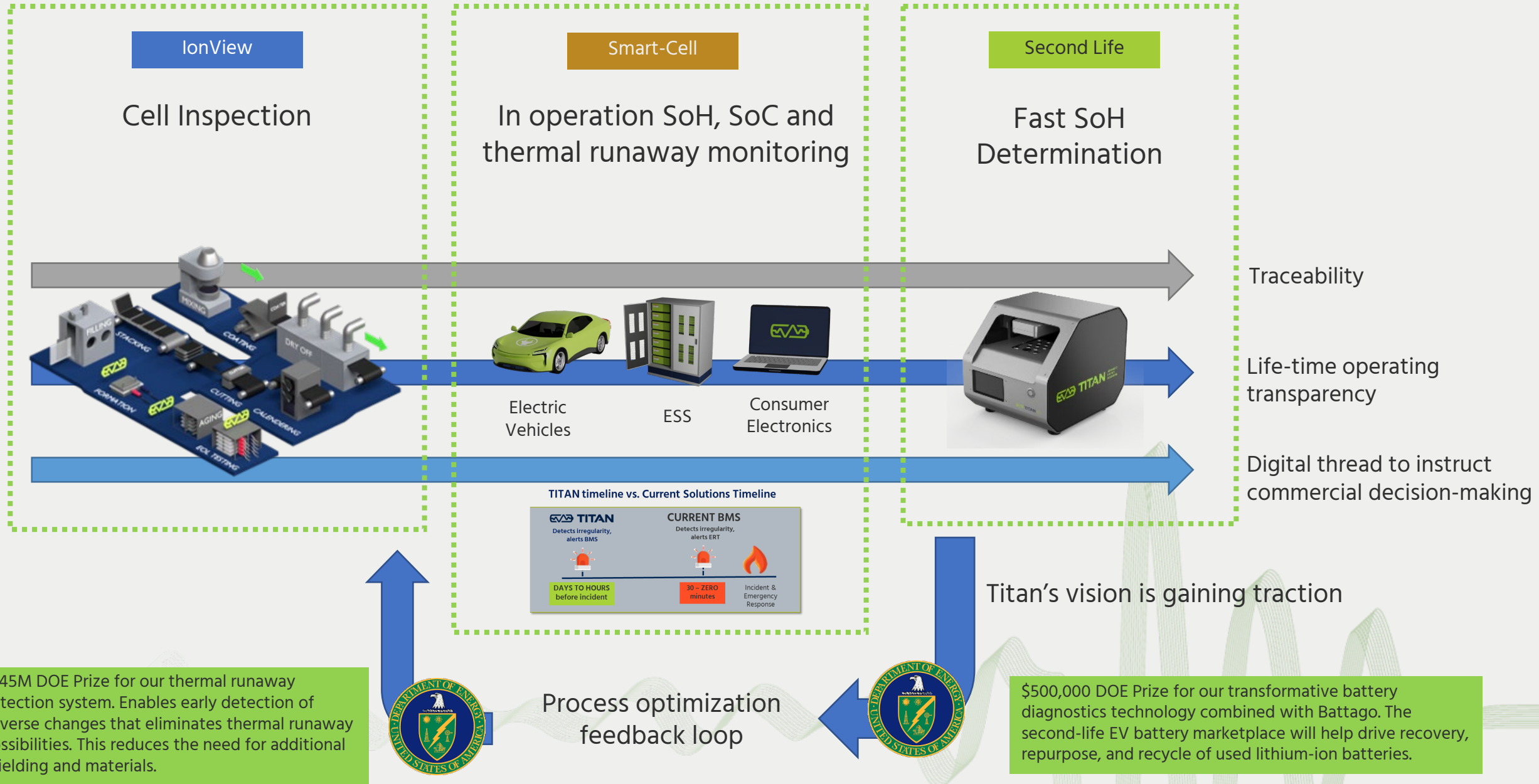


High Resolution Ultrasound Battery Solutions

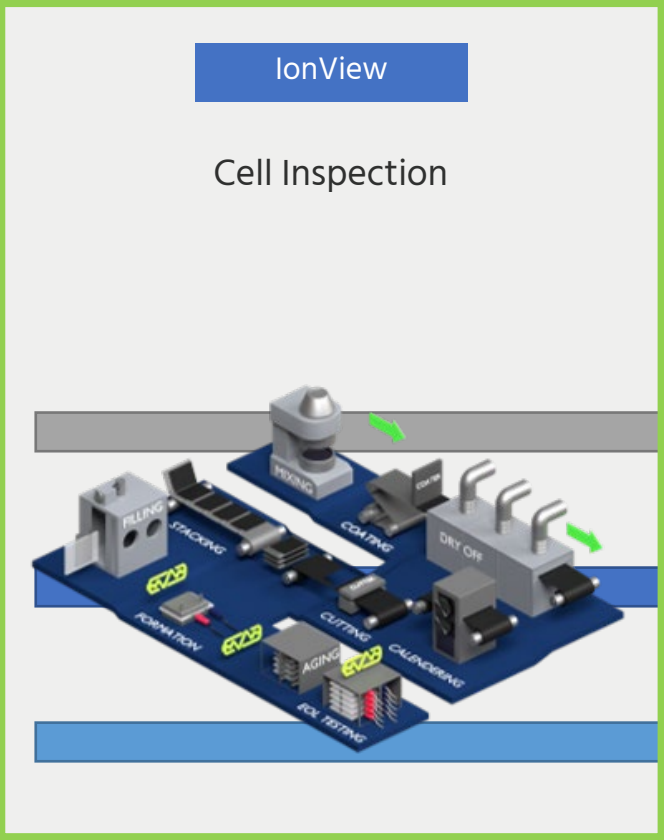
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Full life-cycle transparency - optimization



Non-destructive inspection solutions



	Smart-Cell	Second Life		
		Feb 2023	Q1 2024	Q1 2025
Resolution		> 200 pixels per cm ²		
Speed		< 1,000 per day	10,000 per day	80,000 per day
In-line		At line	✓	✓
Anomalies detected		Li plating, tears, wetting, wrinkles, debris, residual gas		

TITAN timeline vs. Current Solutions Timeline

TITAN	CURRENT BMS
Detects irregularity, alerts BMS	Detects irregularity, alerts ERT
