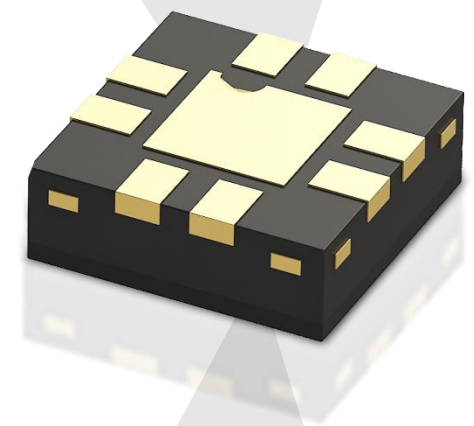




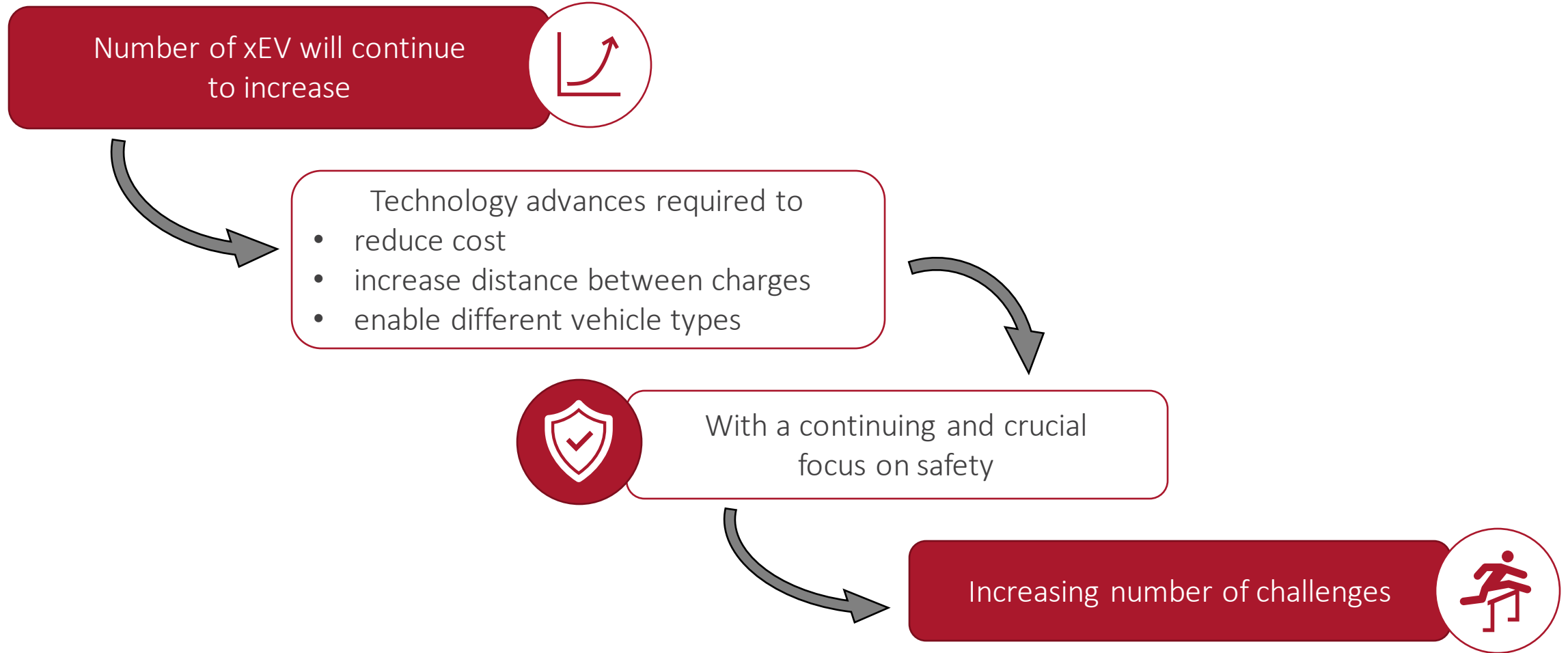
Enabling zero thermal propagation: new approaches with Paragraf graphene-based sensors

