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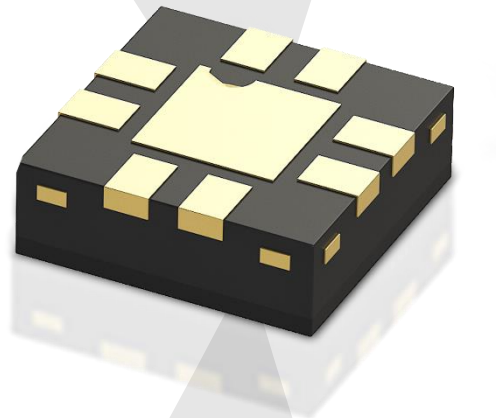
LEADING THE WAY
IN GRAPHENE ELECTRONICS

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

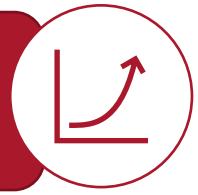
Sarah Driver – Product Manager



Battery Tech Expo Silverstone – 20th April 2023

New technology leads to new challenges

Number of xEV will continue to increase



Technology advances required to
- reduce cost
- increase distance between charges
- enable different vehicle types

With a continuing and crucial focus on safety

Increasing number of challenges

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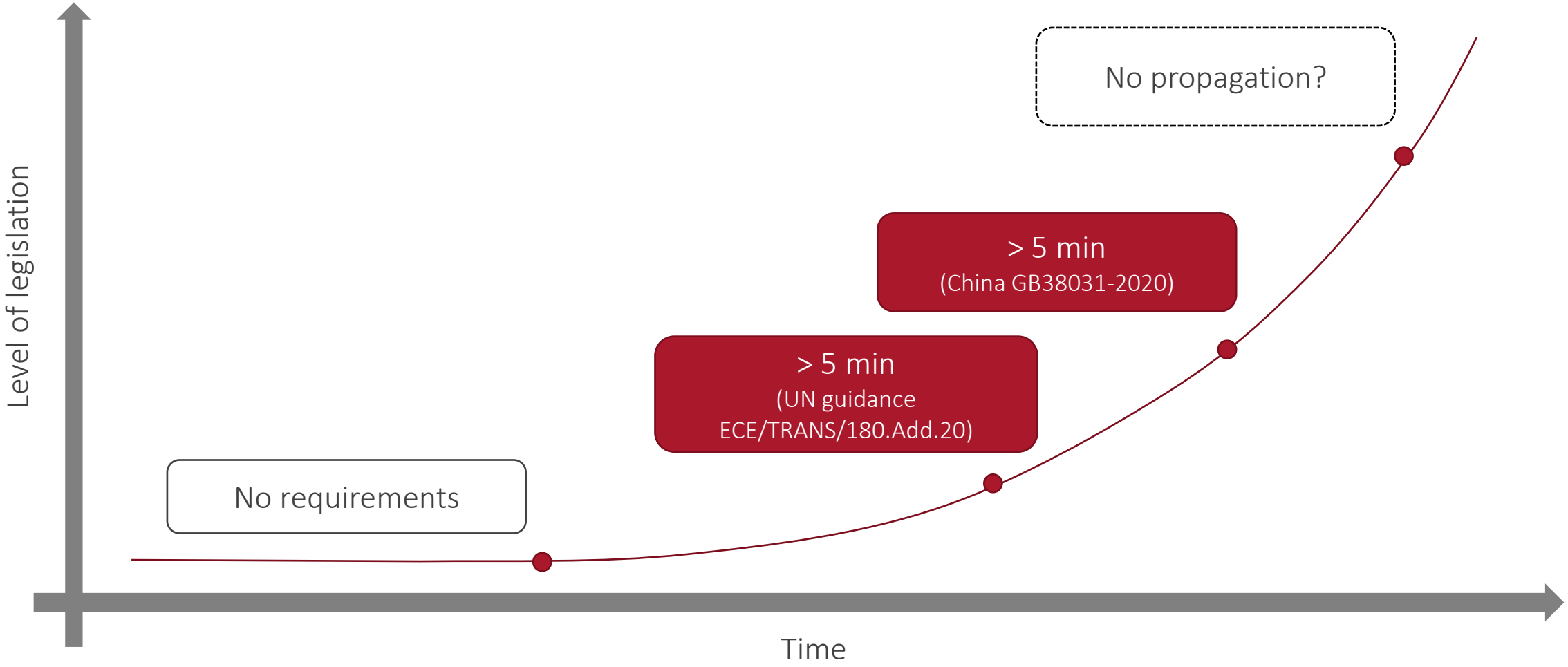
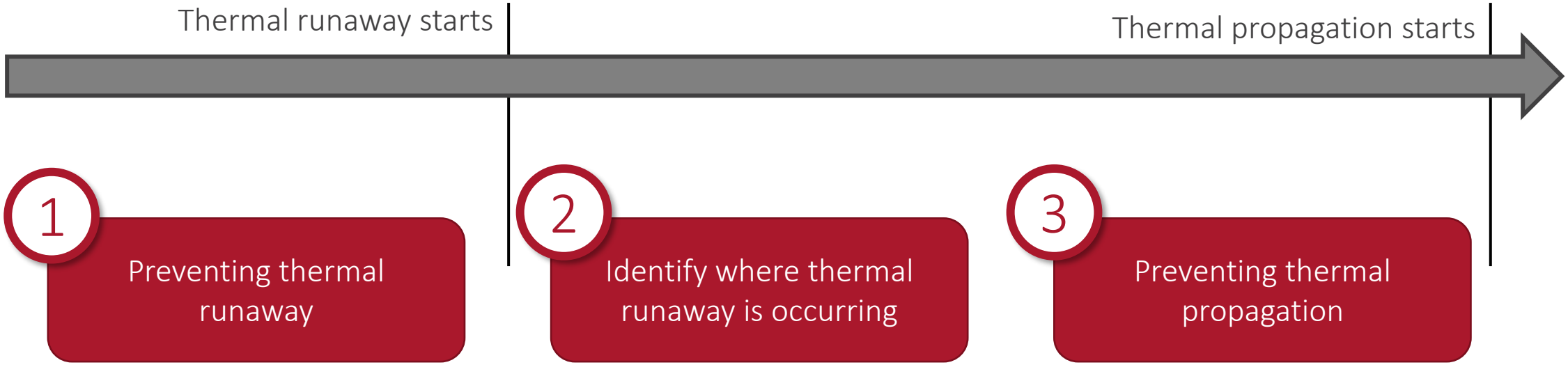
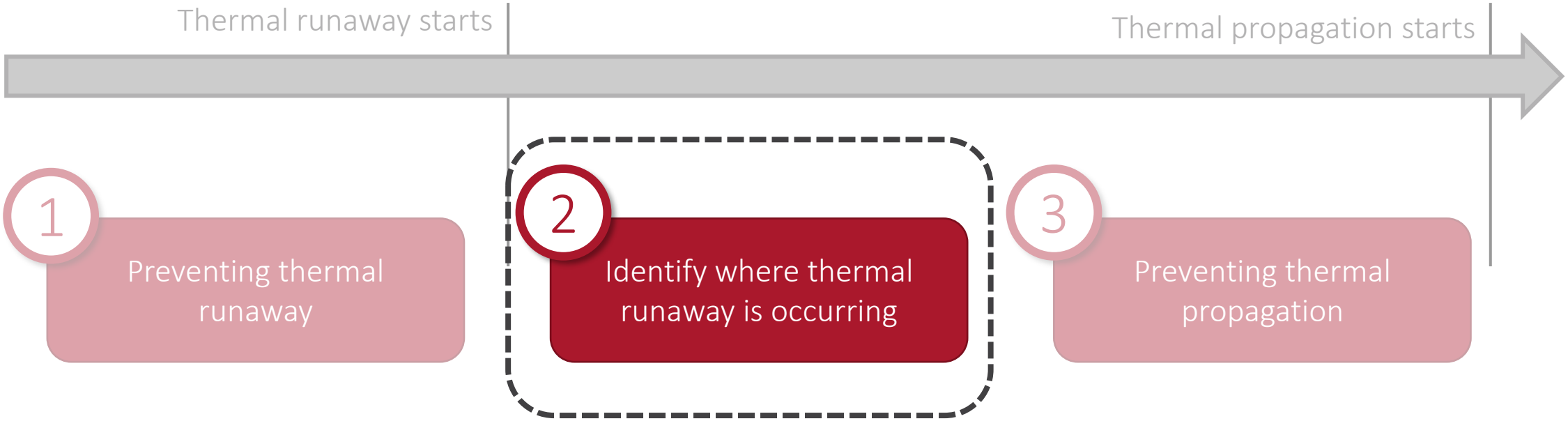
Thermal propagation guidance moving towards legislation