DAYS TO HOURS before Incident	30 - 2550 minutes
	Incident & Emergency Response

Titan's vision is gaining traction

\$1.45M DOE SBIR grant for our thermal runaway detection system. Enables early detection of adverse changes that eliminates thermal runaway possibilities. This reduces the need for additional shielding and materials.



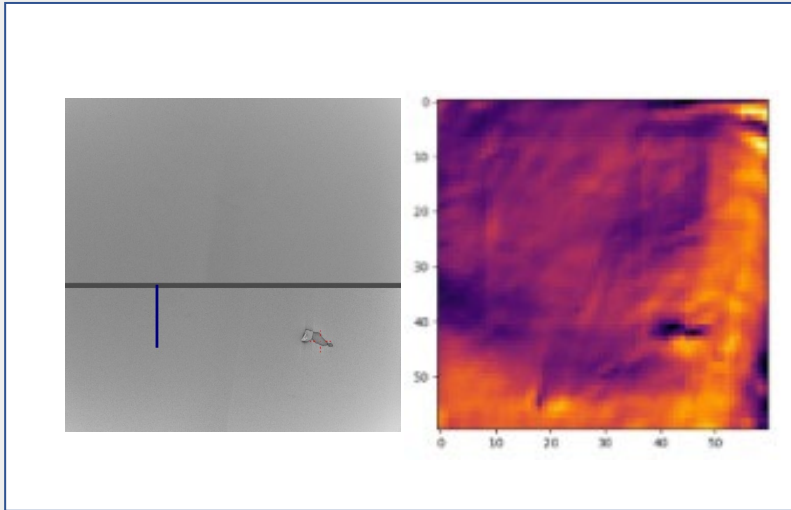
Process optimization
feedback loop



~\$1,000,000 DOE L-Ion Battery Recycling Competition Prizes for our transformative battery diagnostics technology combined with Battago. The second-life EV battery marketplace will help drive recovery, repurpose, and recycle of used lithium-ion batteries.