Sarah Driver – Product Manager

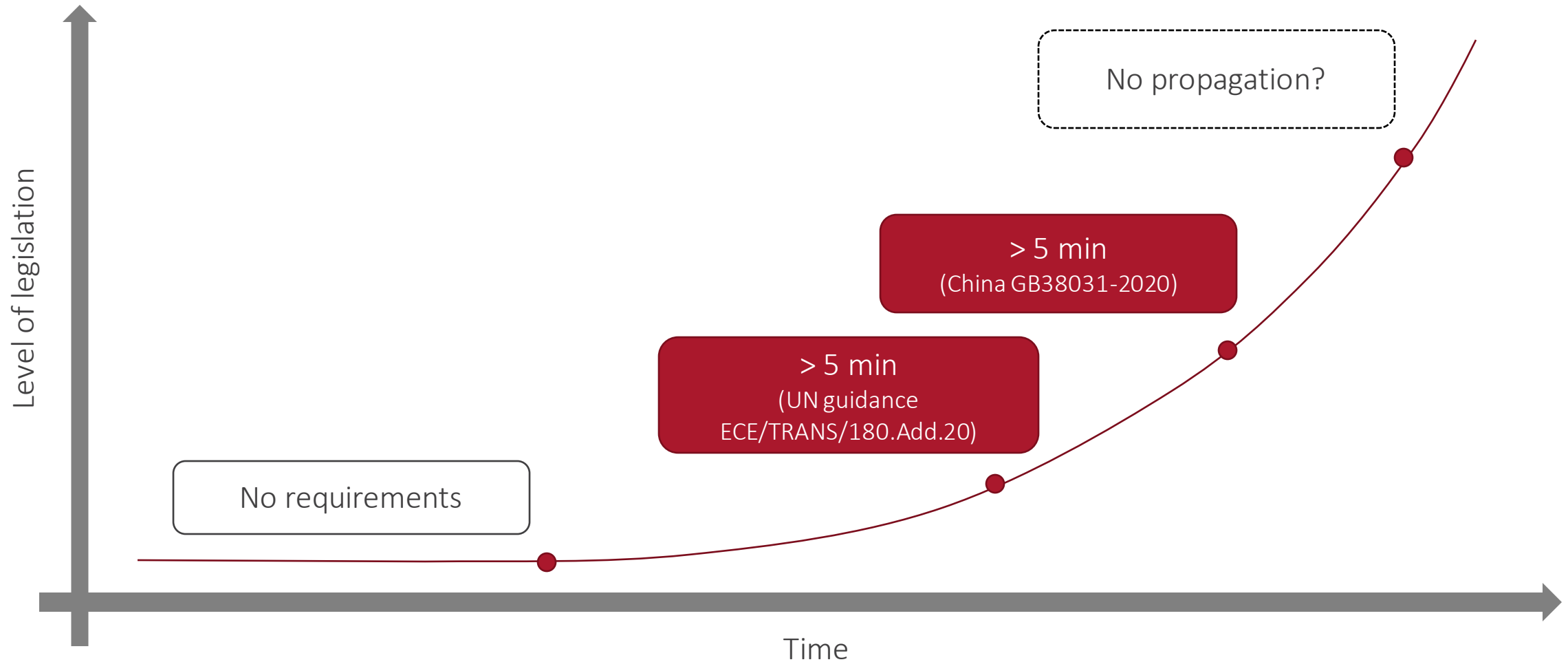
Battery Tech Expo Silverstone – 20th April 2023



