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JCB: An innovation case study

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Personal contributions and references



Courtesy of Google.com

Introduction



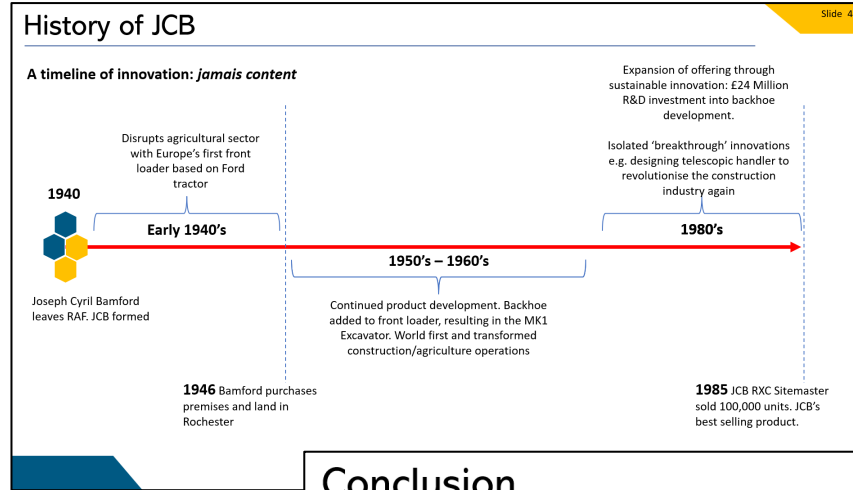
For this presentation, we will be reviewing the British plant manufacturing company **JCB**



JCB have a proud heritage, rooted strongly in innovation, boasting many world first designs in the areas of construction and agriculture



After an overview of the companies history, we will pick a recent product as a case study in innovation. We will then review this innovation in terms of Greg Satel's innovation typology and try to understand the driving forces behind this innovation.



Conclusion

What are Greg Satel's '4 types of innovations'? The typology of innovation



4 quadrants based on how well a problem is defined and how well an associated sector has/can adapt to answer that problem.



Most innovation within businesses is classed as 'sustaining innovation', arguably further along the same spectrum and continuous improvement



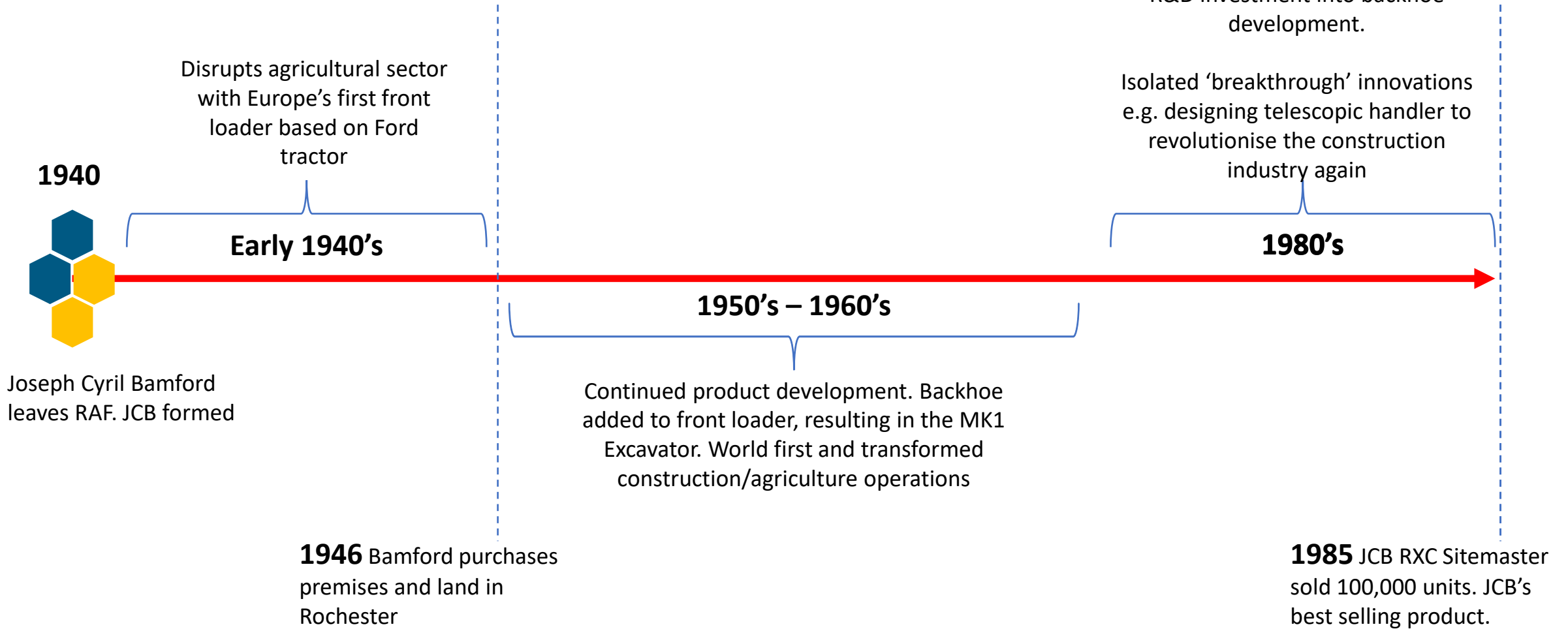
However, from conception, to development, to deployment, many innovations travel through multiple quadrants

Greg Satel's innovation matrix

How well is the problem defined?	Well	BREAKTHROUGH INNOVATION Mavericks Open innovation/prizes	SUSTAINING INNOVATION Roadmapping R&D labs
	Not well	BASIC RESEARCH Research division Academic partnerships	DISRUPTIVE INNOVATION Innovation labs Lean launchpads
		Not well	Well
		How well is the domain defined?	