The advantage of Titan Ultrasound inspection is that it enables direct defect detection, spatially resolved & earlier in the process

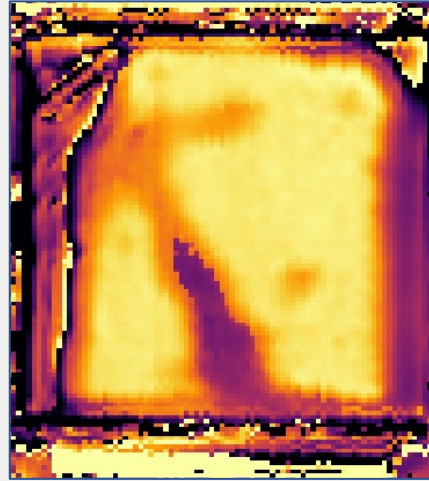
Direct defect detection



By analyzing cell morphology, Titan identifies anomalies that directly impact performance, like:

- Non-uniform electrode properties
- Insufficient electrolyte dispersion
- Tears, gas bubbles, Li plating and debris

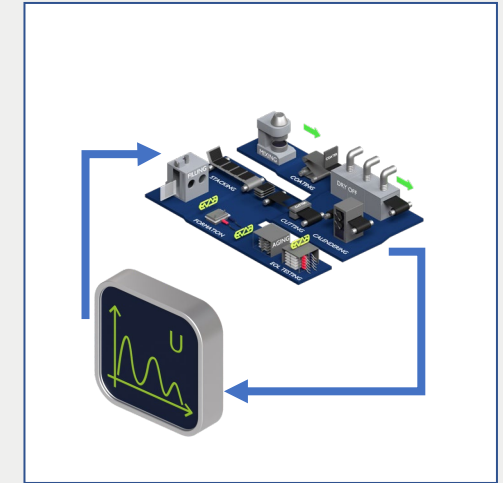
Spatially resolved



Titan identifies

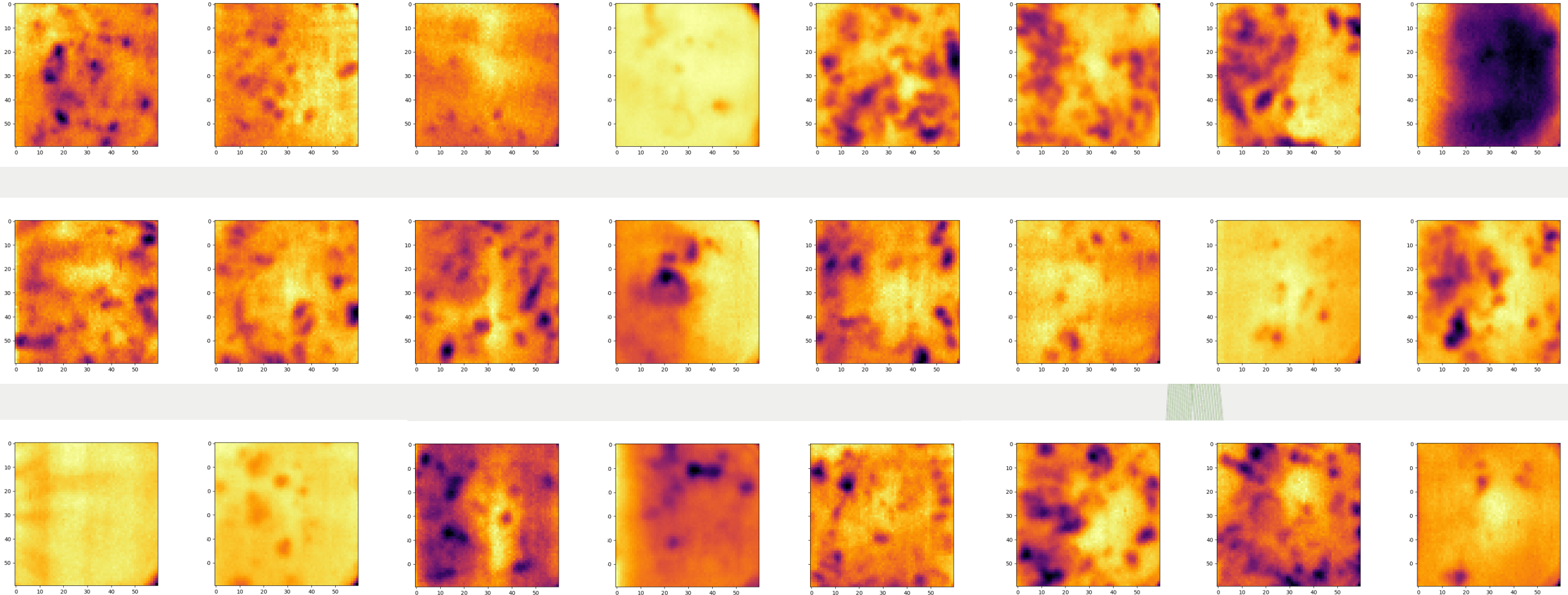
- location of anomalies in 3D,
- capacity lost due to insufficient wetting
- debris or contaminants

