How firms manage bottlenecks in EV business ecosystem?

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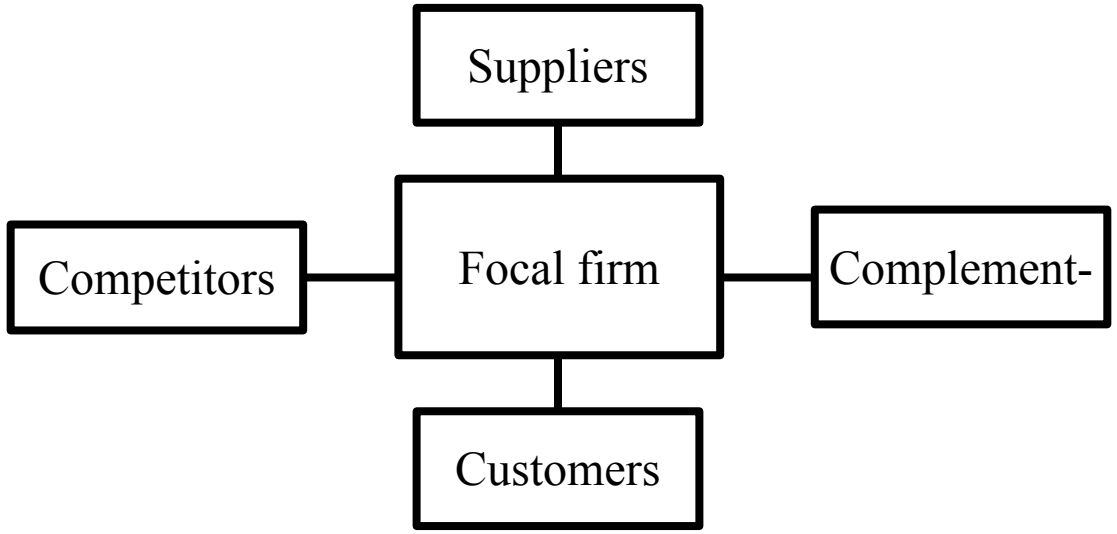
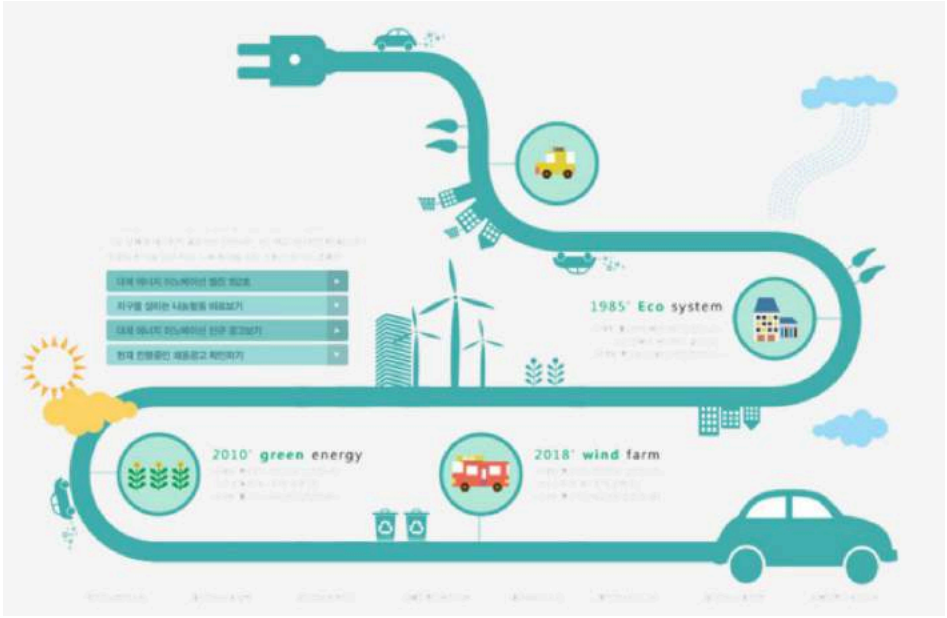
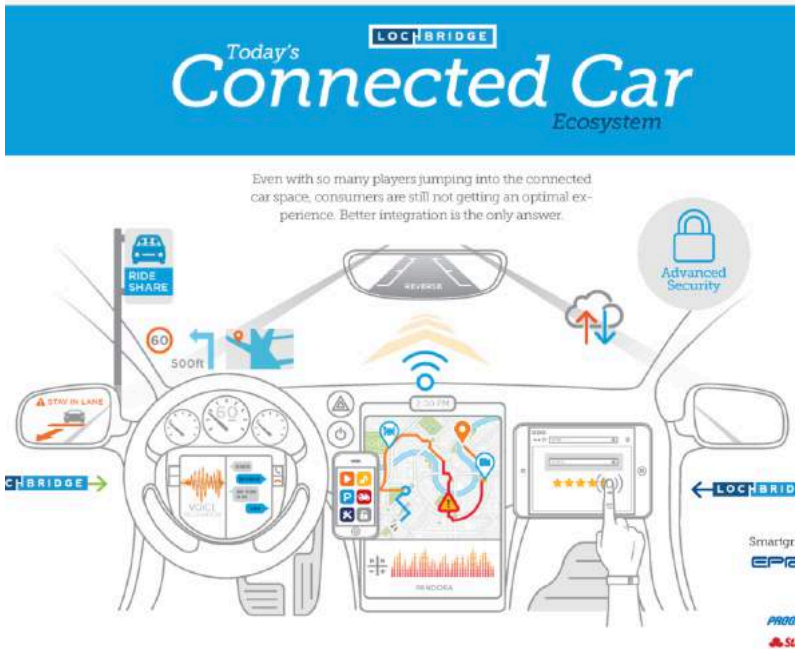
What are the specific features in Auto Ecosystem?

- Car-makers have always been the **focal firm** in the industry/ecosystem…
- So, How should **focal firms** manage auto ecosystem?



What are the specific features in Auto Ecosystem?





- The emergence of **nascent auto ecosystems**: EV ecosystem, connected car ecosystem
  - **Bottlenecks** constrain the grows of nascent ecosystem (Jacobides et al, 2006; Baldwin, 2015)
- EV ecosystem: bottlenecks far from core competences, unique structure and interdependence between components
- So, how focal firms manage **bottlenecks** in nascent EV ecosystem with high interdependence?