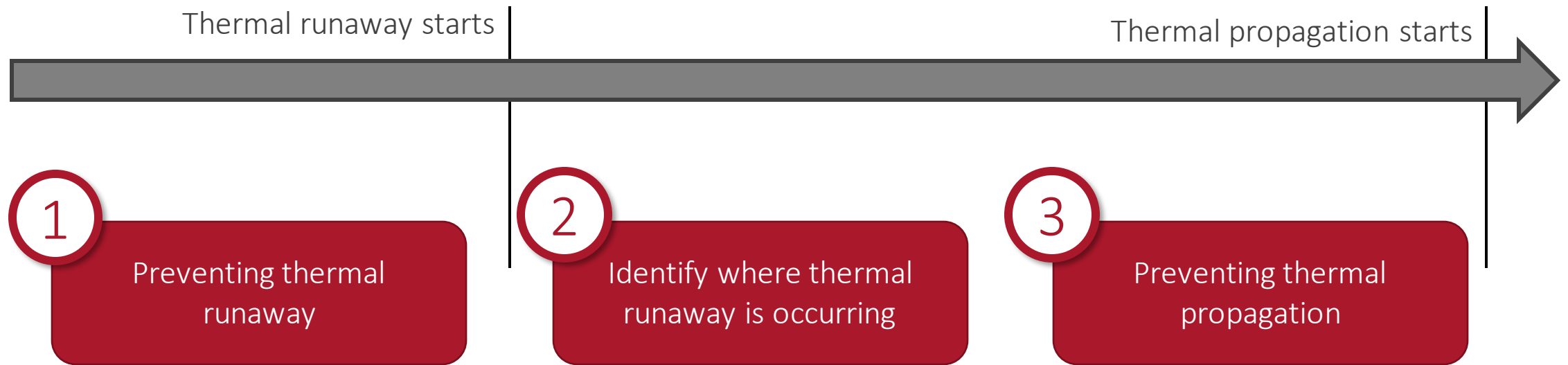
New technology leads to new challenges



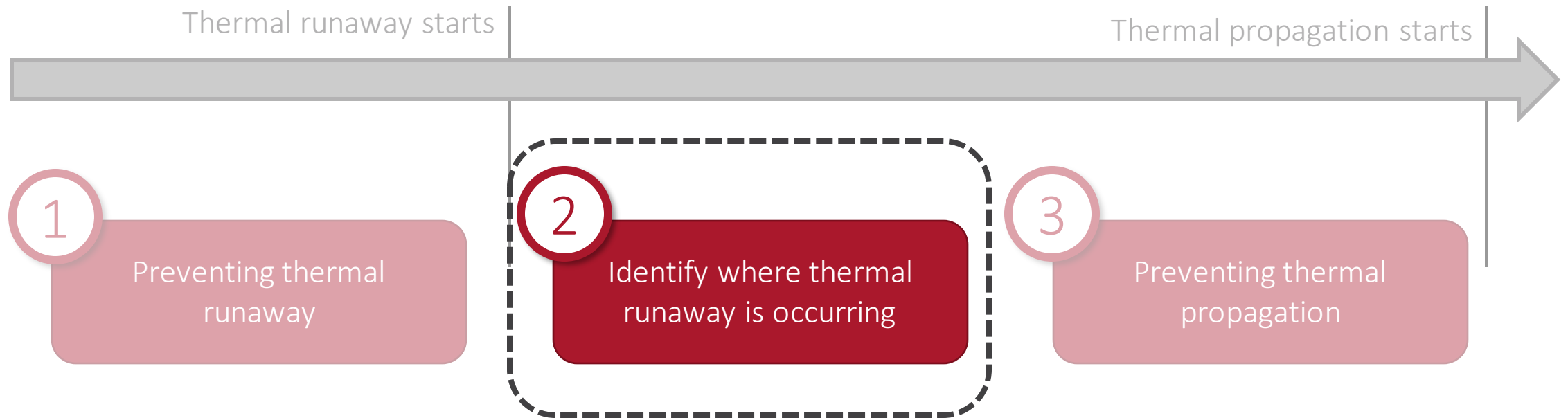
Thermal propagation guidance moving towards legislation



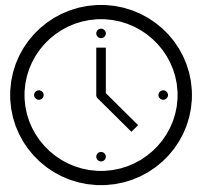
Three approaches to achieving zero propagation



Three approaches to achieving zero propagation



Area 2: Identification



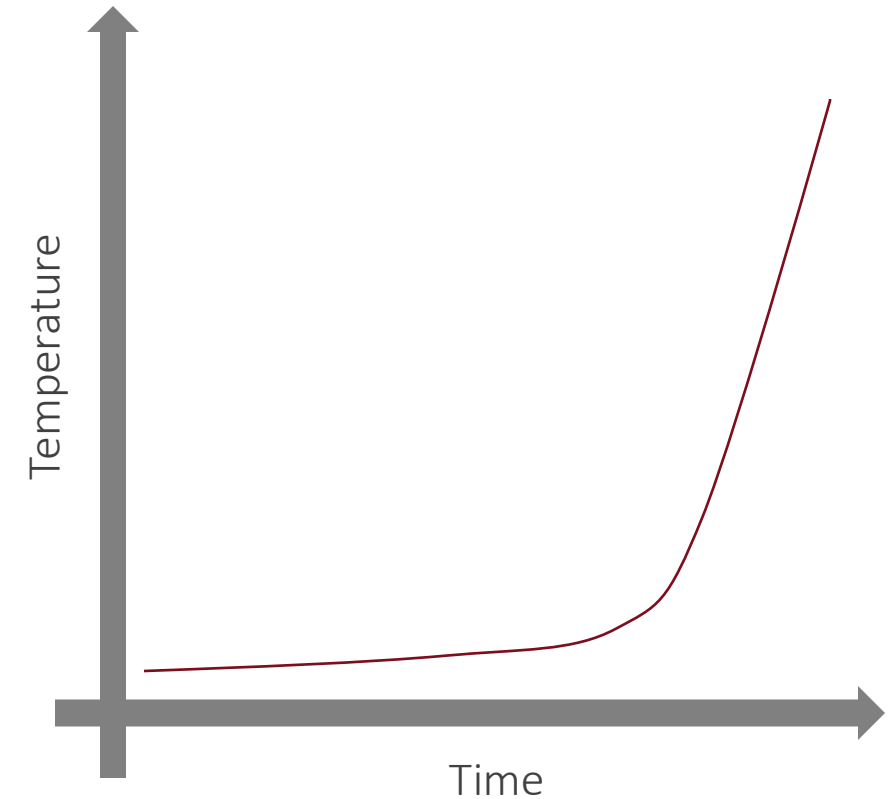
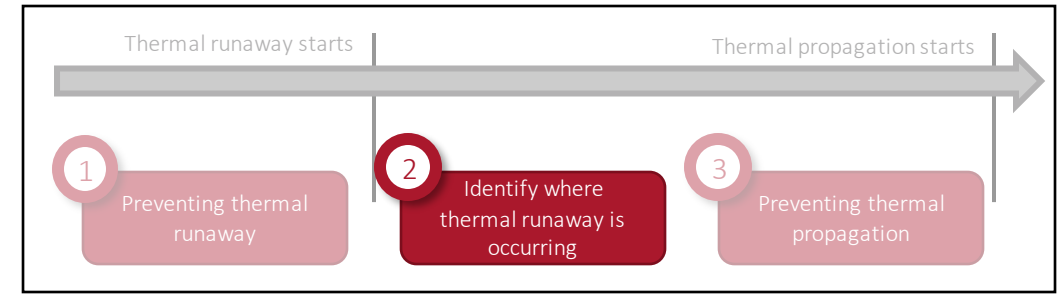
Need the earliest warning possible