...early intervention

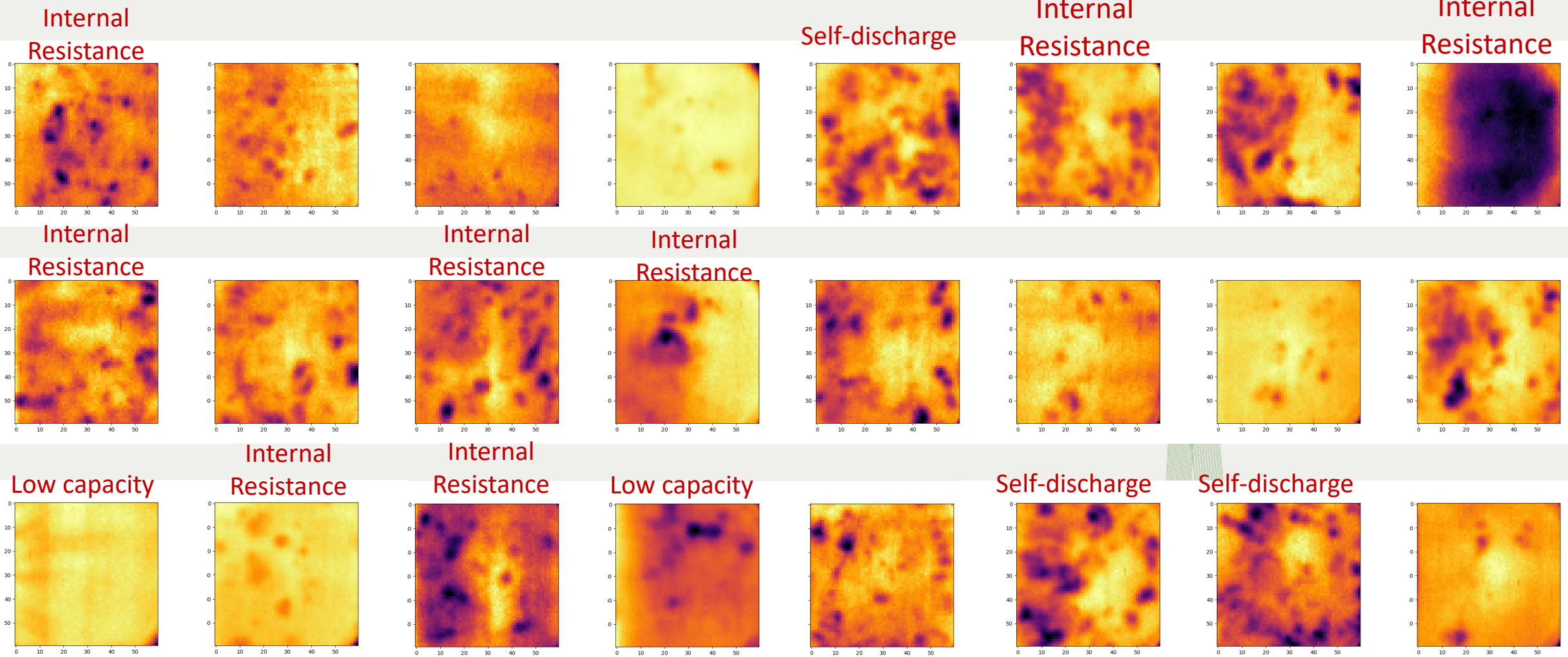


- Actionable insights enable rapid feedback loops
- Rework becomes possible, for instance with electrode wetting issues
- Shrinking the operational envelope