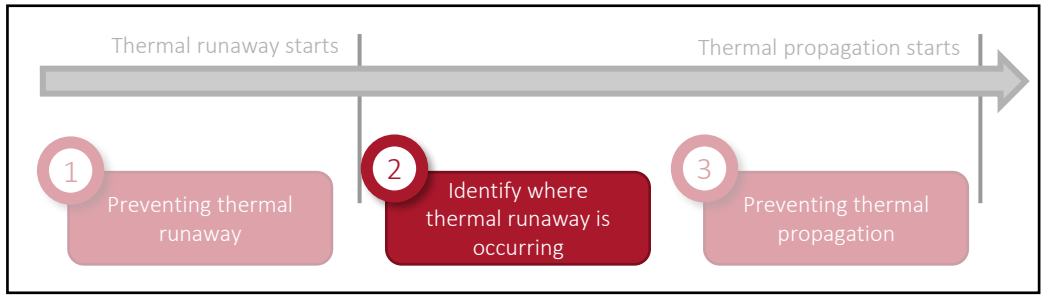
Three approaches to achieving zero propagation



Three approaches to achieving zero propagation



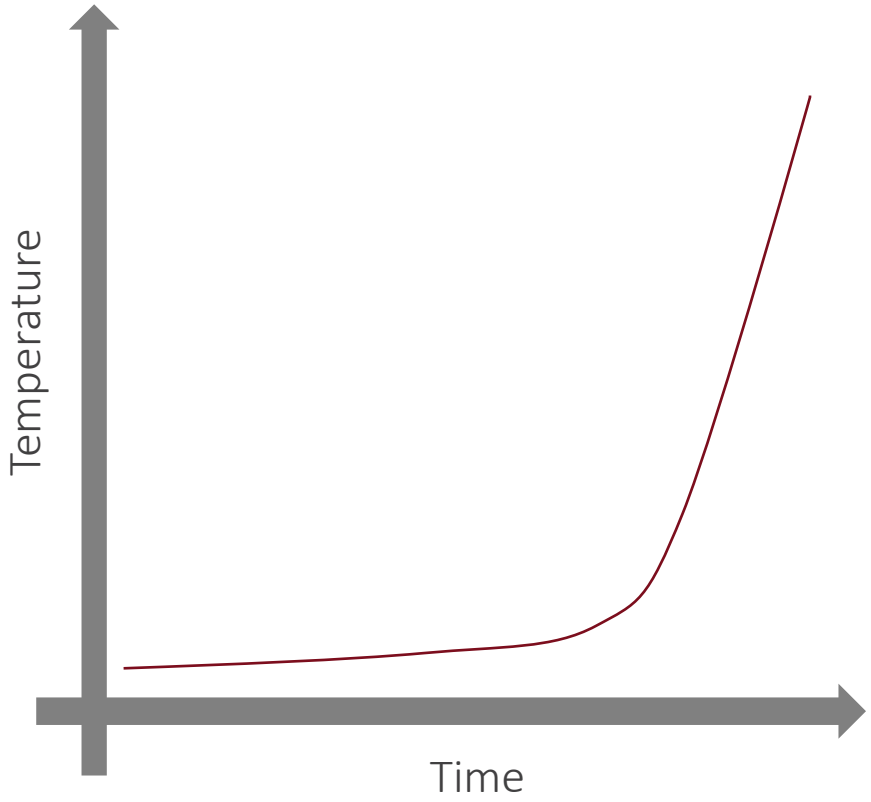
Area 2: Identification