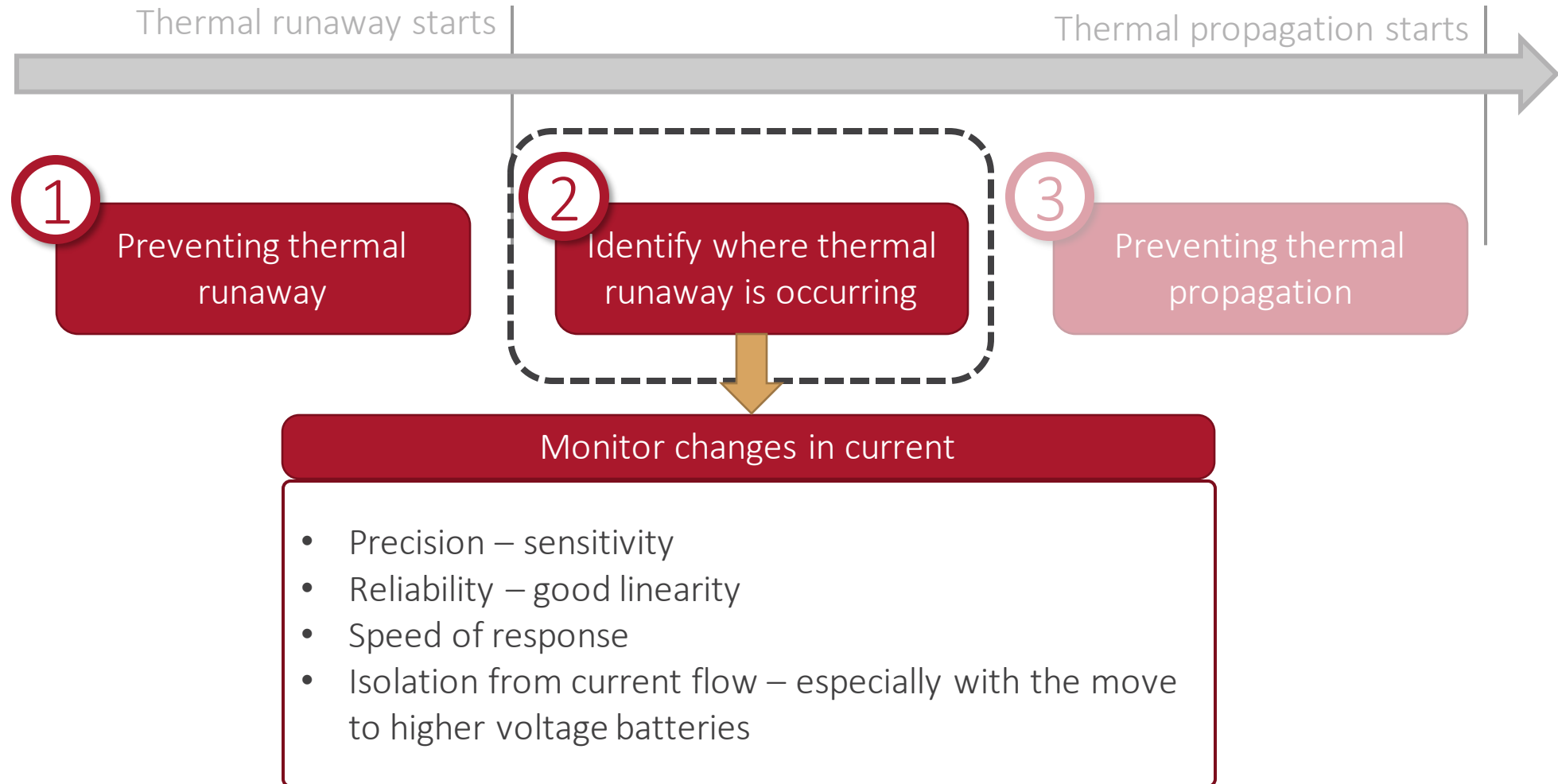
Determine the precise area



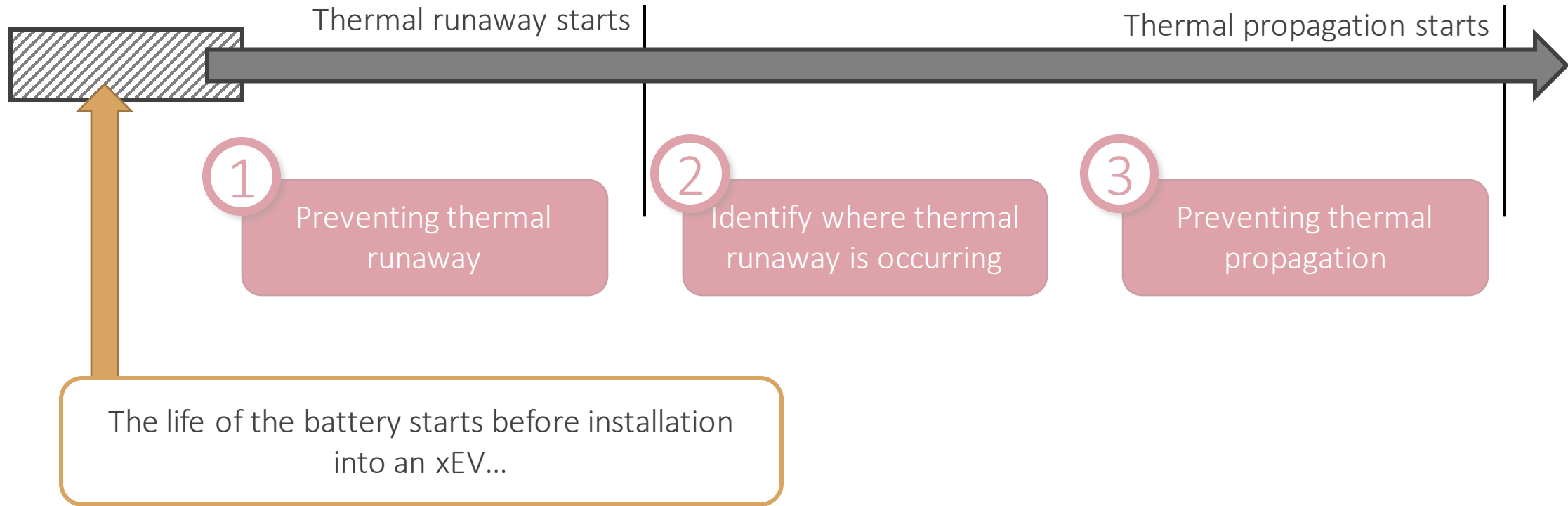