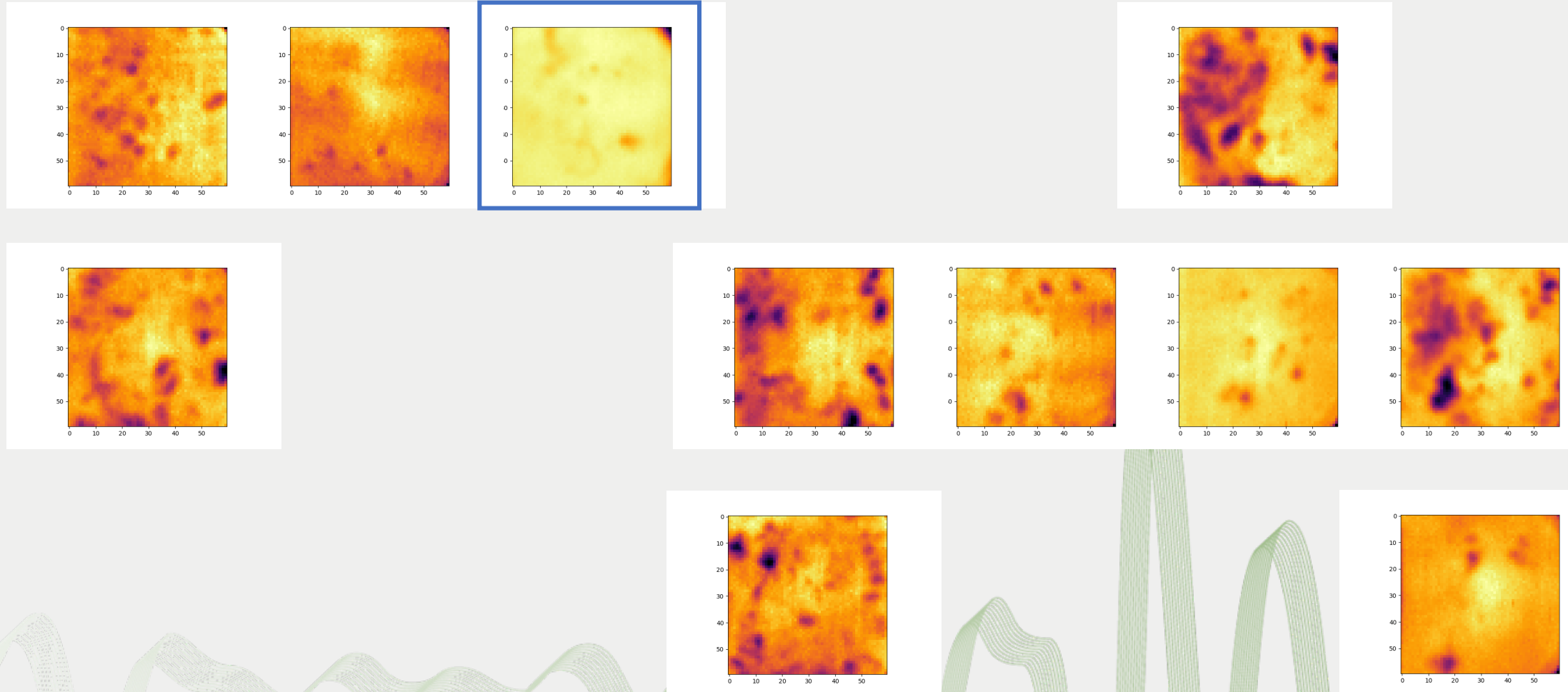
Significant variations between cells due to a range of manufacturing anomalies