Existing literature on focal firm, bottleneck in ecosystem…

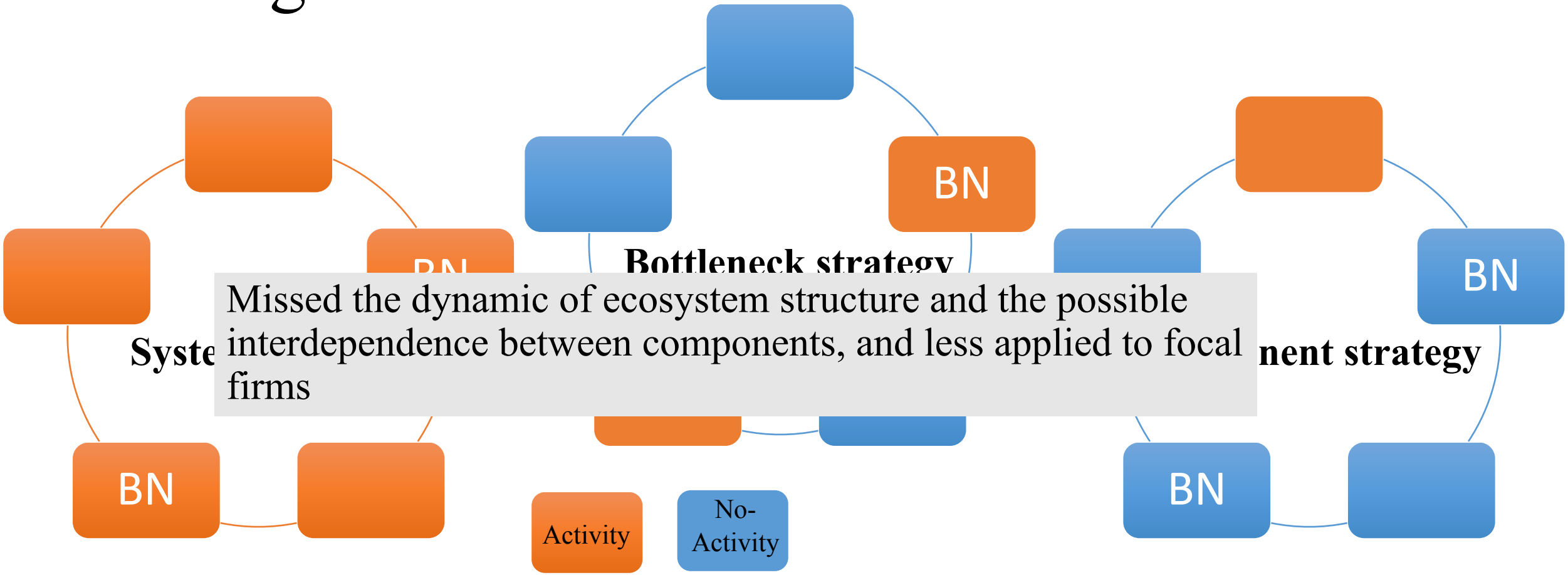
Focal firm in an ecosystem

- **An architect** - to set a system-level goal and establishes standards and interfaces (Gulati et al.,2012)
- **A leader** - to recruit partners (Ozcan and Eisenhardt, 2009) and fight for system level goal

Bottleneck(BN) in an ecosystem

- BN - components that technically constrain the ecosystem due to poor quality, high cost, or short supply (Jacobides et al, 2006; Baldwin, 2015; Hannah, 2016).
- **Solve BN** problem – innovate in BN to create value (Ferraro and Gurses 2009, Baldwin 2015)
- **Become BN –** monopoly in BN (e.g. IP, architecture advantage) to capture value (Jacobides 2006; Ferraro and Gurses 2009; Hannah &Eisenhardt 2016)
- All under the condition that firm enters the BN activity!!

Existing literature on nascent ecosystem strategies…



Missed the dynamic of ecosystem structure and the possible interdependence between components, and less applied to focal firms

(Hannah & Eisenhardt, 2017)

Research question:

- How focal firms manage bottlenecks in nascent business ecosystem? (e.g. Battery Electric Vehicle ecosystem)

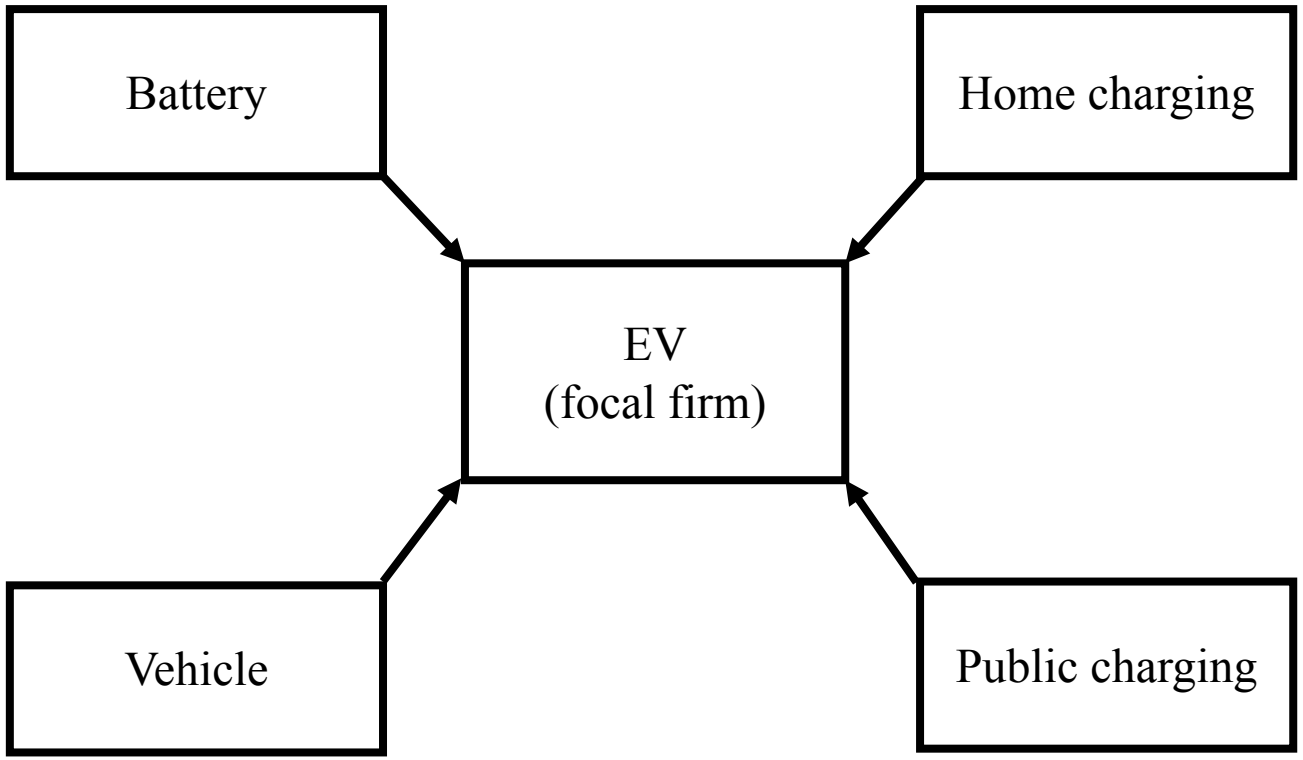
- Especially, when…
  - the component of the ecosystem are interdependent (structure)
  - the BNs are far from the existing core competence of focal firm
  - During BN shifting

Setting and Methods

Research design

- We use a inductive multiple-case design (Eisenhardt, 1989; Yin, 1994)
  - Method is particularly effective when existing theory provides limited insight, and for process questions (Van de Ven and Huber, 1990)
  - Rely on qualitative data (interviews, archival documents…)

Setting: EV ecosystem



Selected market: U.S. and European

Setting: EV ecosystem

Bottlenecks are the components that constrain the ecosystem due to poor quality, high cost, or short supply (Jacobides et al, 2006; Baldwin, 2015; Hannah, 2016).

Battery: high cost, poor quality (low energy density), short supply

Charging station: low availability, poor quality (slow charging speed), high cost

Selection of cases

Common points

- Focal firms - BEV
- Time period (2007-2017)
- Location: US (expect Renault) and European market
- Top BEV players

Differences

- **Ecosystem strategy**
- Incumbent V.S New comer

Data source

Informant Interviews				Archival Materials	
Informant	Count	Sample title	Time period	Source	Count
Selected Car makers	12	Head of e-mobility, VP, Manager on smart charging, Engineer, Researcher in experiment project	30min - 2h	Industry magazines and reports: Automotive News, and charged Electric vehicle magazine (2007-2017)	1829
External ndustrial experts	3	Ultitily, rival firm, Journalist on automobile industry	30 min - 1h	Existing case studies, books	e.g. "Lessons from the Renault Zero Emission Initiative"
				Corporate Annual Reports and/ or Sustainable Value Reports	2007-2016

The cases

EV Ecosystem development

2007- 2011/2012
Preparing an ecosystem

→

2011/2012- 2017
Developing a matured ecosystem

Preparing the initial ecosystem strategy:

- Experimenting on ecosystem strategy (BN and interface)
- Prepare for getting complementor partners on board

Tesla Roadster (2008-2012)

Nissan Leaf (2010-2011)

Renault – Better place (2009-2011)

BMW Mini E & Active E (2009-2011)

Bottlenecks(BN) shifting

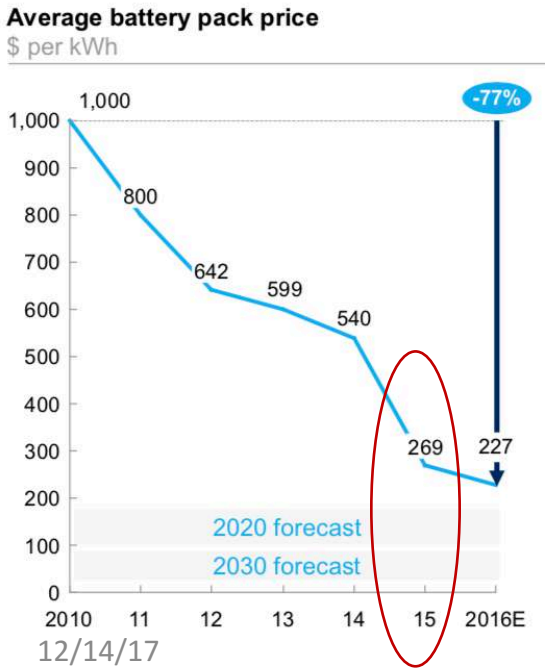
2007- 2015

Primary BN: Battery
Secondary BN: Charging

→

2015- 2017

Primary BN: Charging
Secondary BN: Battery



Battery:

Price in 2015 dropped to 27% of what it was in 2010, all selected car-maker brought a new version of EV with larger battery capacity with same price. "We don't think this is going to be a bottleneck at least for the next 5-6 years." 2017

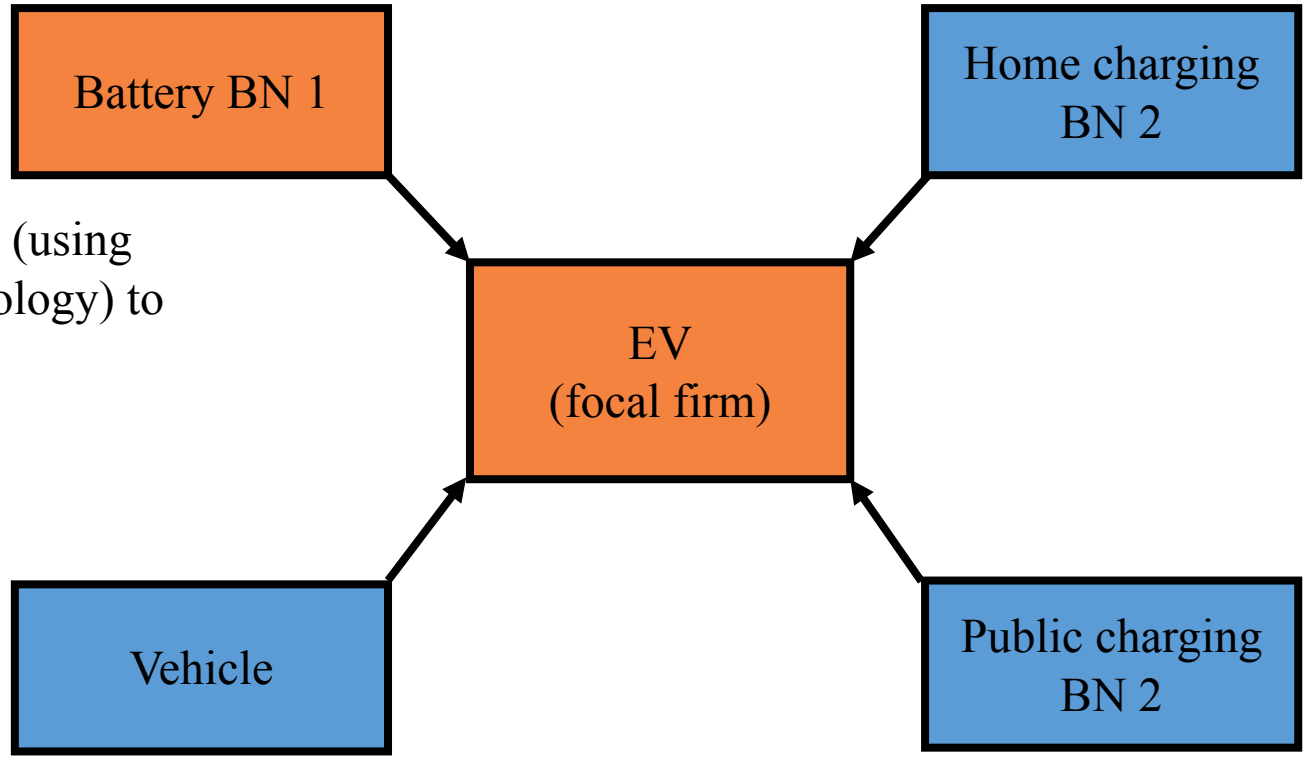
Charging:

"It is a good thing **we have big battery**. only the idea of being charged overnight is not working…**we need quick, public charging**…" 2016
"range is not what hold customer back the range is going to help but not solve"" all we need is charging network" 2015

3 stages in EV ecosystem evolution


Tesla

Preparing an ecosystem (2007-2012) Tesla: Bottleneck strategy



Innovated in **battery BN** (using matured laptop cell technology) to reduce cost