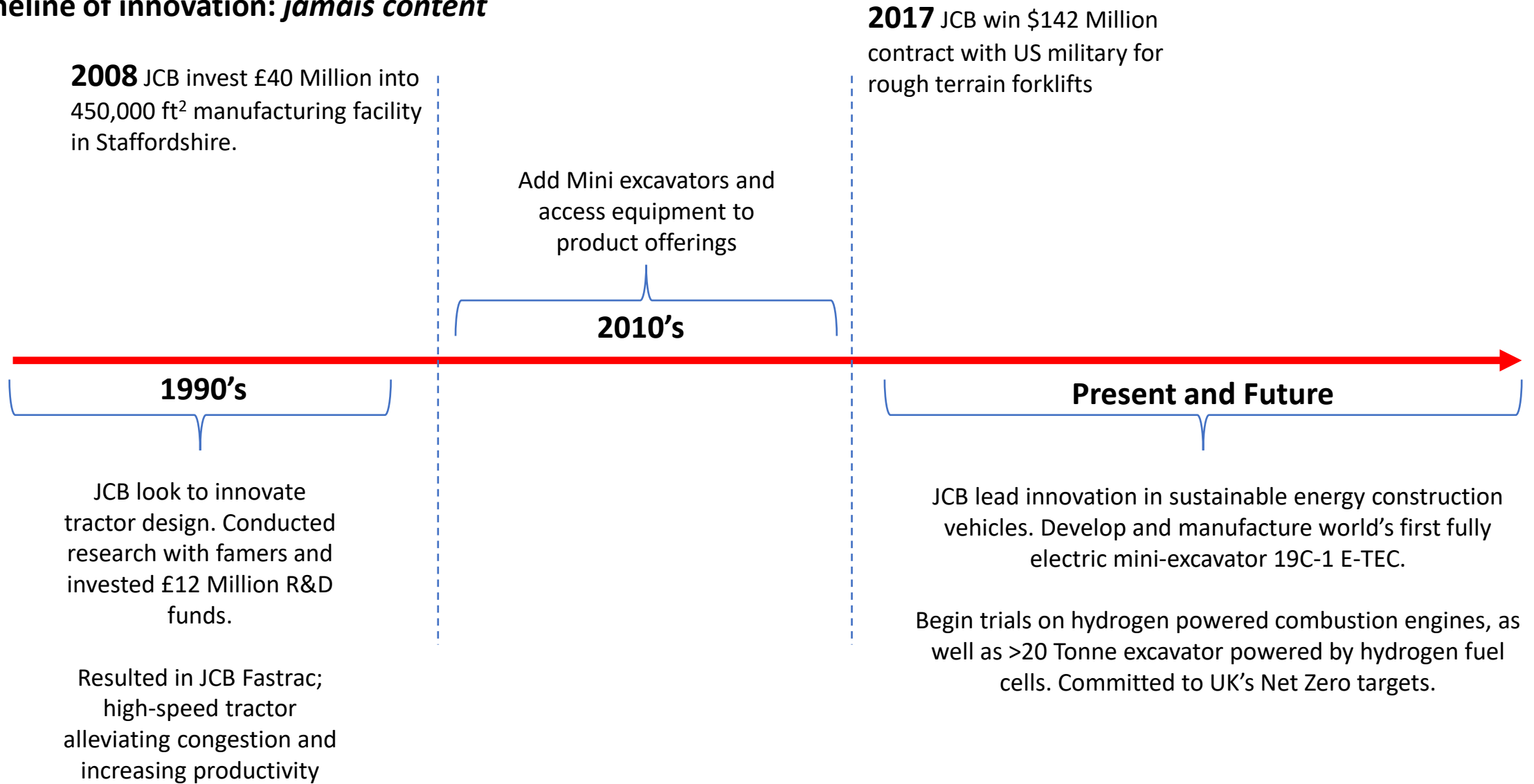
History of JCB

A timeline of innovation: *jamaïs content*



History of JCB

A timeline of innovation: *jamais content*



History of JCB

Present-day products: ahead of the curve



The products JCB provide today (taken from JCB.com)



Electrification of their principal construction vehicles.