Significant variations between cells due to a range of manufacturing anomalies

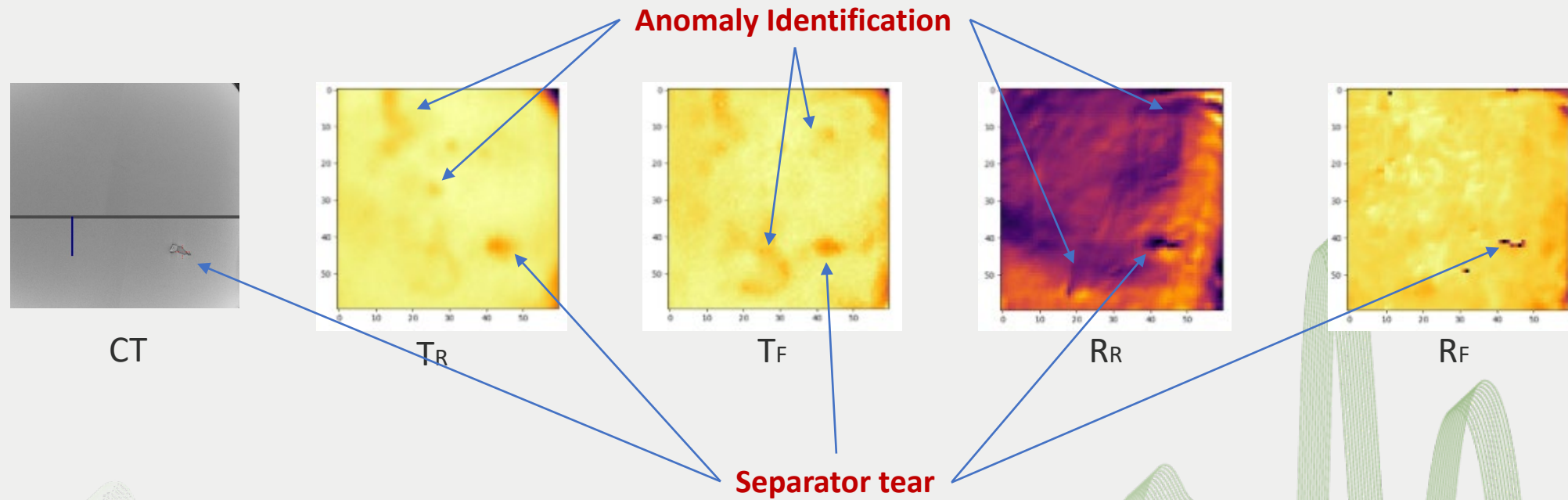


Significant variations between cells due to a range of manufacturing anomalies



Tear detected inside one of the layers and confirmed using CT scan

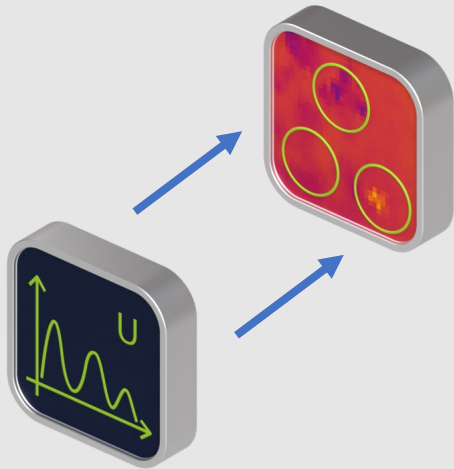
Detected multiple anomalies, which are mostly imperceivable with CT



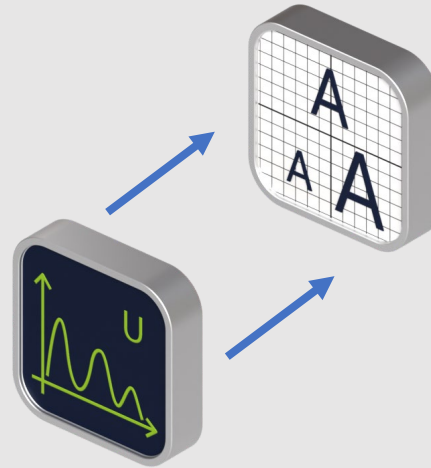
Titan's ultrasound technology helps deliver consistent, homogenous product faster

- Identifies anomalies directly, not through inference
- Spatially resolves the location and magnitude of the anomaly
- Early in the process to accelerate feedback loops
- Can reduce bottom line production costs up to \$4.00 - \$6.00 per KWh