Take action



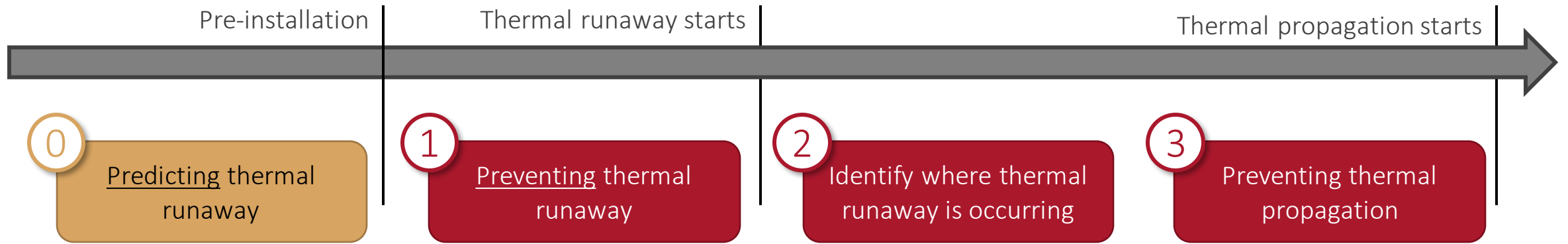
Magnetic field and current sensors are part of the solution