Beating government legislation for any future diesel pollution legislation

PRODUCTS

Construction >	ALL PRODUCTS (A–Z)		
Agriculture >	Access Platforms	Industrial Forklifts	Telescopic Handlers
Electric >	Dumpsters	Mini Excavators	
Government and Defence >	Generators	Site Dumpers	
Logistics >			
OEM Solutions >			
Power Generation >			
Rental Solutions >			
Industry Solutions >			
Waste and Recycling >			

Innovation case study: Electric powered excavator

The rise of the JCB – E-Tec Mini Excavator



1989: JCB entered min excavator sector with Model 801, weighing in at 1.4 Tonnes and powered by a diesel engine

By end **1990:** Captured **21.3% of global market**



By 2016: total number = **100,000 manufactured**

Market place valued at **£4 Billion.** Centred on China and India¹



Market was expected to grow year-on-year. However, innovation was **incremental from 1989 - 2018**

Courtesy of Google.com



Innovation case study: Electric powered excavator

The rise of the JCB – E-Tec Mini Excavator



Fundamental digging requirements of end user remain similar from 1989, however peripheral elements were changing:

E.g. changes to **noise and emission legislation** when in use in urban/sensitive environments



JCB classed these changes in legislation, coupled with other rapidly changing technology within the construction industry as **major threats to their business**²

Innovation: change the fuel/energy drivetrain



JCB had originally developed a hybrid powertrain for mini-excavators based on the Toyota Prius³. It worked, but was to **costly to end user** to put into production

Innovation case study: Electric powered excavator

The rise of the JCB – E-Tec Mini Excavator



Not as simple as just changing drive train. Any new mini excavator had to **compete** with diesel precursor on **price, stability and performance**



Settled on a fully electric power train developed and built by **‘Hyperdrive Innovation’**, using the same cell technology as built into Nissan’s Leaf EV.

Proved to be as rugged and reliable as diesel equivalent

Courtesy of JCB.com



Innovation case study: Electric powered excavator

The rise of the JCB – E-Tec Mini Excavator



2018, the 19C-1E-TEC Mini Excavator was launched. **Worlds first fully electric mini excavator**



Allowed JCB to be ahead of the legislative and client-need curve, providing solutions for areas with **Zero Emissions** and **Lower noise signatures (5x less)**



Quality of **innovation celebrated** by award of the Dewar Trophy in 2019

Courtesy of



Conclusions and discussion

Conclusion

How does JCB fit within Greg Satel's 4 innovation types?



Now we can ask the fundamental question:

How does JCB fit within Greg Satel's 4 innovation types?



First, let us define what the 4 types of innovation are as per Greg Satel's typology:

Conclusion

What are Greg Satel's '4 types of innovations'? The typology of innovation⁴



4 quadrants based on how well a problem is defined and how well an associated sector has/can adapt to answer that problem (skillsets).



Most innovation within businesses is classed as 'sustaining innovation', arguably further along the same spectrum and continuous improvement



However, from conception, to development, to deployment, many innovations travel through multiple quadrants

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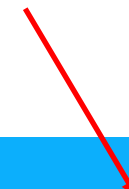


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		How well is the domain defined?	

Most innovation takes place here!



Conclusion

What are Greg Satel's '4 types of innovations'? The typology of innovation⁴



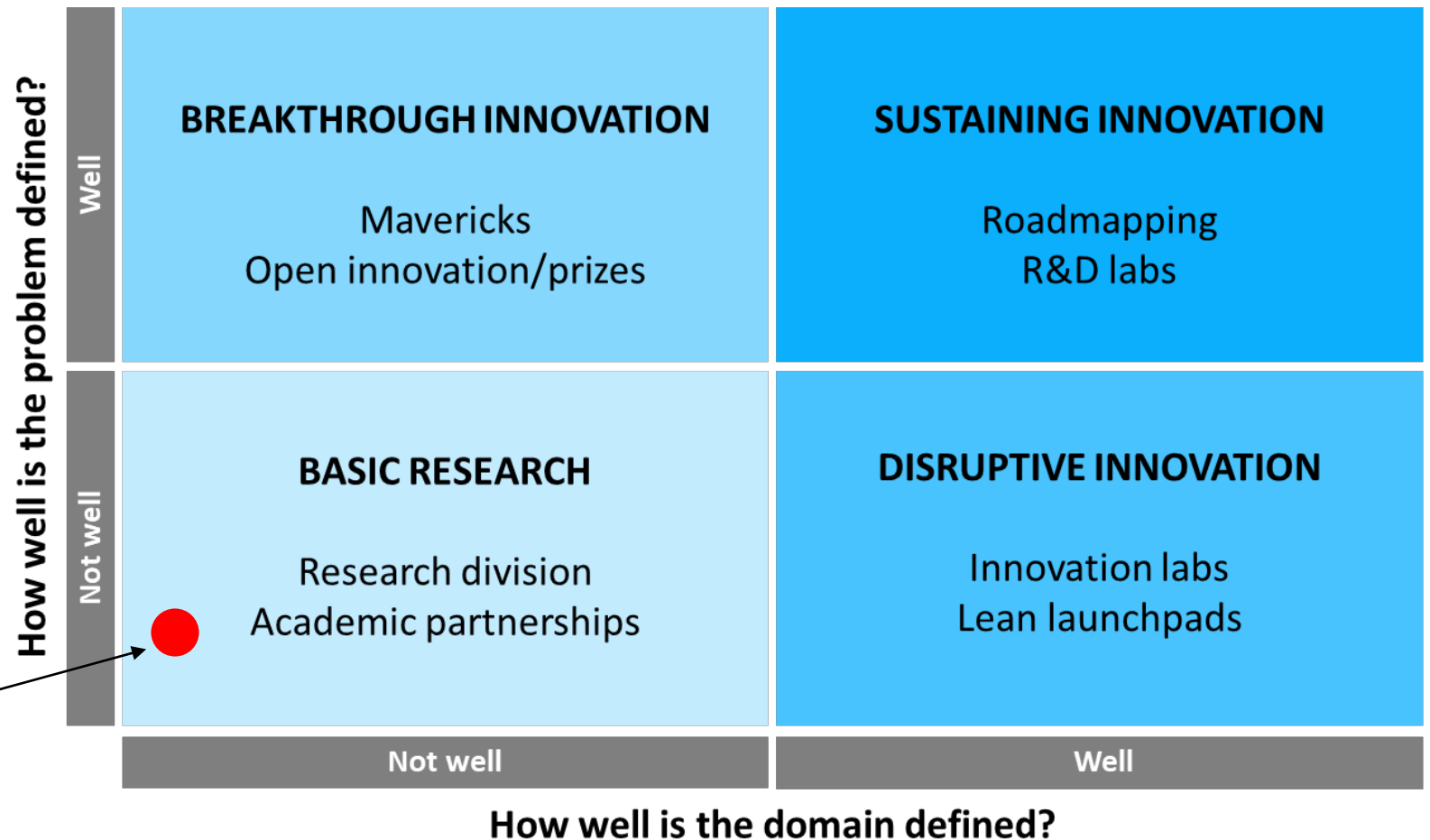
Lets now review the innovation trends behind the electric mini excavator