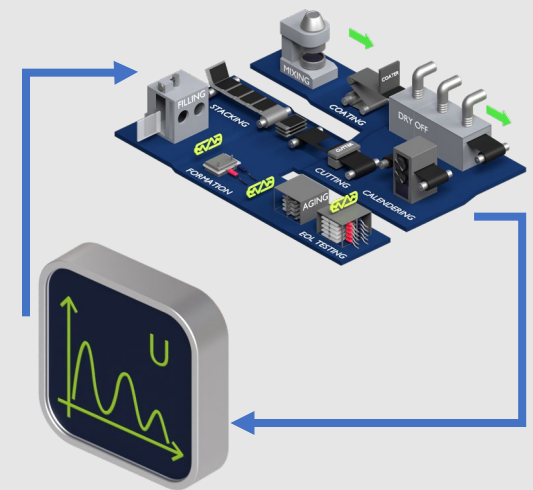
Direct Anomaly Detection

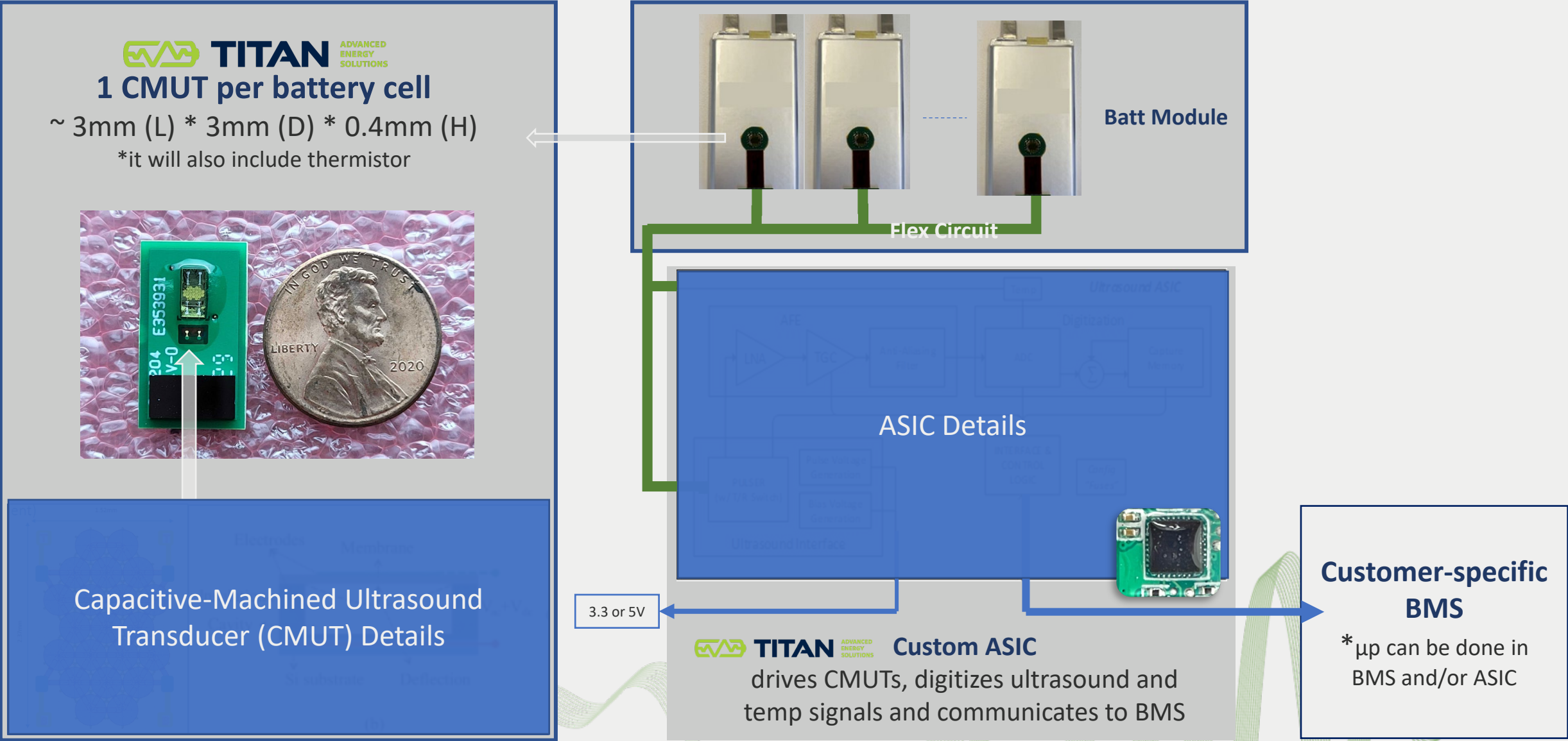


Spatial Resolution



Feedback Loop to Production







Thank You!

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