



Solid state battery technology

**Growth and Innovation Forum
11th February 2020**

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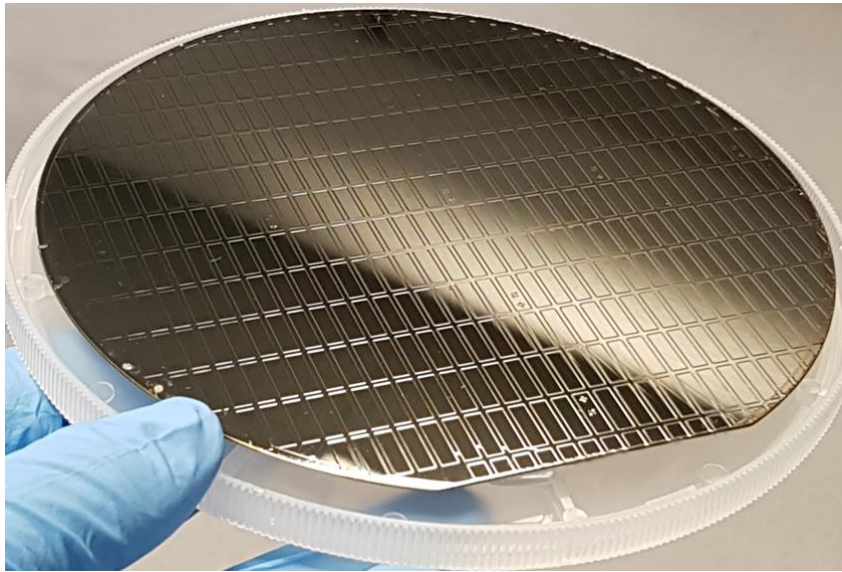
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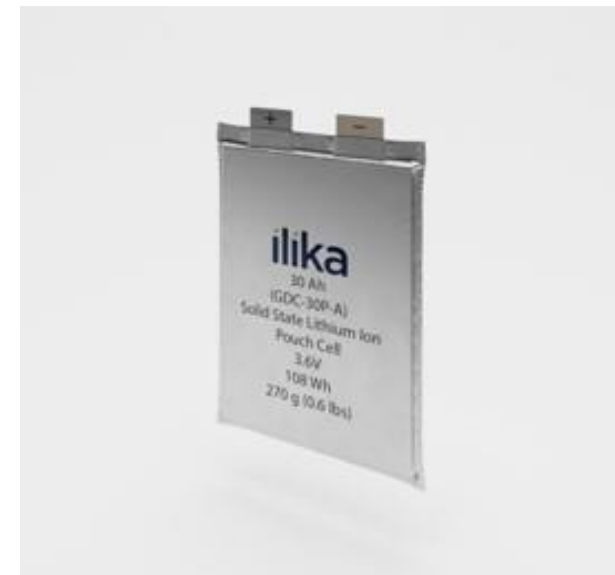
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Business Overview



- ▲ Our mission is to rapidly develop leading-edge IP, manufacture and sell solid state batteries for high performance applications. We will achieve this using ceramic-based lithium-ion technology that is inherently safe in manufacture and usage.

- ▲ AIM Listed 2010
- ▲ Launched cm scale Stereax[®] technology in 2016 & mm scale in 2019
- ▲ Collaborating with auto industry partners & UK Government to develop solid state EV pouch cells