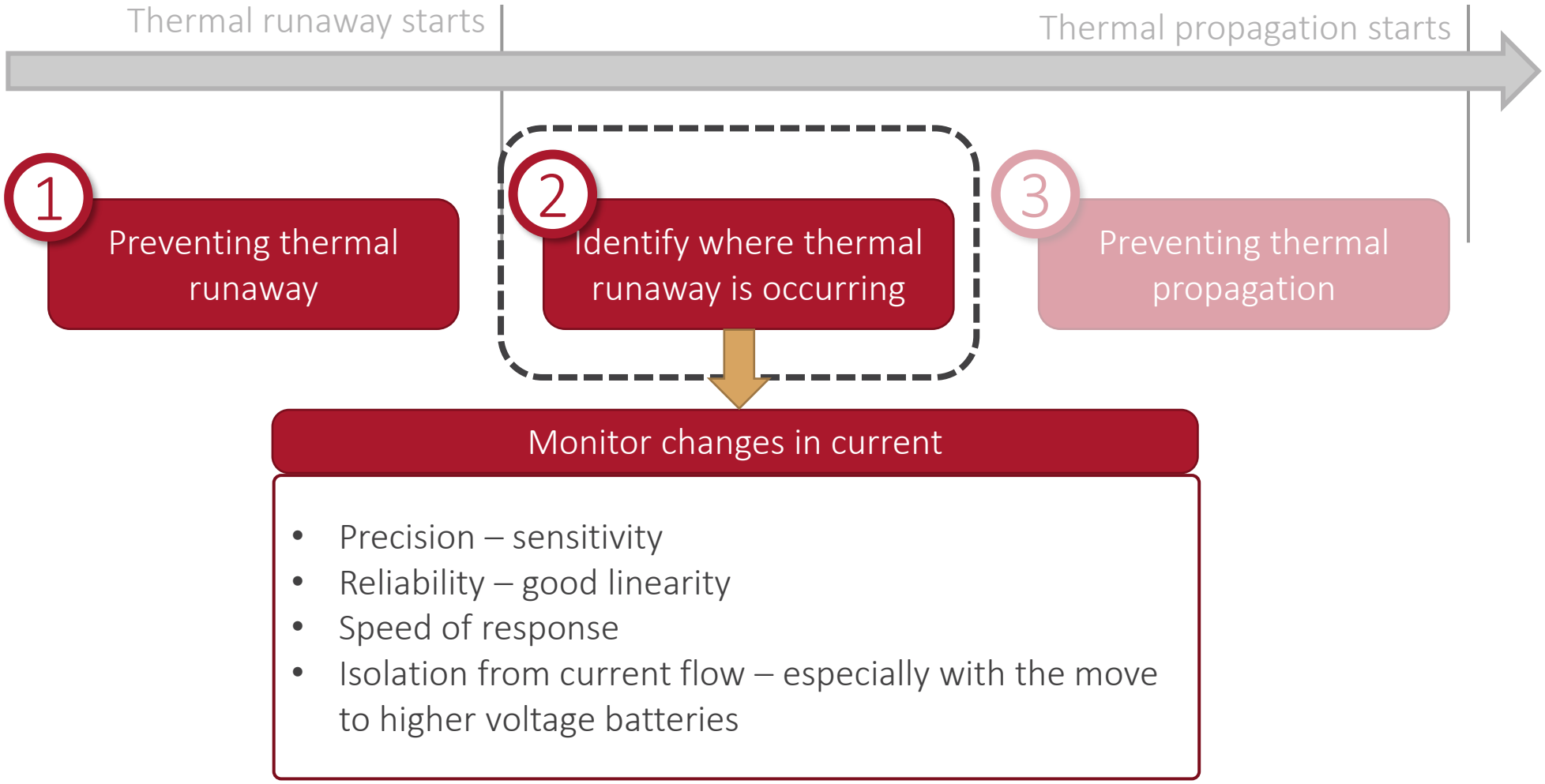
Need the earliest warning possible

Determine the precise area

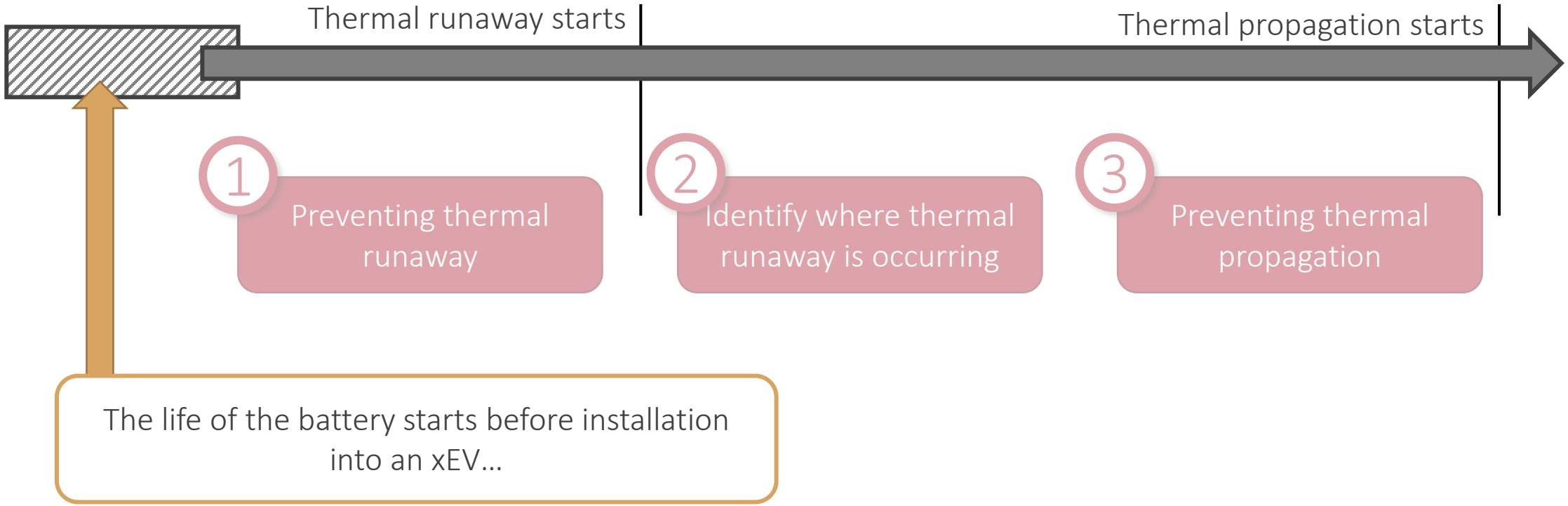
Take action



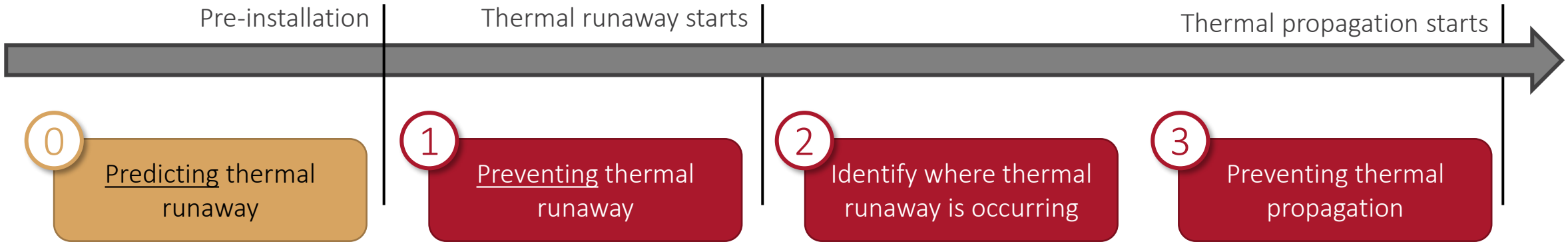