Recruited partners in non-BN (lotus) to assemble an initial ecosystem, 2008

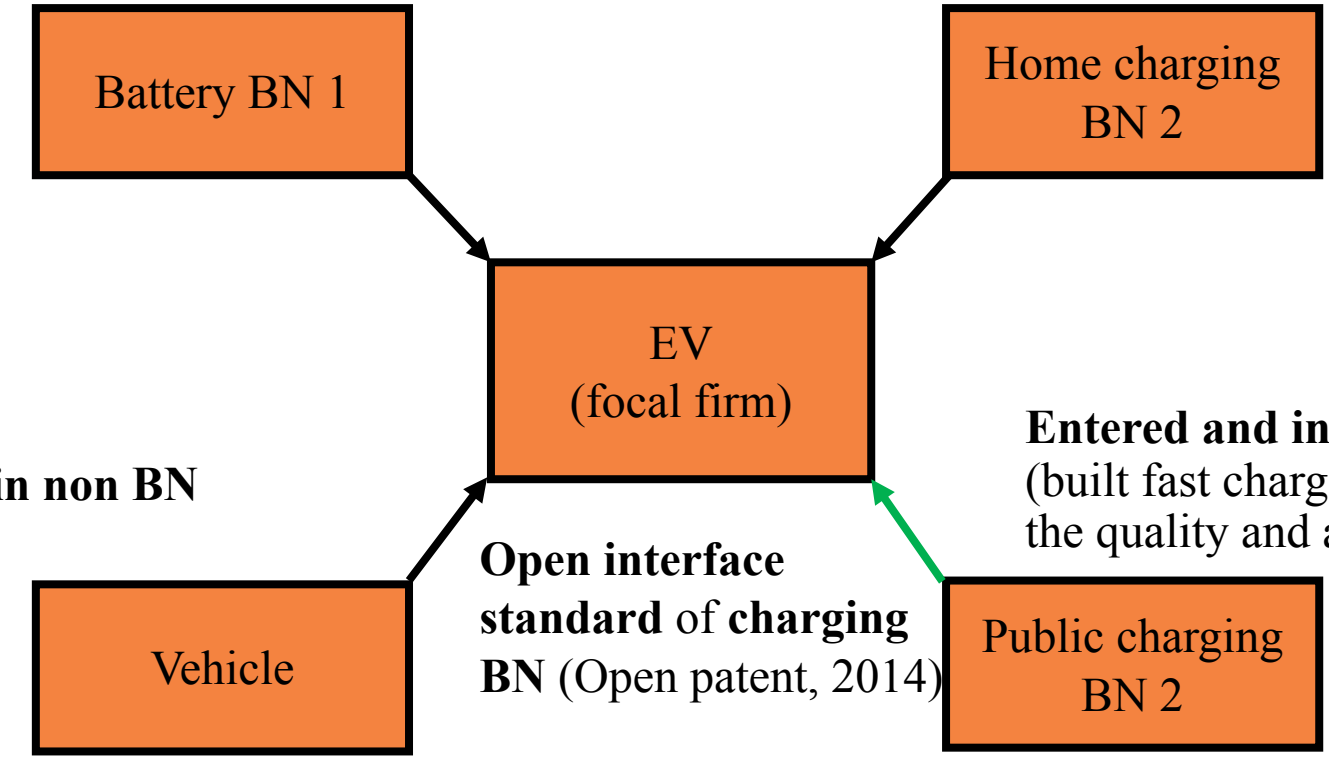
Activity

No-Activity

Modularization on the interface

Developing a matured ecosystem (2012-2015) Tesla: System strategy

Enter and innovating in battery BN with partner (Gigafactory, 2014)



Entered and innovated in non BN (vehicle, 2013-)

Open interface standard of **charging BN** (Open patent, 2014)

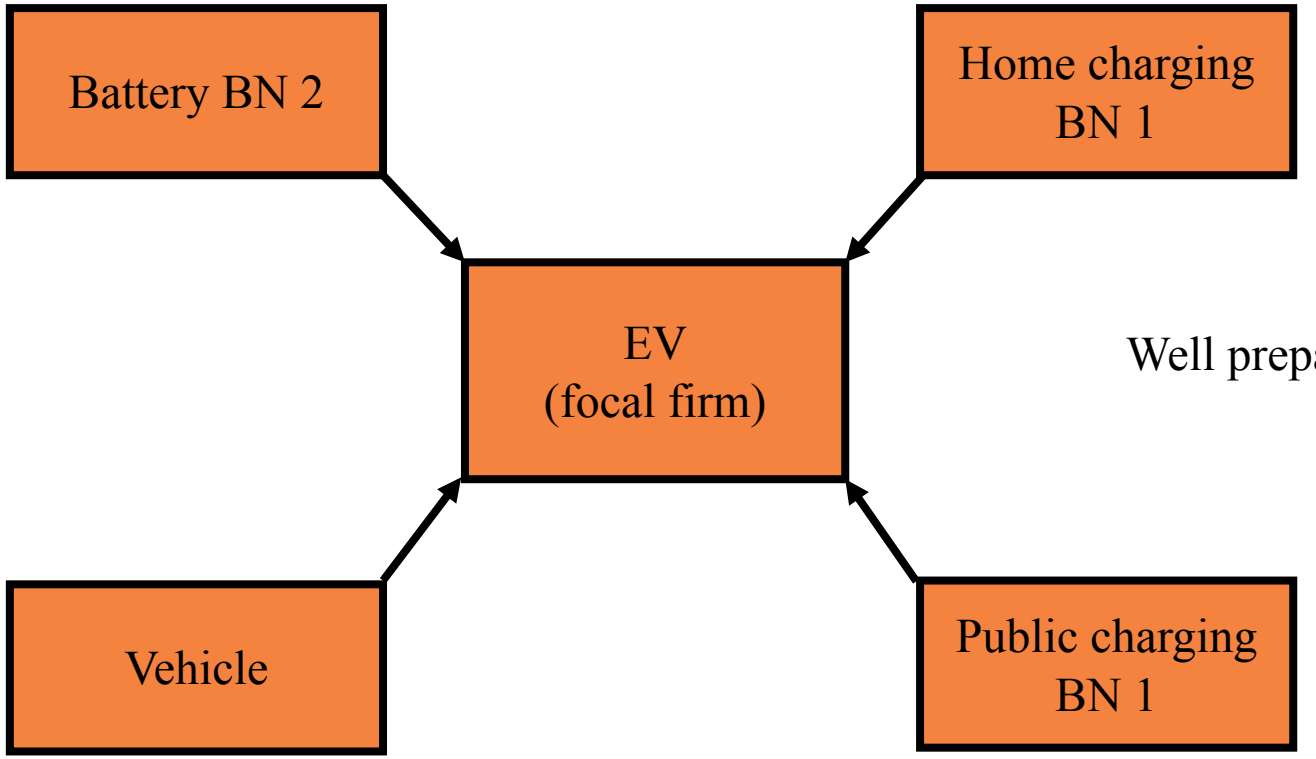
Entered and innovated in charging BN (built fast charging network 2013-) to increase the quality and availability