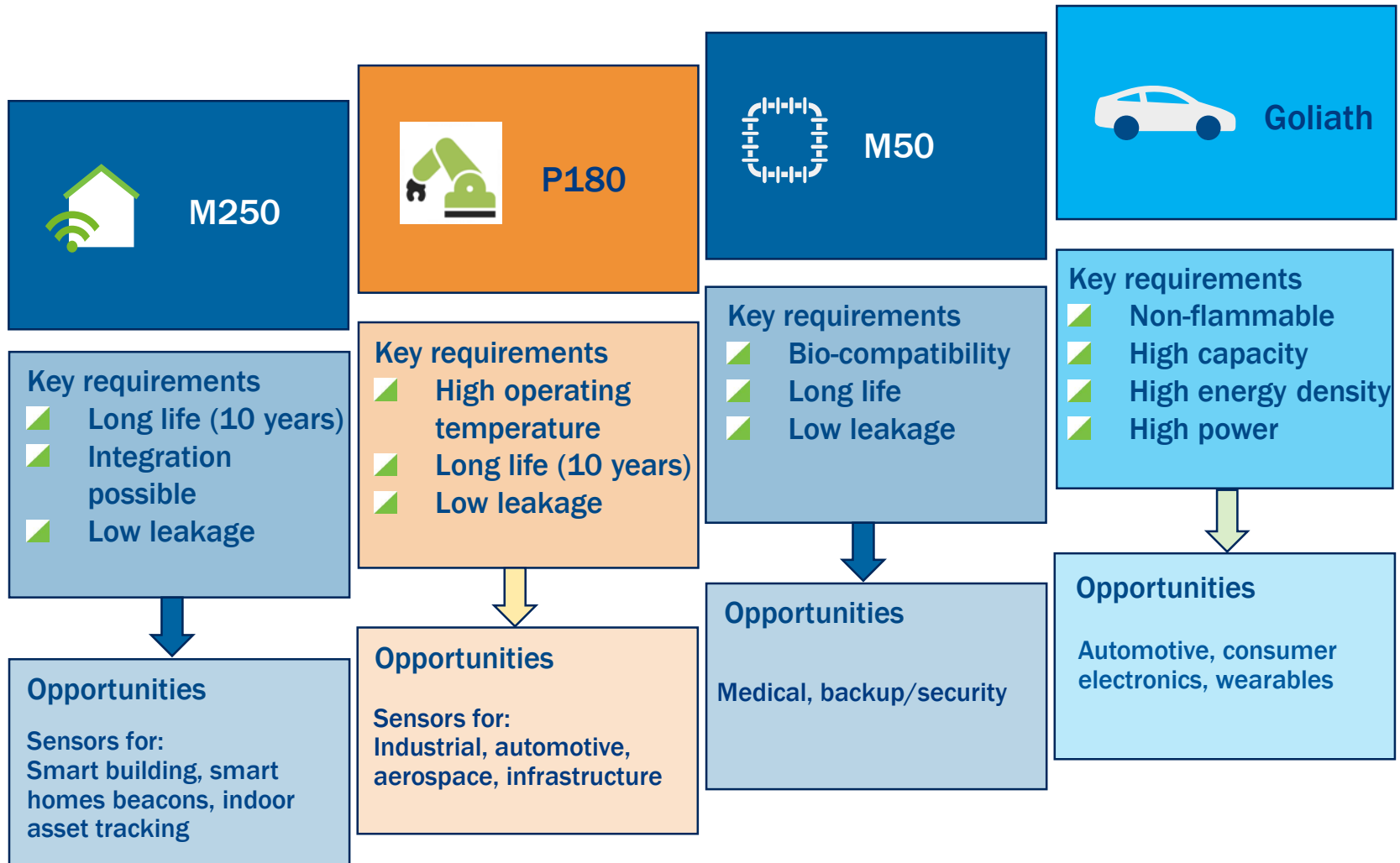


Energy storage solutions



	Conventional Li-ion	Supercapacitors	Iluka Solid State Batteries
Temperature range			
Trickle-charging/ Low Leakage			
Fast charging			
Ultra-compact			
Safety Profile			

Stereax[®] product to market mapping



Ilika is developing the Goliath solid state battery product line to address the growing demand for safe, high performance batteries for Electric Vehicles



Market needs

Cost



Now \$130/kWh (cell)
\$280/kWh (pack)
2035 \$50/kWh (cell)
\$100/kWh (pack)

Energy Density



Now 700Wh/l,
250Wh/kg (cell)
2035 1400Wh/l,
500Wh/kg (cell)

Power Density



Now 3 kW/kg (pack)
2035 12 kW/kg (pack)

Safety



2035 eliminate thermal runaway at pack level to reduce pack complexity

1st Life



Now 8 years (pack)
2035 15 years (pack)

Temperature



Now -20° to +60°C (cell)
2035 -40° to +80°C (cell)