Magnetic field and current sensors are part of the solution



Thermal runaway prediction at manufacturing



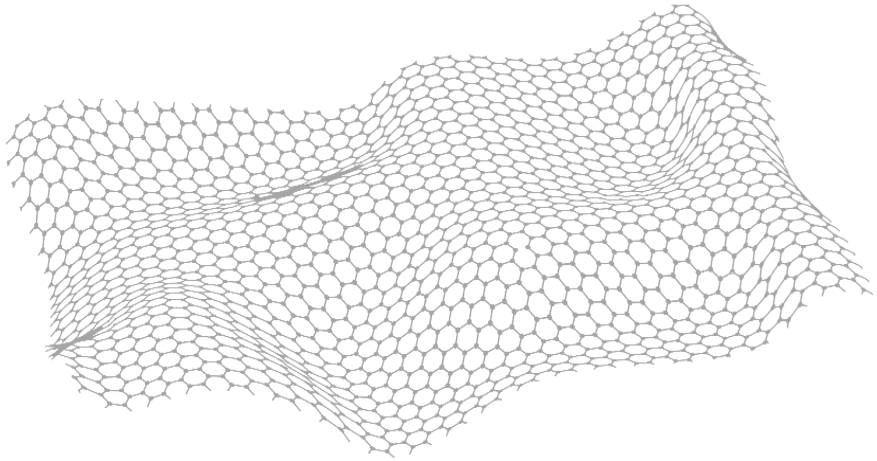
Thermal runaway prediction at manufacturing