1) Basic research to define the problem: Arguably this was undertaken from 1989 after the production of the **Model 801** from 1989

Is it possible to use a hybrid power train? Is it possible to use a fully electric power train? Will it be as rugged

Greg Satel's innovation matrix



Conclusion

What are Greg Satel's '4 types of innovations'? The typology of innovation⁴



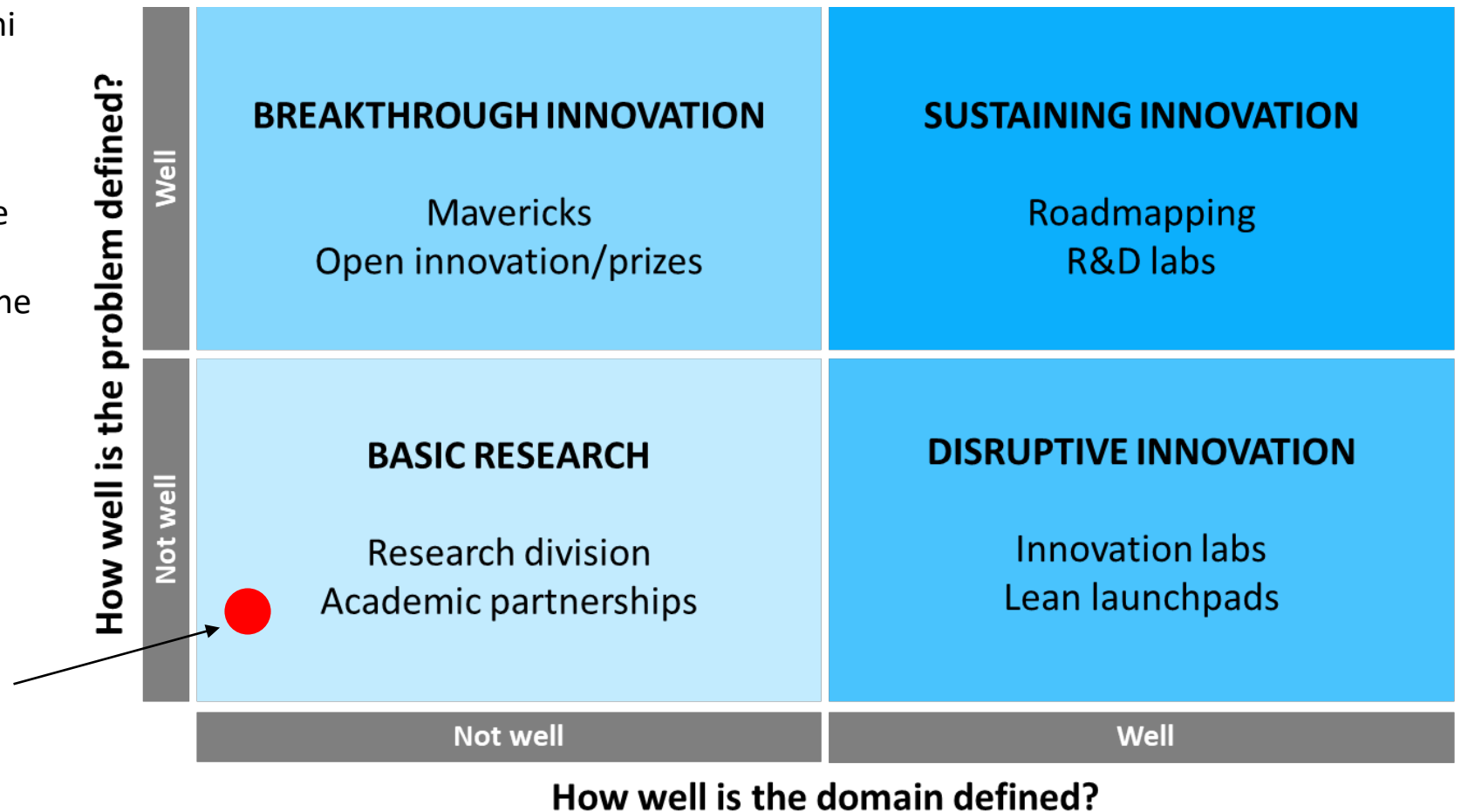
Lets now review the innovation trends behind the electric mini excavator