Activity

No-Activity

Modularization on the interface

BN shifting (2015-2017)
Tesla: System strategy



Well prepared for BN shifting

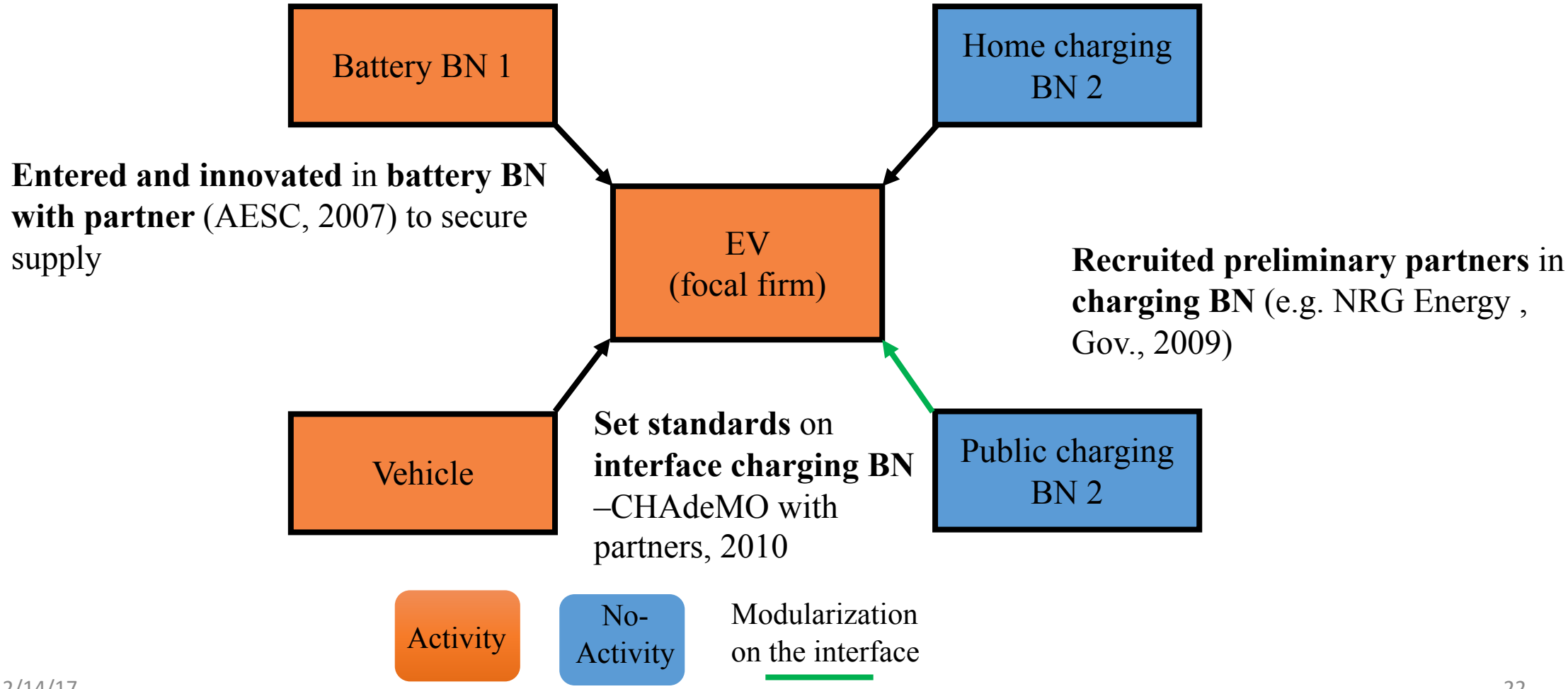
Activity

No-Activity

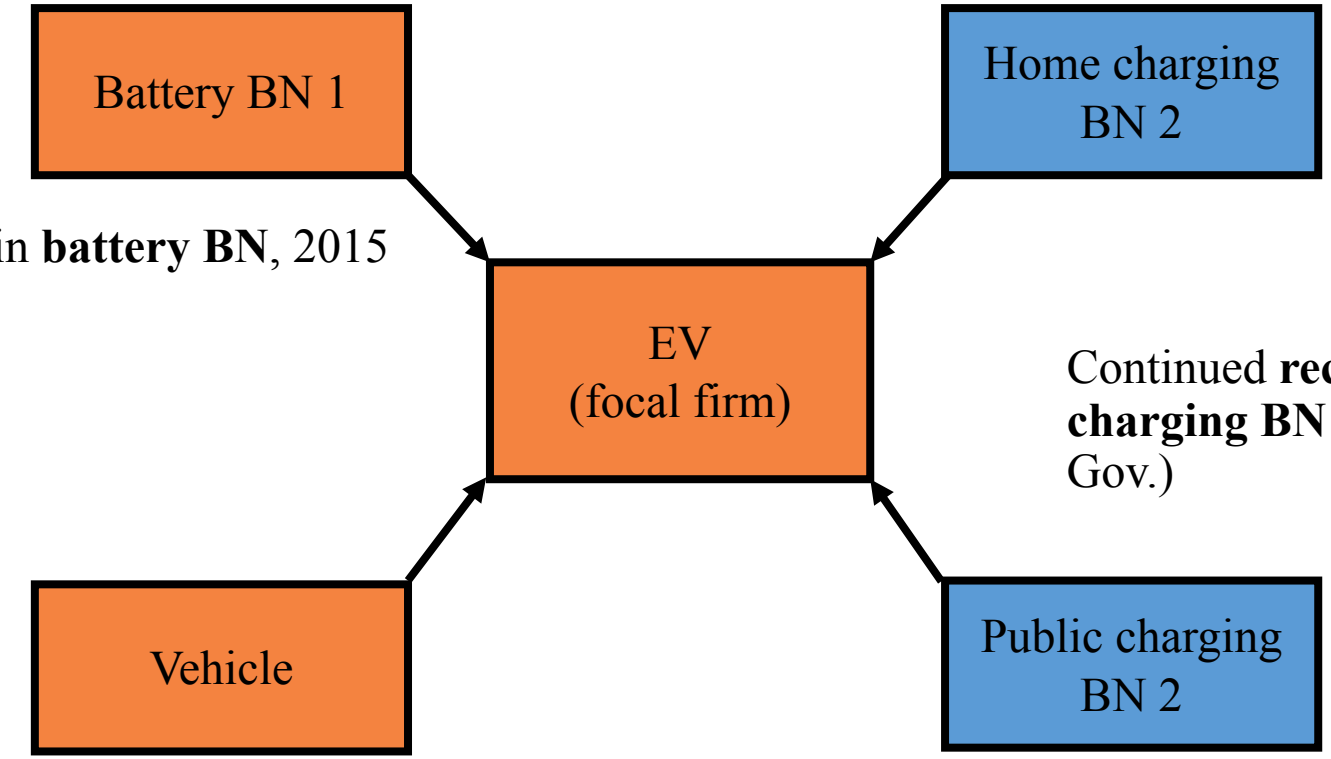
Modularization on the interface


Nissan

Preparing an ecosystem (2007-2011) Nissan: Bottleneck strategy



Developing a matured ecosystem (2011-2015) Nissan: Bottleneck strategy



Less competitive in **battery BN**, 2015

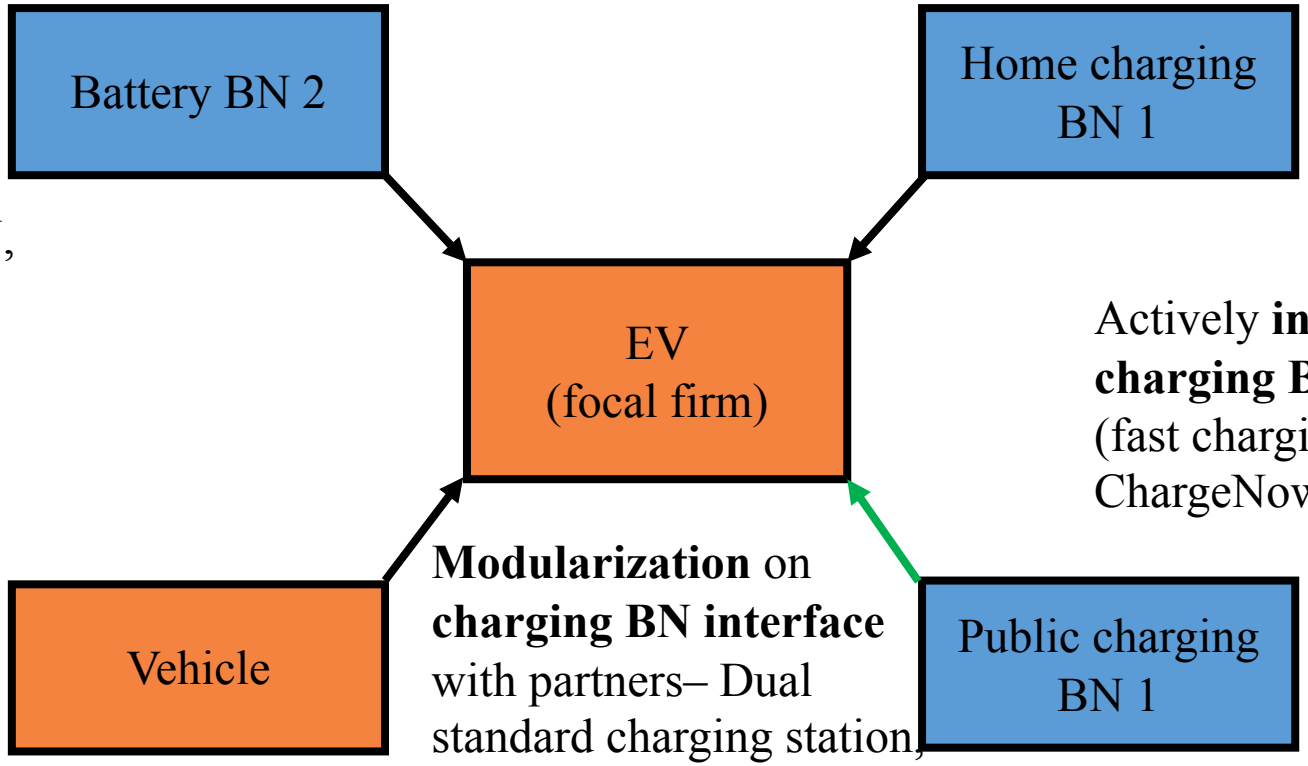
Continued **recruiting partners** in **charging BN** (e.g. ChargePoint-2011, Gov.)