Predictability



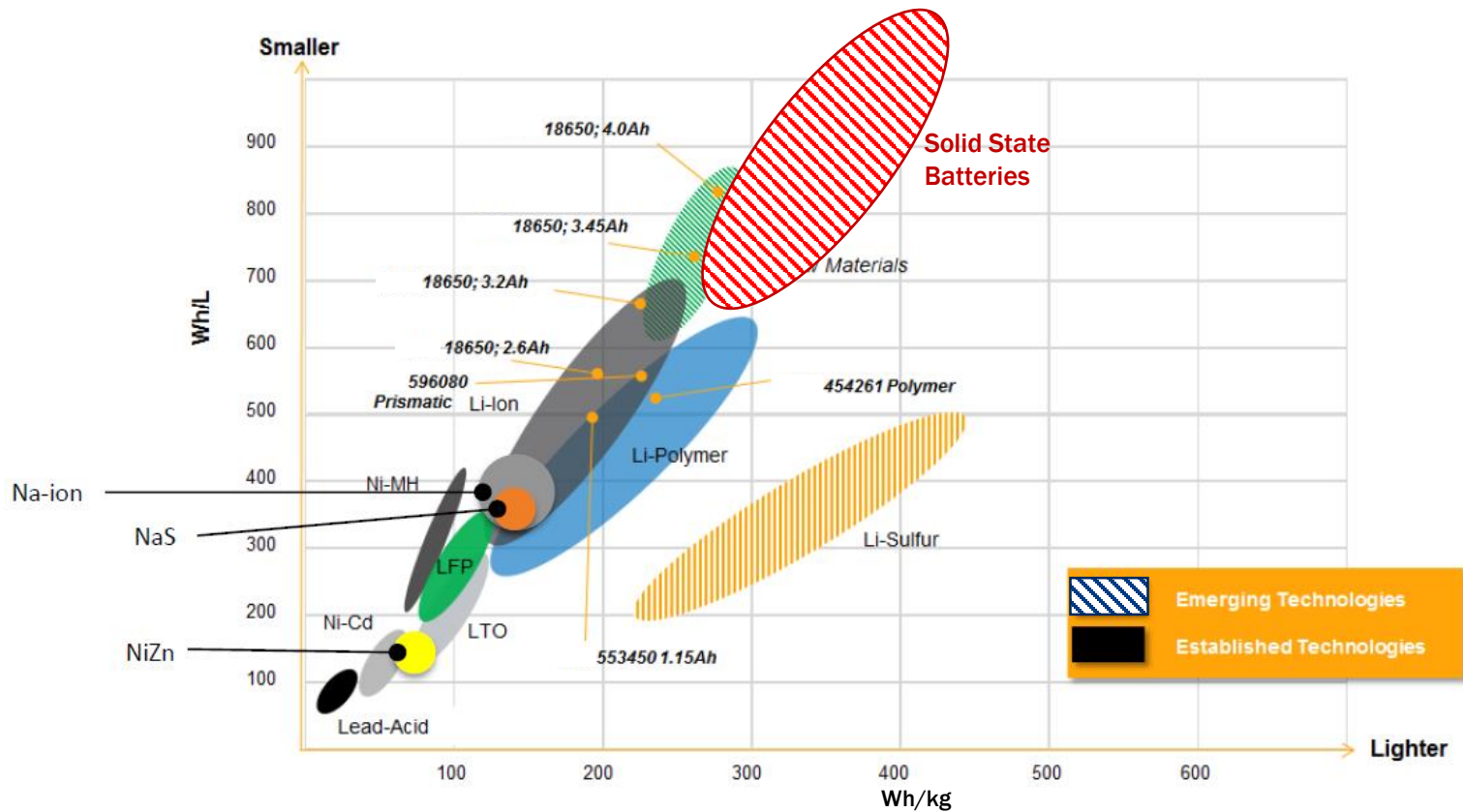
2035 full predictive models for performance and aging of battery

Recyclability



Now 10-50% (pack)
2035 95% (pack)

Battery technologies: size and weight



Source: Christophe Pillot - Avicenne

Solid state batteries

Advantages

Safety

Durability

Fast charge / discharge

High energy density (Wh/L)