1) Basic research to define the problem: Arguably this was undertaken from 1989 after the production of the **Model 801** from 1989

Initial trial with pre-existing Prius battery cell/technology

Greg Satel's innovation matrix



Conclusion

What are Greg Satel's '4 types of innovations'? The typology of innovation⁴



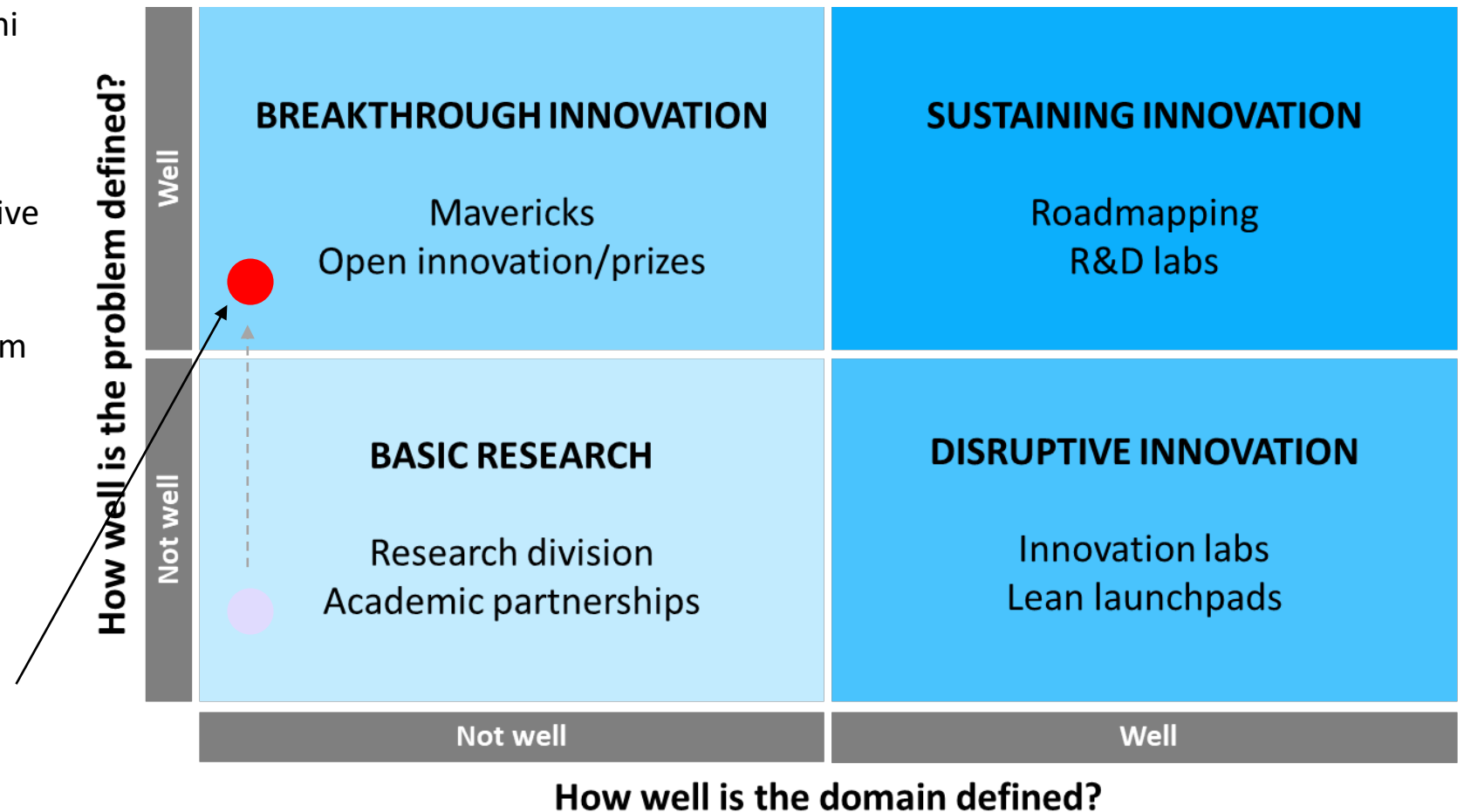
Lets now review the innovation trends behind the electric mini excavator