Activity

No-Activity

Modularization on the interface

Bottleneck shifting (2015-2017)
Nissan: Bottleneck/Component strategy



Quitted from **battery BN**, 2017

Actively **initiating innovation** in **charging BN with partnership** (fast charging with BMW, ChargeNow, 2015, 2017),

Modularization on **charging BN interface** with partners– Dual standard charging station, 2015

Activity

No-Activity

Modularization on the interface


BMW
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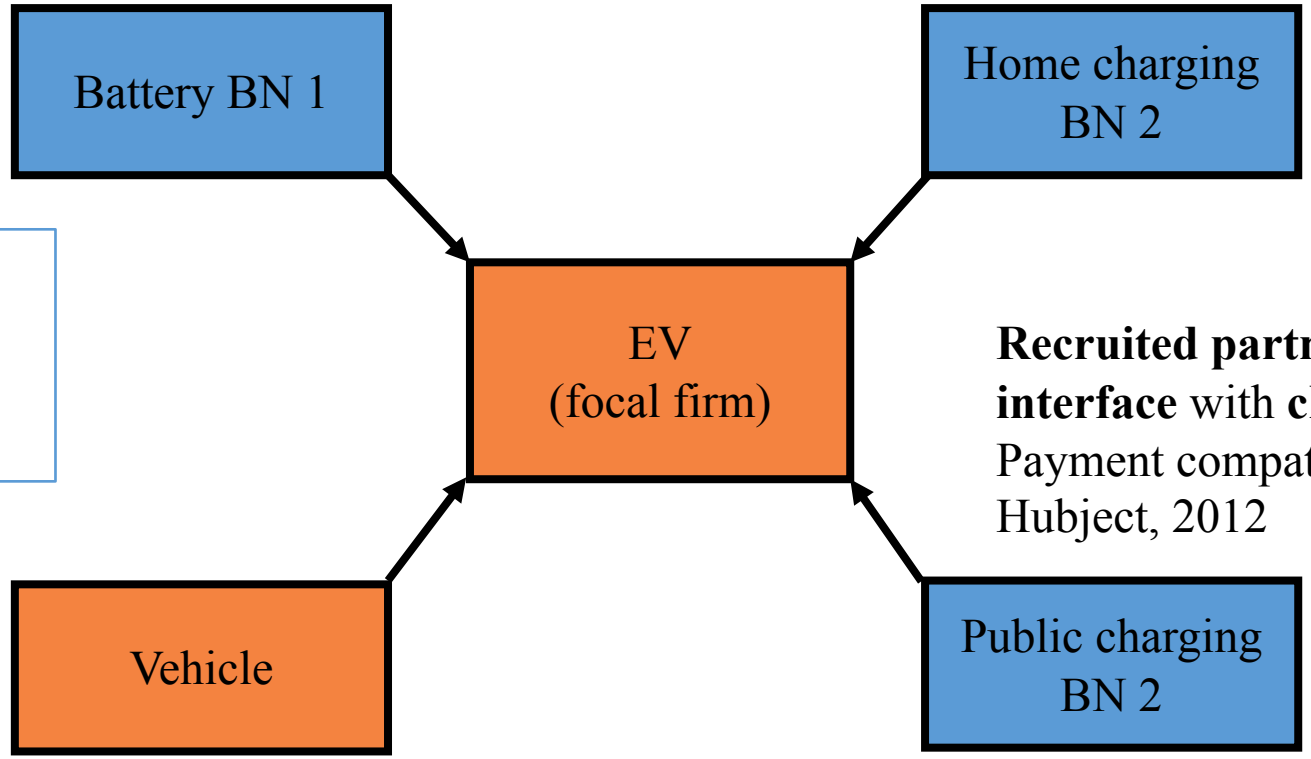
Preparing an ecosystem (2007-2011)
BMW: Component strategy



Experiments on users' acceptance of EV
- 100 mile range
- Overnight charging

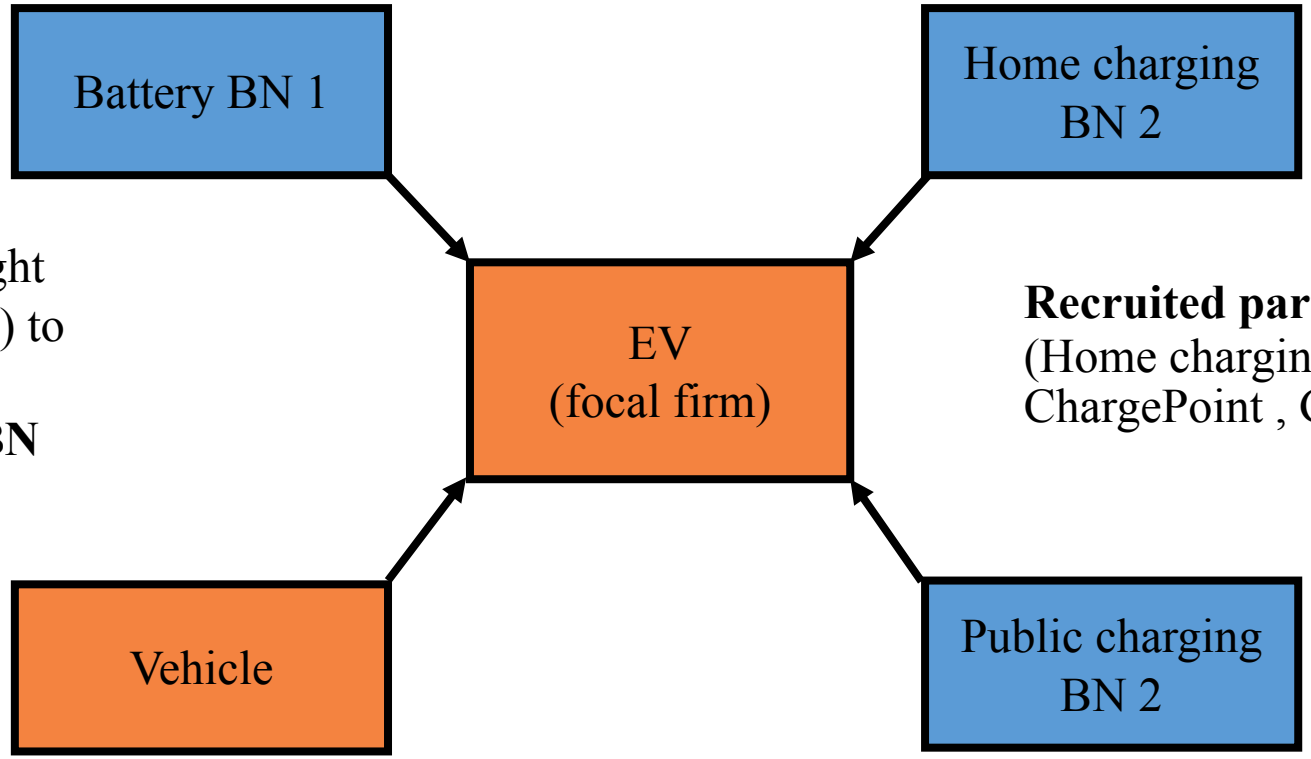
Recruited partners to **modularize interface** with **charging BN** – e.g. Payment compatibility, ChargeNow, Hubject, 2012

Activity

No-Activity

Modularization on the interface

Developing a matured ecosystem (2011-2015)
BMW: Component strategy



Innovated in non-BN (light weight material of vehicle) to **soften** the functional requirements of **battery BN**