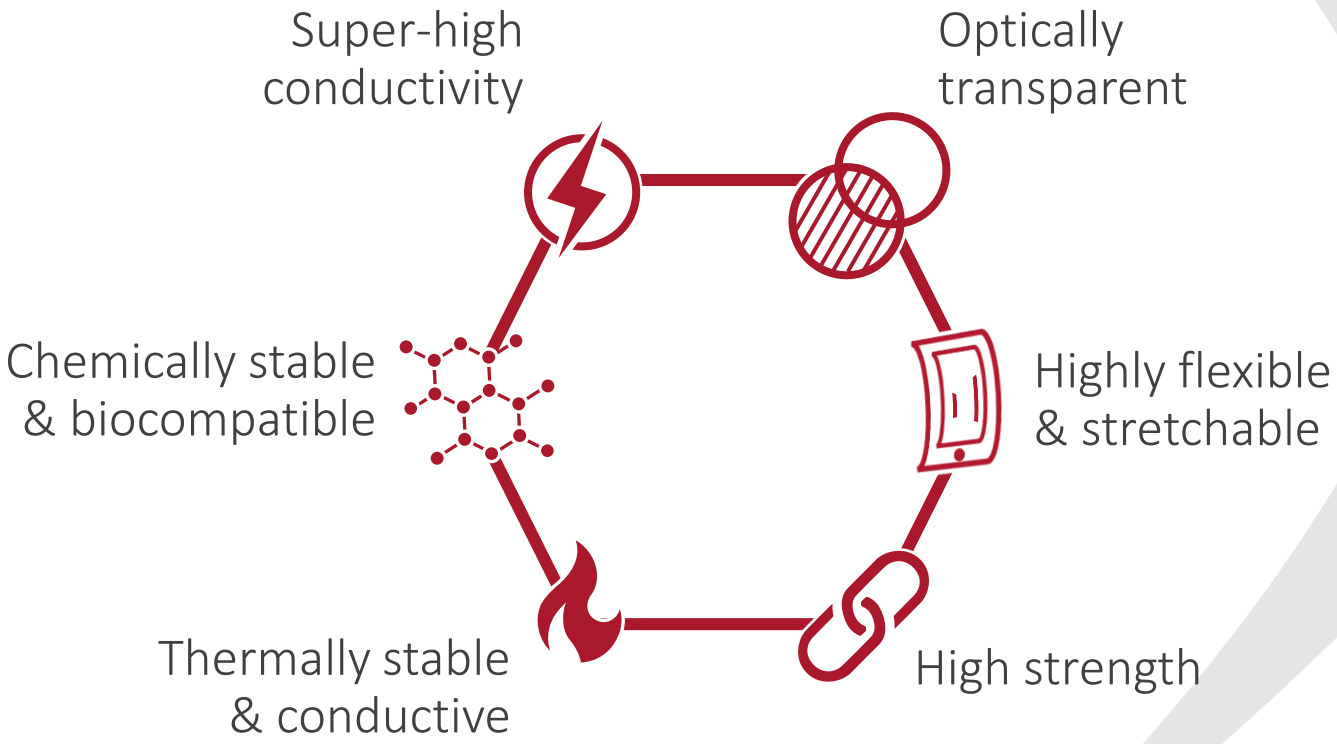


How can Paragraf help?

Graphene | The Dawn of Advanced Electronics Materials

Graphene is set to transform the electronics industry





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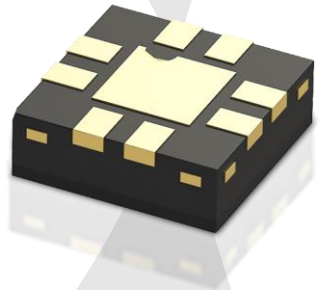
Paragraf | Graphene electronic devices | Industry ready