2)Development with Hyperdrive Innovation, JCB could build a fully electric power train and better define both the problem and solution to non-diesel powered mini excavators

Work with automotive sector, utilising battery tech from Nissan Leaf cars

Greg Satel's innovation matrix



Conclusion

What are Greg Satel's '4 types of innovations'? The typology of innovation⁴



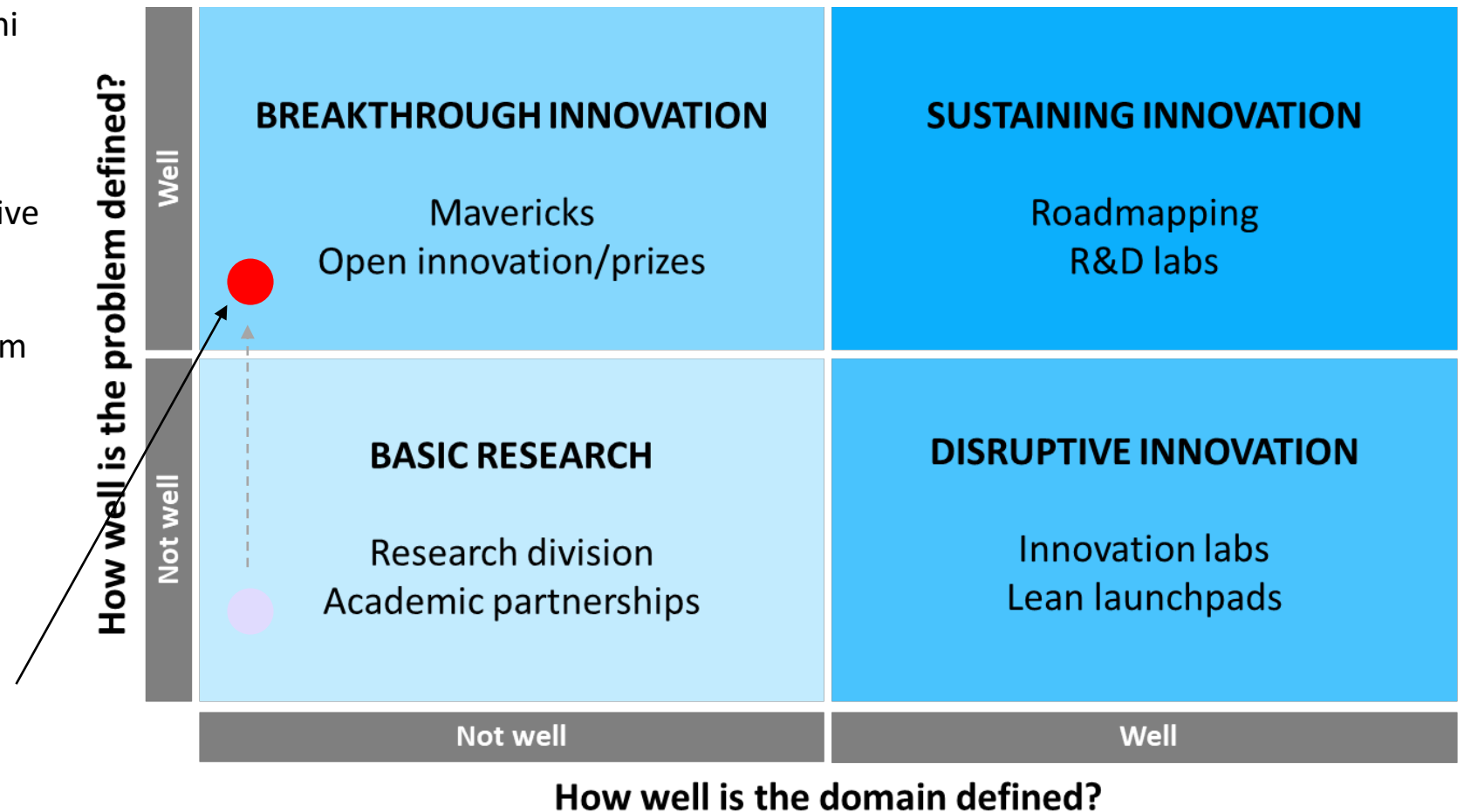
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2)Development with Hyperdrive Innovation, JCB could build a fully electric power train and better define both the problem and solution to non-diesel powered mini excavators

Produce the 19C-1E-TEC Mini Excavator.