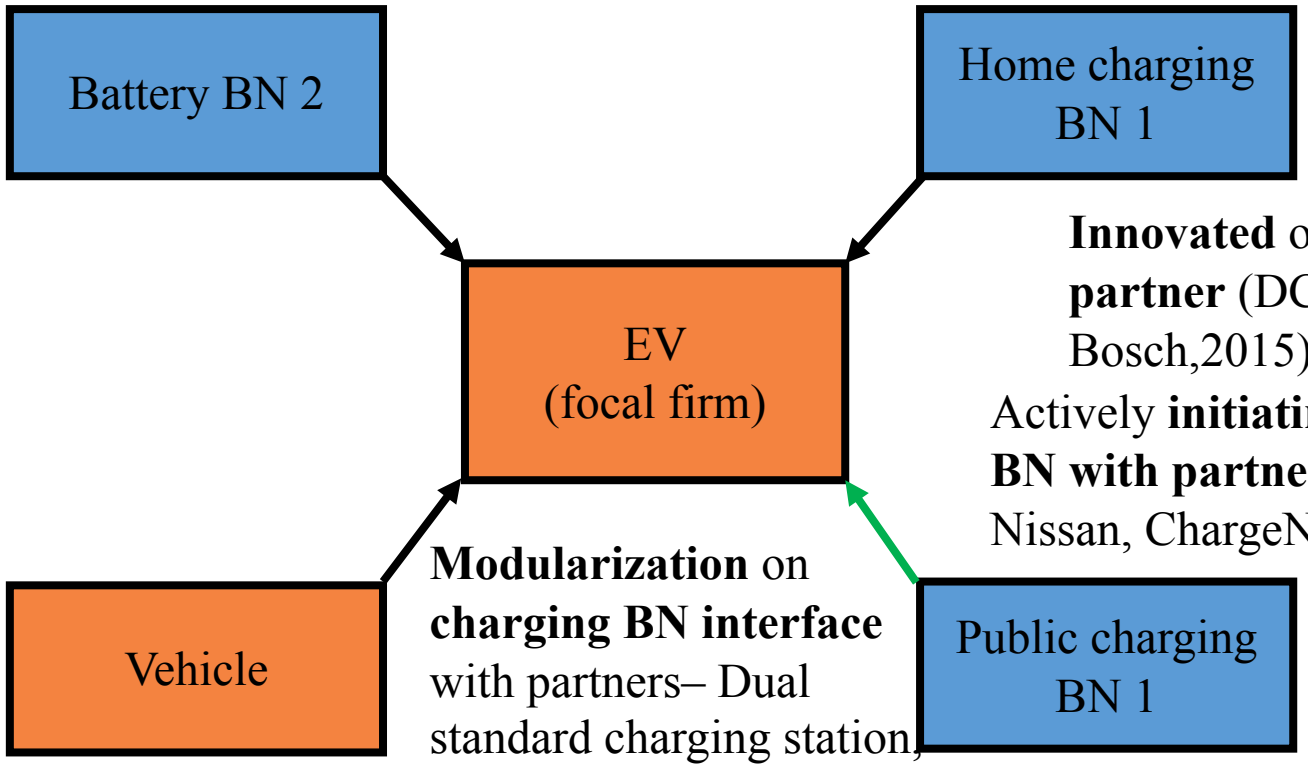
Recruited partners in charging BN (Home charging first, public ChargePoint , Gov.), 2013

Activity

No-Activity

Modularization on the interface

Bottleneck shifting (2015-2017)
BMW: Component strategy



Innovated on **charging BN** with **partner** (DC fast charging station with Bosch,2015)

Actively **initiating innovation** in **charging BN with partners** (fast charging network with Nissan, ChargeNow, 2015, 2017),

Modularization on **charging BN interface** with partners– Dual standard charging station, 2015