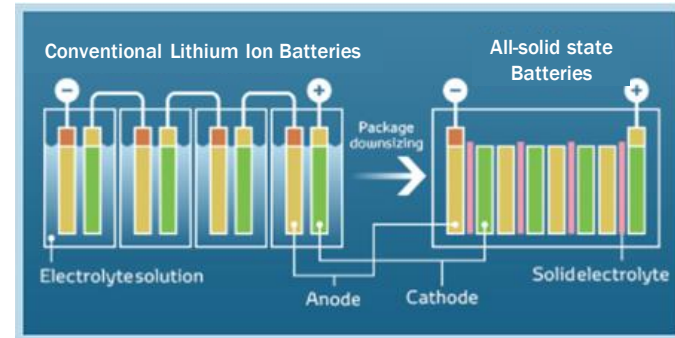
High energy density (Wh/kg)

Thermal stability

Simple construction

Low self-discharge

Efficient packaging



Source: Toyota

Challenges

Materials conductivity

Interface reactions and resistance

Manufacturing Methods

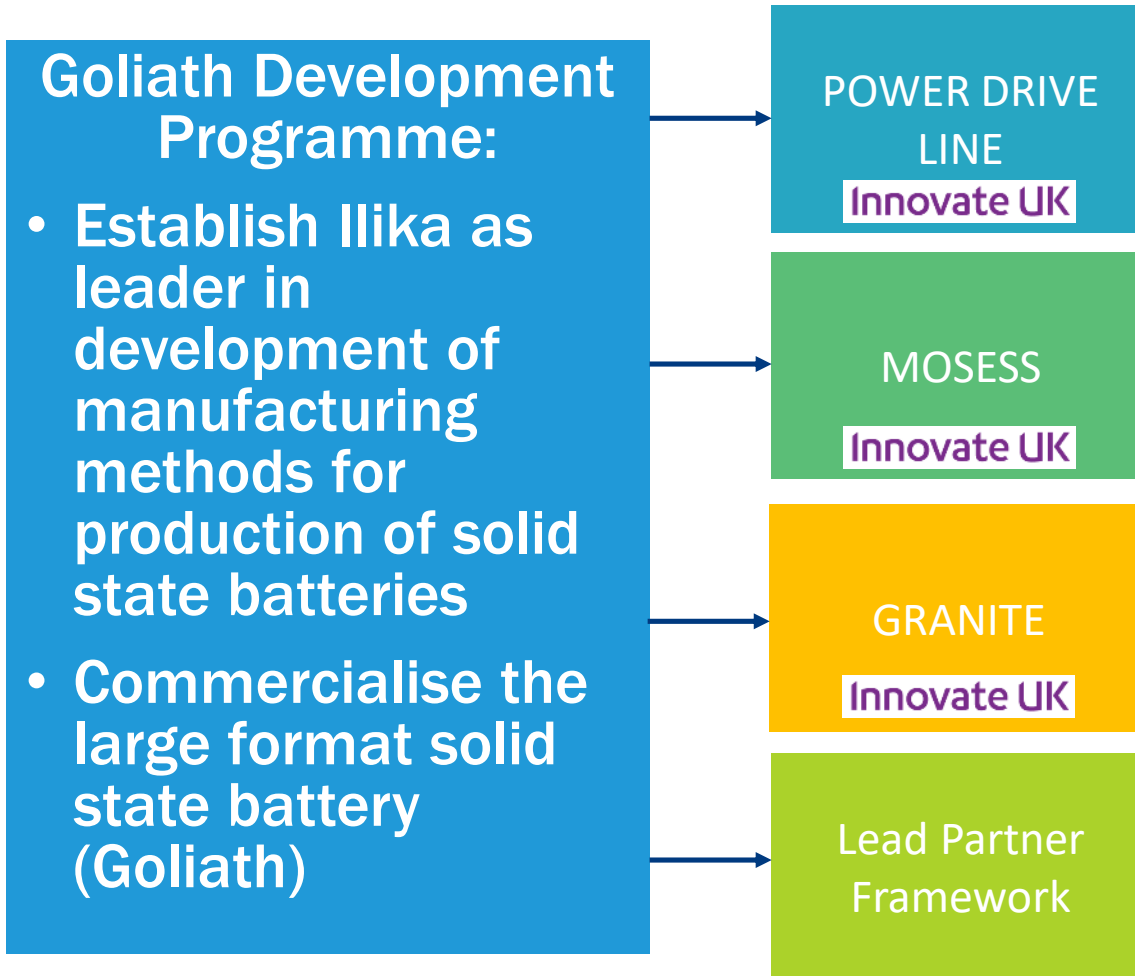
Electromechanical Stability

What differentiates Ilika's Goliath program?