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



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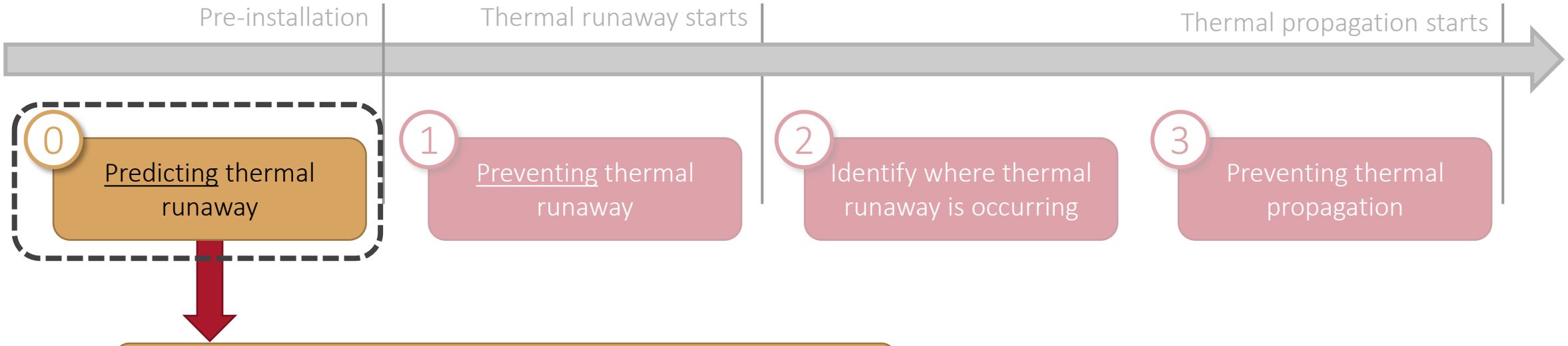
How Paragraf sensors are part of the thermal event solution



Predictive testing

- Identifying potential issues in batteries in production, to prevent them from entering service
- Collaborations with leading battery manufacturers
- Paragraf solution at R&D stage
- **The main goal!**

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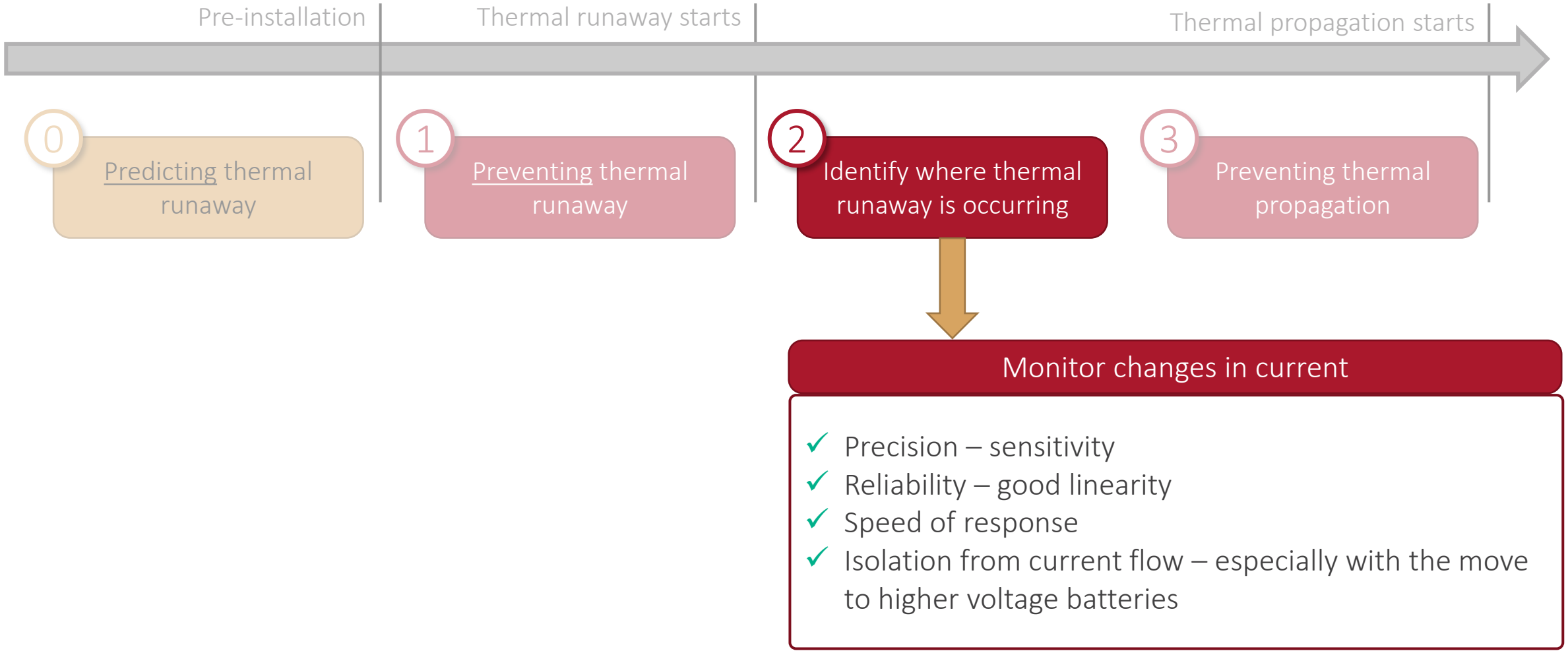

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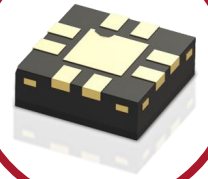
Summary

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.