Thermal runaway prediction at manufacturing



Thermal runaway prediction at manufacturing

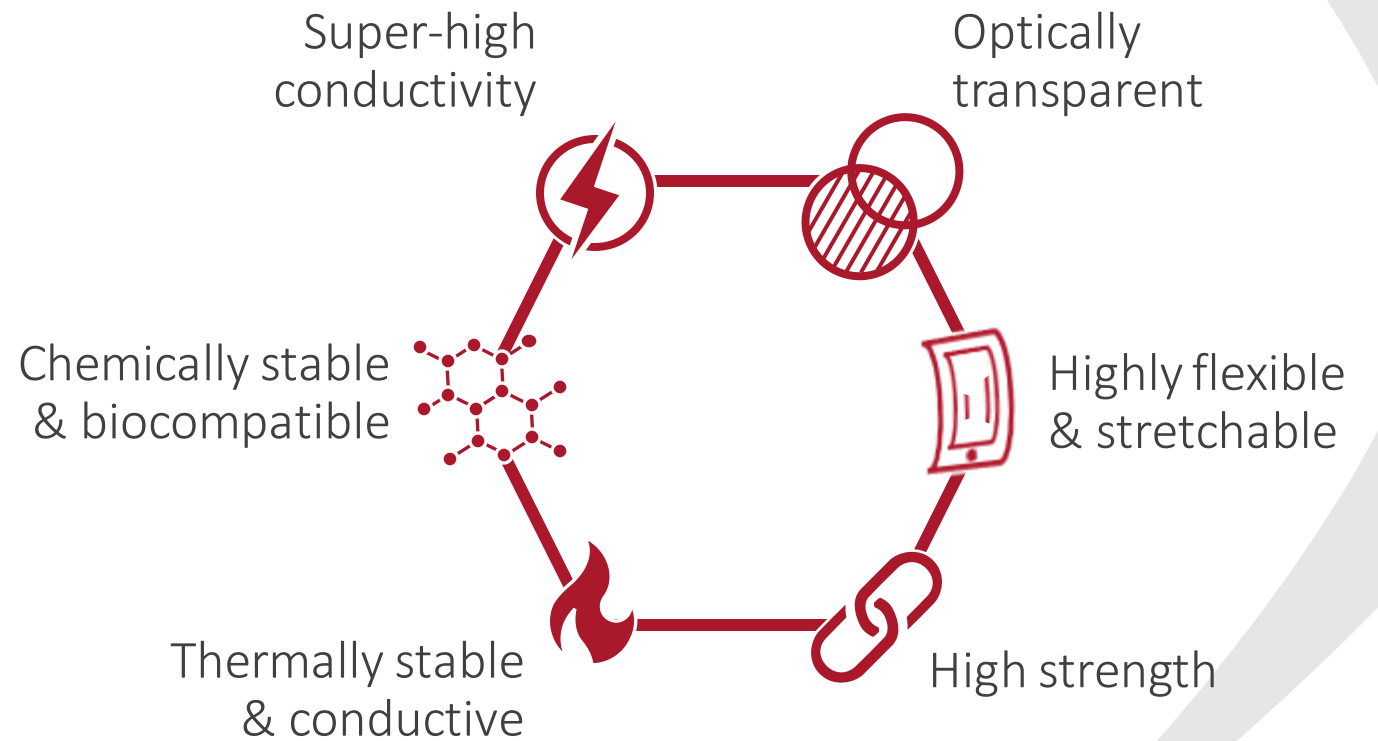
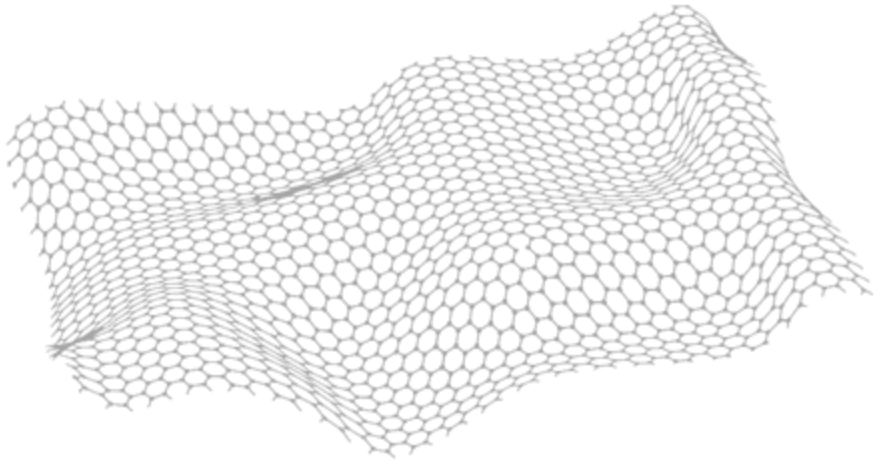




How can Paragraf help?

Graphene | The Dawn of Advanced Electronics Materials

Graphene is set to transform the electronics industry



Paragraf | Graphene electronic devices | Industry ready

The first company in the world to mass produce graphene-based electronic devices at scale using standard semiconductor processes.

Higher sensitivity

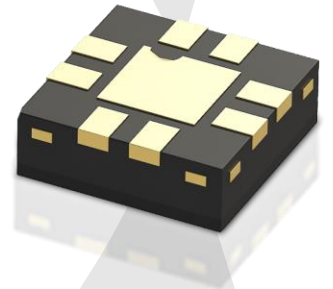
- Enables detection of smaller changes in field, improved resolution in current sensing