Greg Satel's innovation matrix



Conclusion

What are Greg Satel's '4 types of innovations'? The typology of innovation⁴

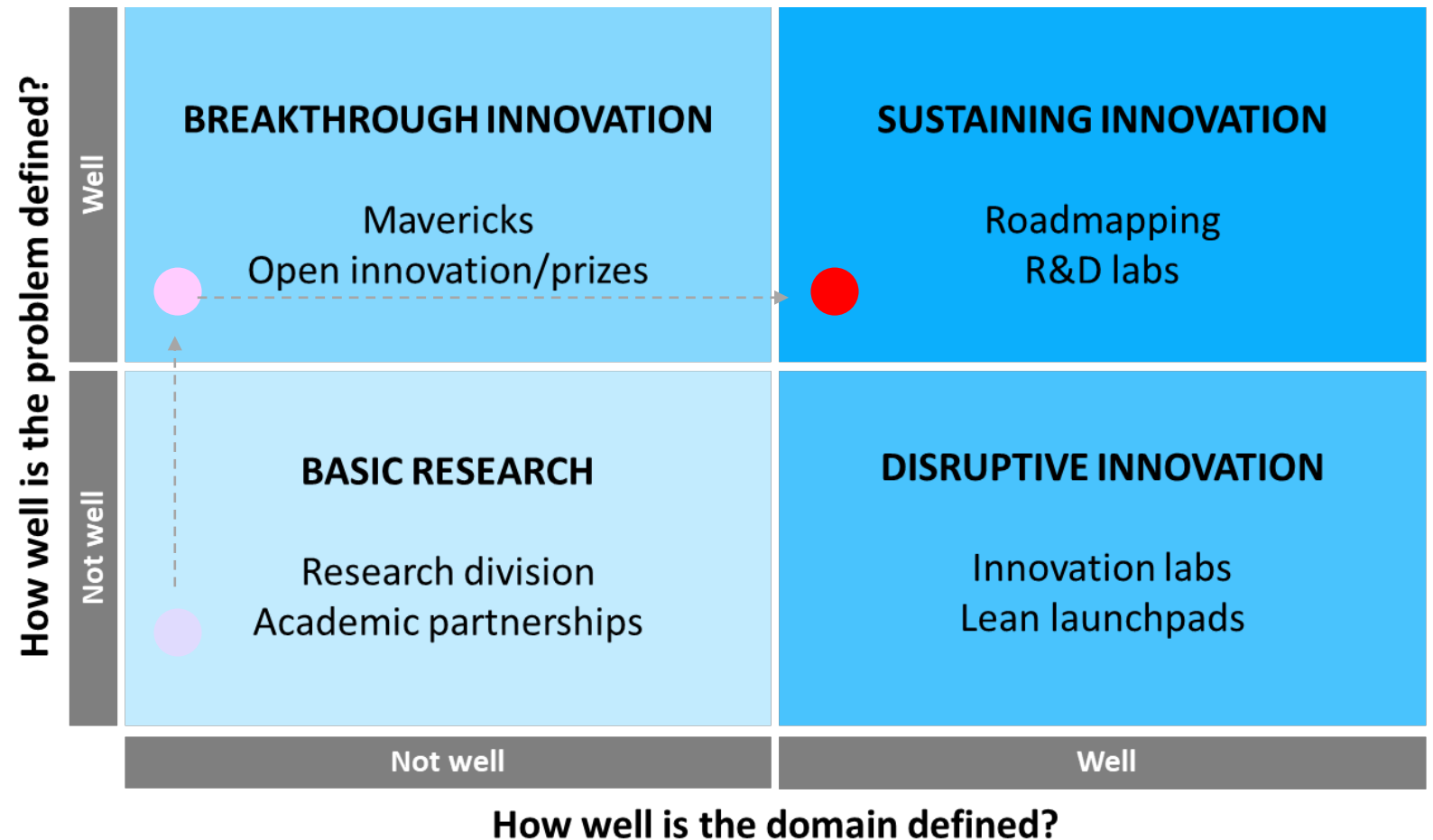


Lets now review the innovation trends behind the electric mini excavator



3) Sustaining innovation: continuous improvement from initial release in 2019. Fundamentally built on JCB's plant manufacturing history

Greg Satel's innovation matrix



Additional Questions

Conclusion

Additional questions

The extent to which the innovation has shifted JCB's company market position



Rather than continue to compete within current markets, the 19c 1E Etec shifted JCNB's focus, creating a whole new market for zero-emission plant.



Initially, they were first to market, with nearest competitor joining them in 2019. They had 1 year of near-total market share