- ▲ **Use of silicon as anode material**
 - ▲ Experiences gained from Stereax SSB program
- ▲ **10 years of materials innovation on solid electrolytes**
 - ▲ Extensive testing around sulphides and oxides
 - ▲ Selection of oxides
 - ▲ Development of specific oxides
- ▲ **Flexibility to use best in class cathode material**
 - ▲ Supply of advanced NMC grades will evolve over next 5-10 years and Ilika is positioned to take advantage of this

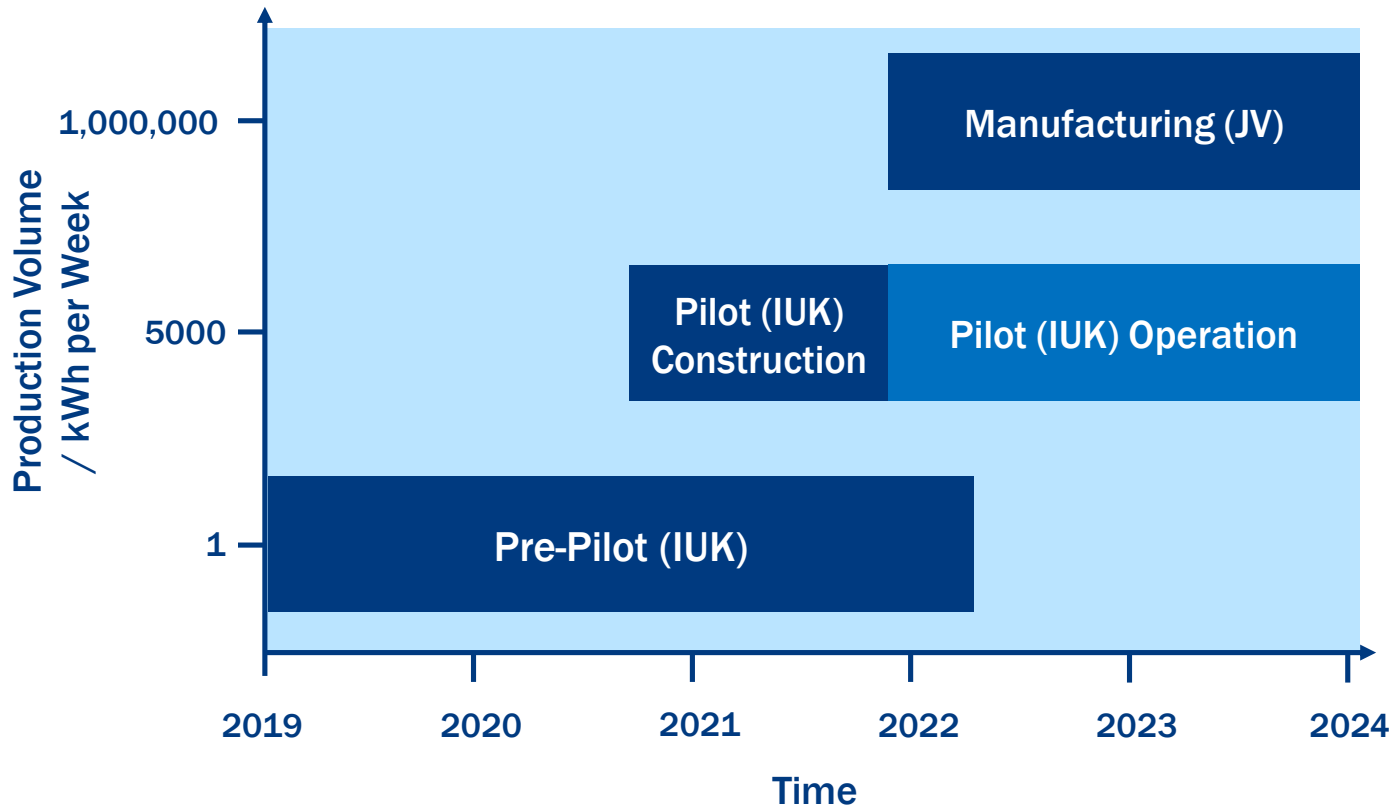
Goliath Development Partnerships



Goliath manufacturing scale-up



- ▲ The technology will be developed and manufactured in three phases



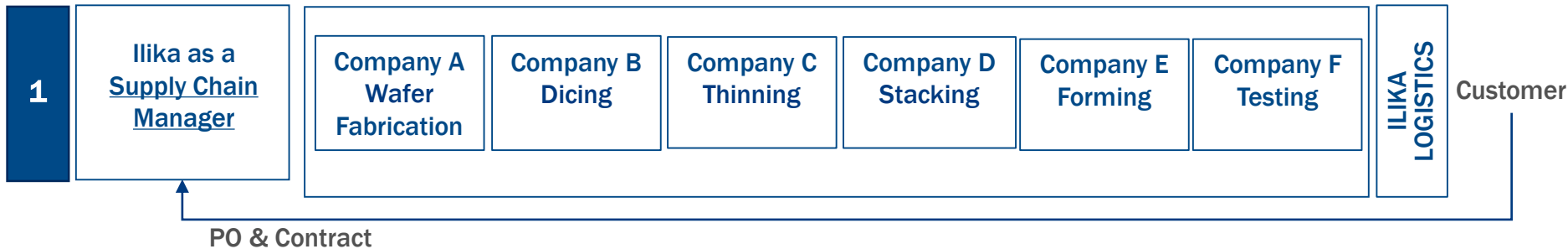
Ilika Business Model



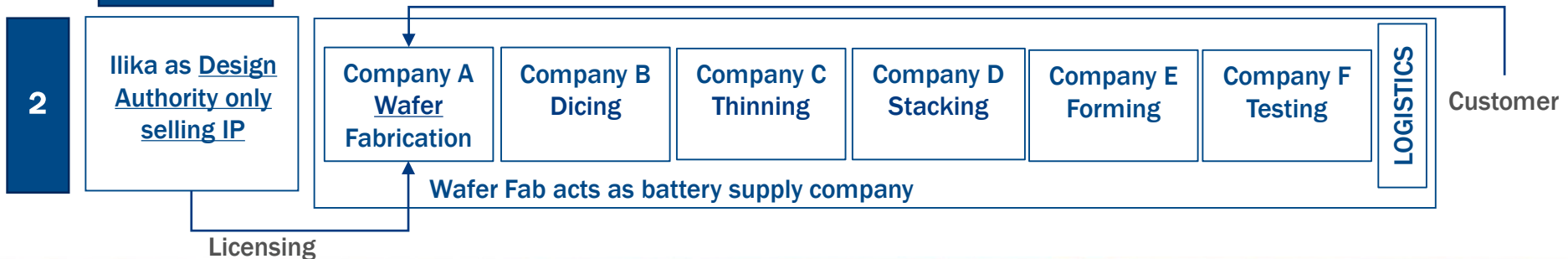
Pilot



Partnership



Licensing



Financial summary for the half year ended 31st October 2019



- ▲ Revenue £1.5m (H1 2018: £1.0m)
- ▲ EBITDA loss £1m (H1 2018: £1.3m)
- ▲ Cash £1.9m with £0.7m received post period end.

- ▲ **Solid state batteries will be a significantly disrupting technology**

- ▲ **Investors have been taking positions in the technology via investment in SME's**

- ▲ **Ilika offers a lower risk investment proposition because of:**
 - ▲ Its demonstrated ability to make miniature solid state batteries
 - ▲ Its capital light commercialisation model
 - ▲ Substantial grant support from IUK facilitating partnering and reducing reliance on shareholder capital

Contact details



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