Reliability in extreme environments

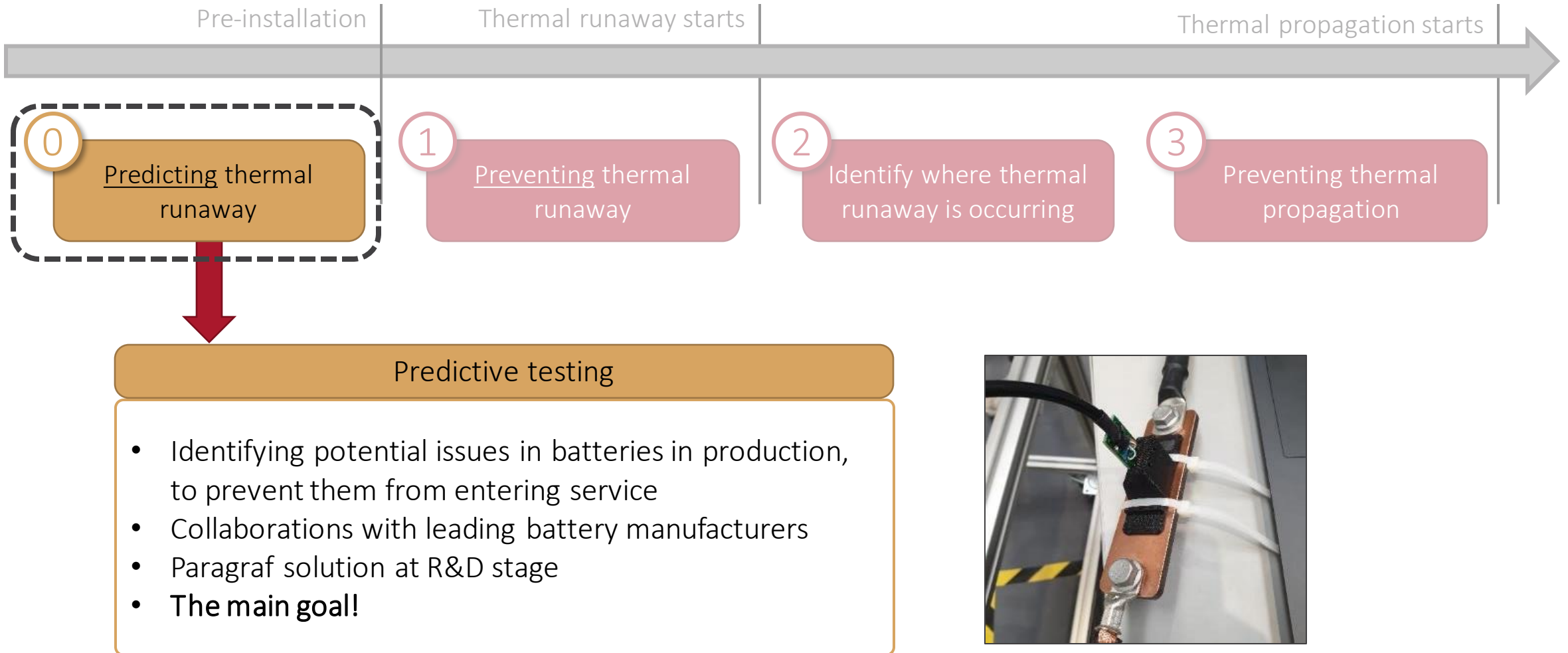
- Withstand temperature extremes, vibration, stress over the vehicle lifetime
- Simple to implement calibration electronics

Superior noise tolerance

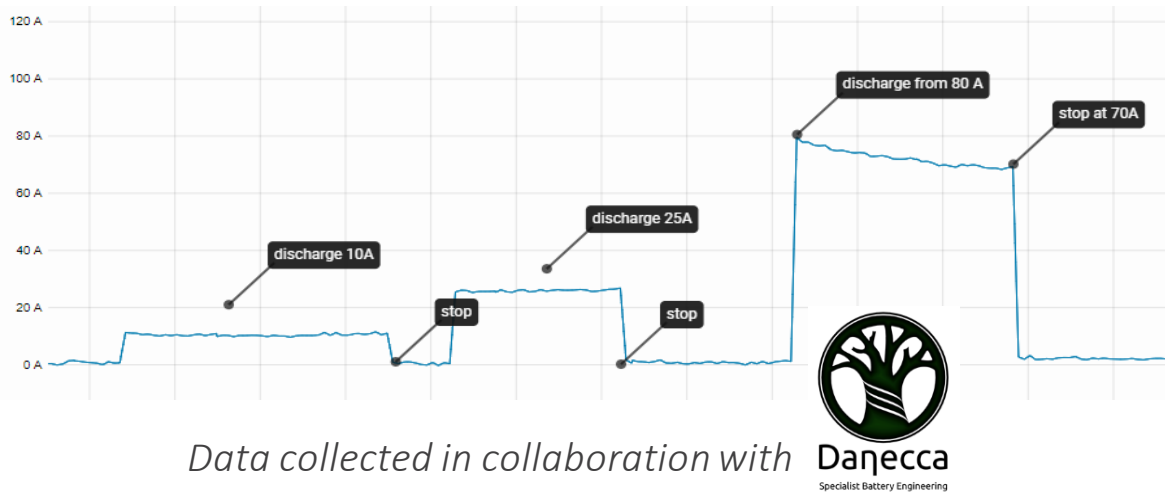
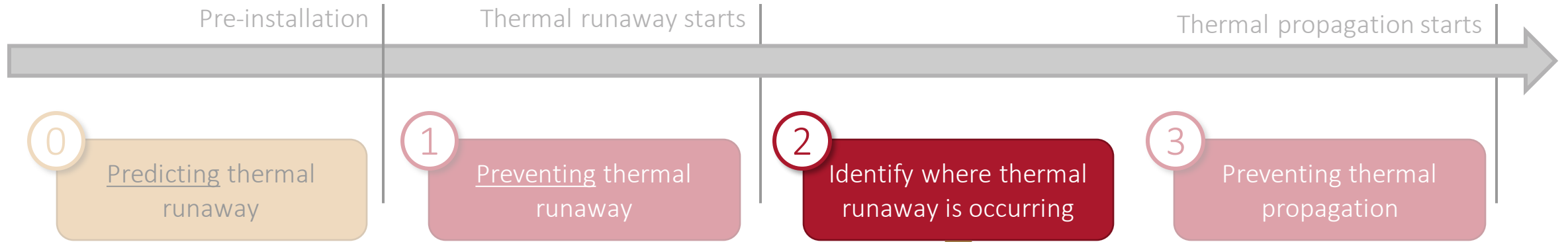
- Reduction in readings from stray fields