Conclusion

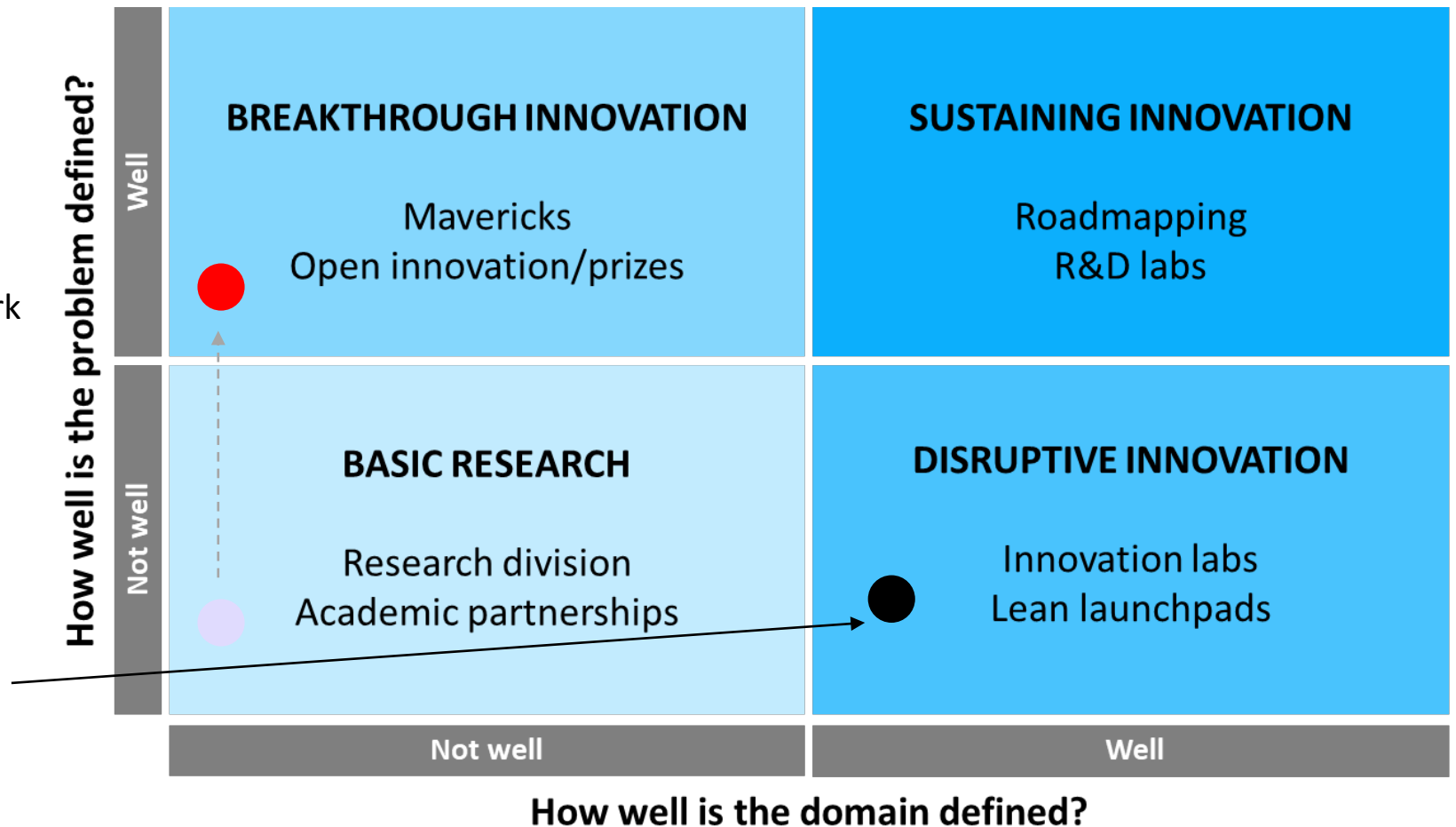
The extent to which the innovation has shifted JCB's company market position



Competitors scramble to keep up. JCB have defined the problem and the domain to work in. Means new competitors are likely to be disruptive, rather than breakthrough

Manufacturer	Date	Development stage
Hyundai	2018	Prototype
JCB	2018	Launched to market
Kobelco	2019	Launched to market
Mecalac	2019	Launched to market
Yanmar	2022	Launched to market

Greg Satel's innovation matrix



Conclusion

Additional questions

How has this innovation influenced JCB's internal structures and management processes?



A strong desire to innovate is present throughout JCB's history, so internal processes were already set-up to handle large scale R&D projects. Innovation managed from a senior/director level. Significant testing.



JCB do not acquire, they concentrate on organic growth. We provide the right tools internally to develop and promote innovation



Additional example is 'Ryse Hydrogen'; spin-out company, with a different management structure, providing additional revenue to JCB

Conclusion

Additional questions

The extent to which JCB have been technology dependent – and if so, which technologies



JCB have been at the forefront of construction technology for most of the lifespan of the company. Their success has been built off of breakthrough innovation within plant/machinery technology since adding a front shovel to a Ford tractor in the 1940's. Their drive for advancement is still key;



Knew they wanted to go electric, but needed to wait until battery technology to improve so as to compete with diesel powered mini-excavator. Focussed on 'Fossil Fuels' which is not sustainable.



Initial R&D investment based on Prius technology meant that they could move quickly when technology or the right partner was available.

Conclusion

Additional questions

The consideration as to the outcome of the innovation:

Classed as a Breakthrough innovation



Its kept JCB a head of legislative curve re. emission targets etc. Kept them ahead of competition and provided a stepping stone into hydrogen technology – increasing market share in two sectors.



Created a new 'green energy' market for construction plant machinery, which is now forcing their competitors to join. They get to set the 'standard' in that market



Provides future-proofing to jobs/workforce and maintains JCB as a flagship manufacturer within the construction and agriculture sectors.

Conclusion: Personal contribution and understanding

What is our personal understanding of this innovation case study?

References

1. MENA report; London, May 9th 2017
2. TIMETRIC, London, October 18th 2016
3. Steven Holmes: “Yellow Goes Green”; Develop 3D, Page 1, March 4th 2020
4. Greg Satel., Mapping Innovation: A playbook for navigating a disruptive age. Accessed through www.DigitalTonto.com (accessed on 30/03/22)