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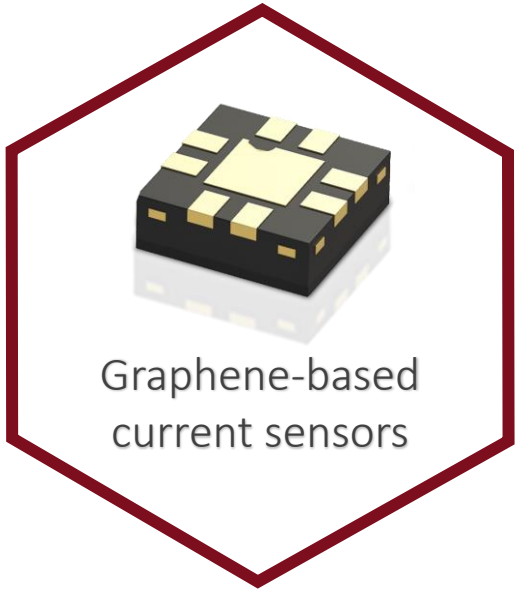
Meet us at Stand 41 (Hall 3)



Higher sensitivity

Reliability in extreme environments

Superior noise tolerance

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

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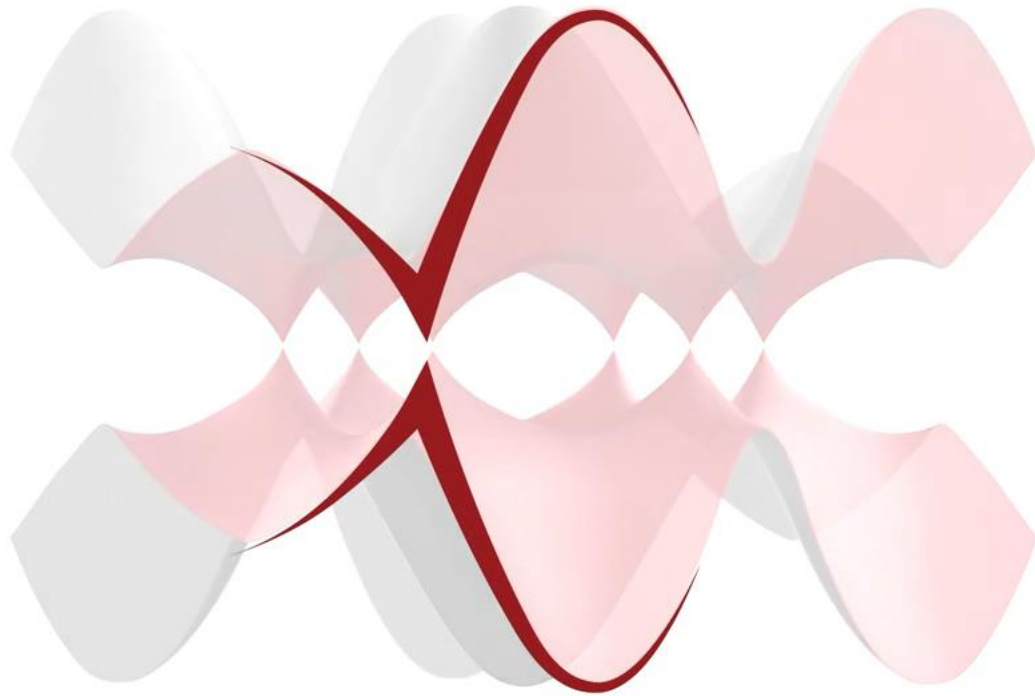

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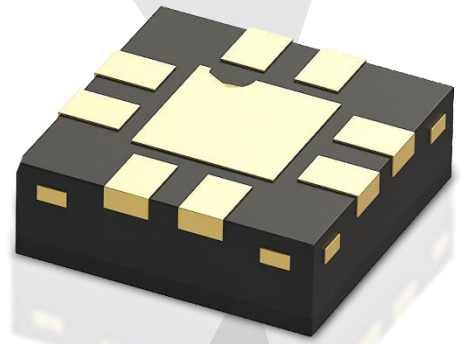
Thank you!

Meet us on stand 41



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