How Paragraf sensors are part of the thermal event solution



How Paragraf sensors are part of the thermal event solution



Monitor changes in current

- ✓ Precision – sensitivity
- ✓ Reliability – good linearity
- ✓ Speed of response
- ✓ Isolation from current flow – especially with the move to higher voltage batteries

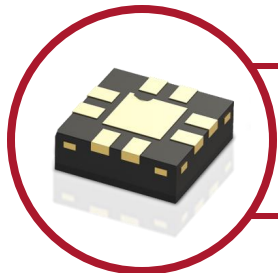
Summary



New technology requirements lead to new challenges – and legislation and customer requirements are becoming more demanding.

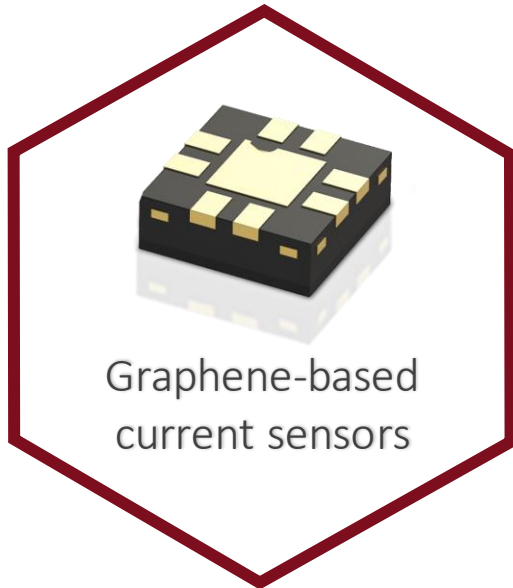


Earlier identification of issues in thermal runaway/propagation timeline leads to a better outcome for everyone.



To enable zero thermal propagation, there are various approaches in which Paragraf's graphene-based magnetic sensors can help.

Meet us at Stand 41 (Hall 3)

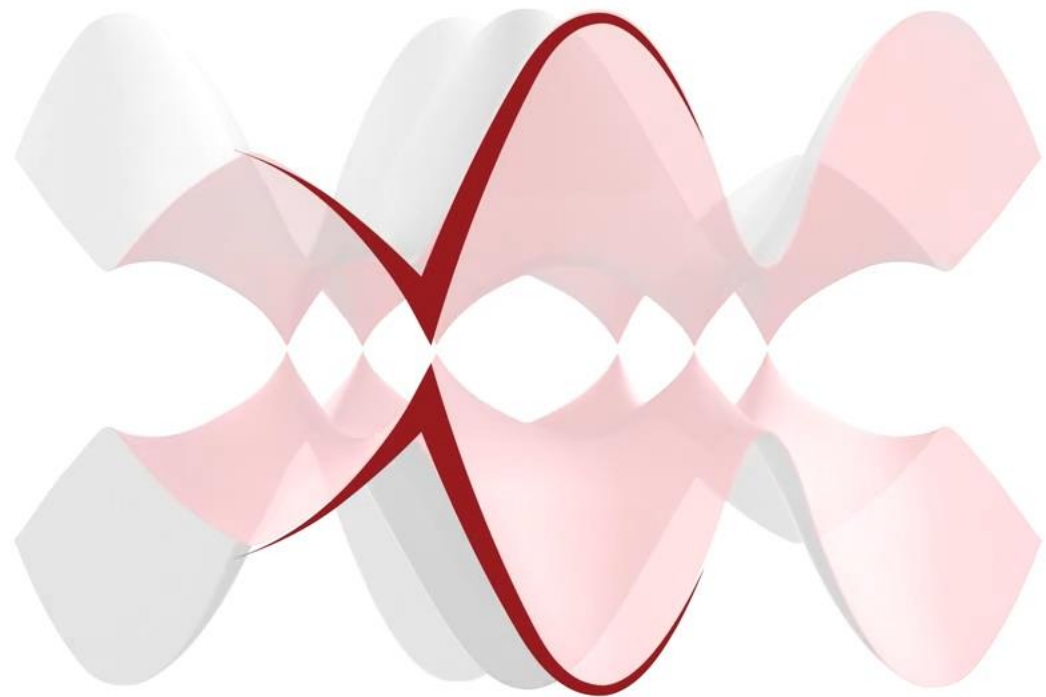


Higher sensitivity

Reliability in extreme environments

Superior noise tolerance

Discuss with us how we can help you enable zero thermal propagation





Thank you!

Meet us on stand 41

Find out more:

www.paragraf.com

sales@paragraf.com

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