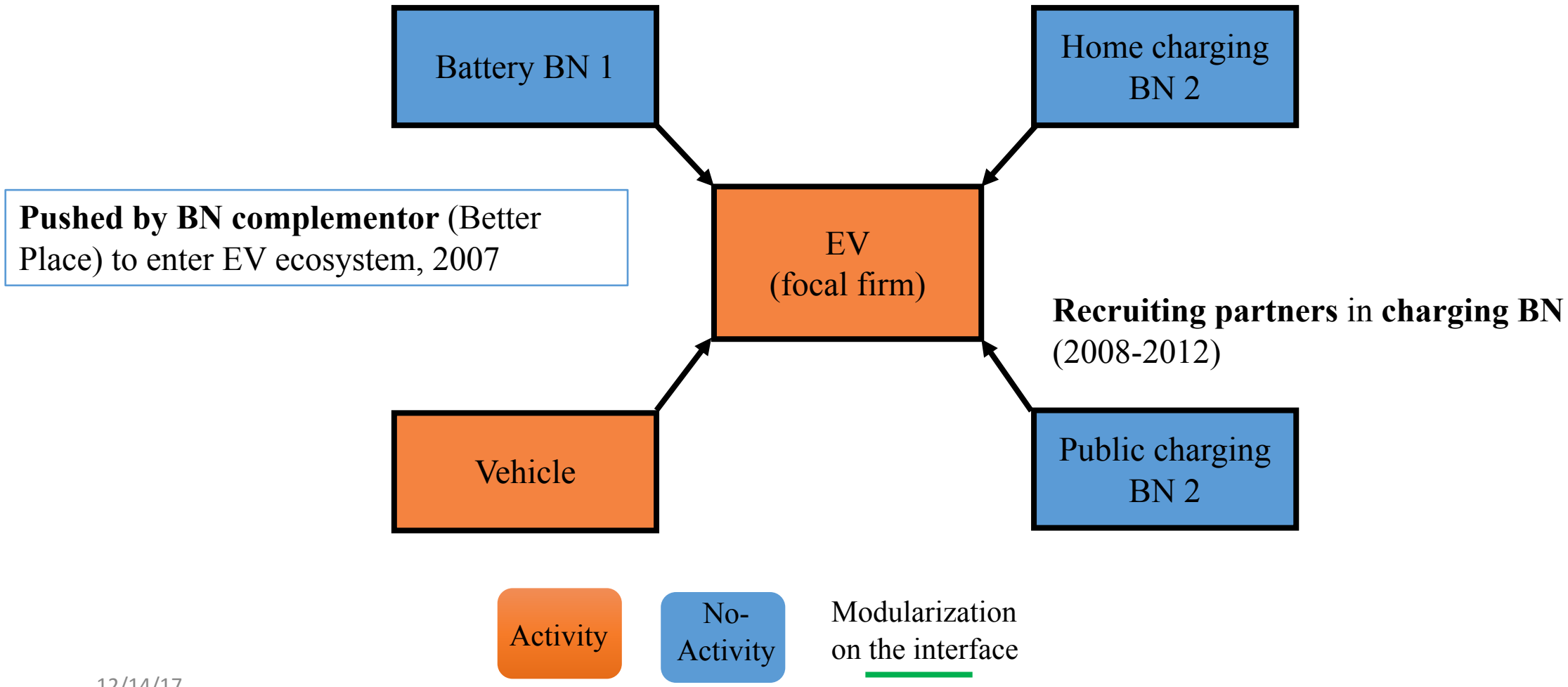
Activity

No-Activity

Modularization on the interface

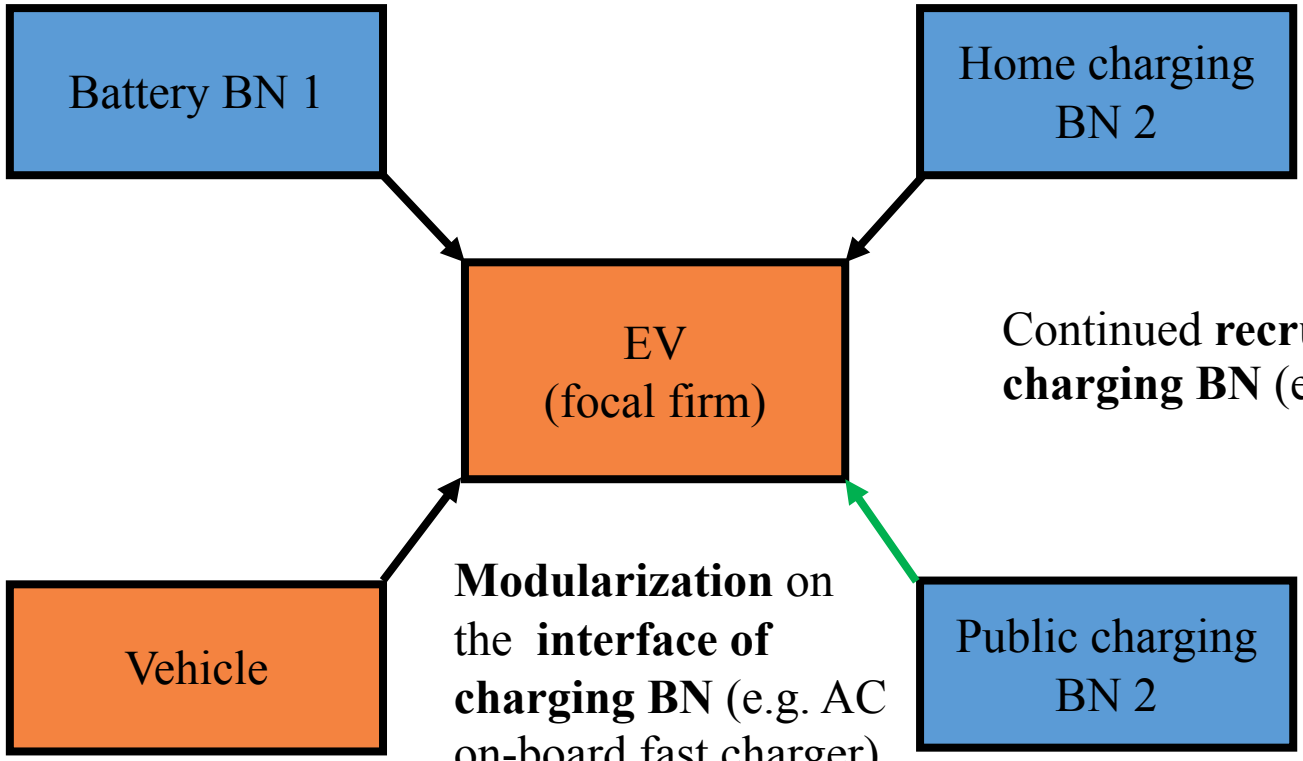

Renault
ZOE

Preparing an ecosystem (2007-2011)
Renault: Component strategy



Developing a matured ecosystem (2011-2015) and Bottleneck shifting (2015-2017)
Renault: Component strategy

Business model innovation in charging BN (Rent the battery separated than the purchase of the vehicle)



Continued **recruiting partners in charging BN** (e.g. Gov., Utility)

Modularization on the **interface of charging BN** (e.g. AC on-board fast charger)

Activity

No-Activity

Modularization on the interface

Discussion and conclusion

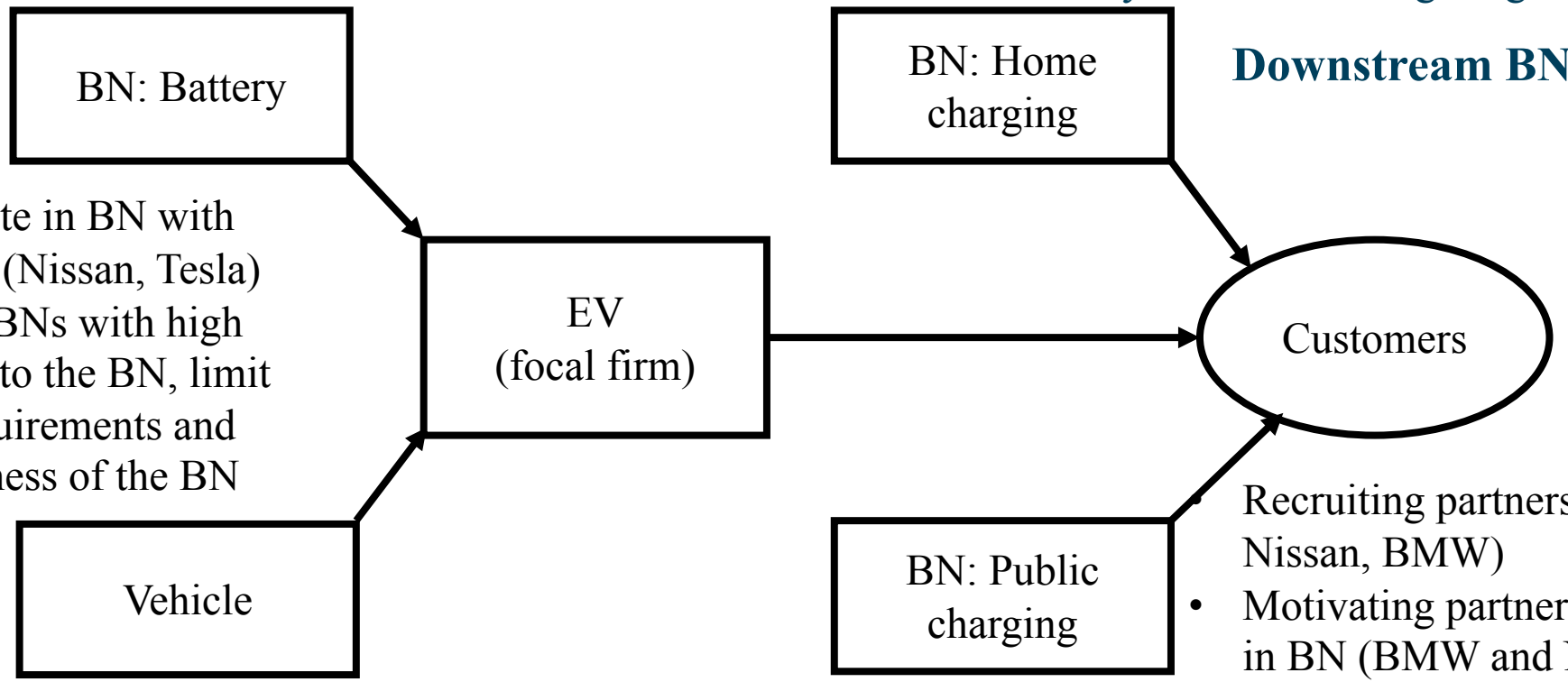
How focal firm manages BNs in ecosystem

BN component are assembled or bundle by the focal firm to offer to the customer

BN component assemble or bundle by customer during usage

Upstream BN

Downstream BN



- Enter and innovate in BN with qualified partner (Nissan, Tesla)
- Innovate in non-BNs with high interdependence to the BN, limit functionality requirements and soften the toughness of the BN (BMW)
- Business model innovation on BN (Renault)

- Recruiting partners (Renault, Nissan, BMW)
- Motivating partners to innovate in BN (BMW and Nissan)
- Modularization on the interface (all four firms, but various way)
- Enter and innovate in BN with qualified partner (Tesla)

How focal firms could choose between ecosystem strategy?

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	System strategy	Bottleneck strategy	Component strategy
			
Advantage	• Synthesis and high performance • Less venerable in BN shifting	• Less investment and high profit by capturing BN	• Least investment • Focus on existing core activities
Requirements	• High investment • Capability in all the component	• Ability to identify the trend of BNs • Capability in BN • Ability to recruit qualified partner for non BN (esp. BN shifting) • Ability to modularize the interface with BN	• Ability to recruit qualified partner • Ability to motivate partners to innovate in BN (esp. BN shifting) • Ability to modularize the interface with BN • Ability to soften the BN by innovate in its components

Conclusion

- We studied the 4 cases of EV ecosystem to understand how focal firm manage the bottlenecks in ecosystem when bottlenecks are far from the core competences.
- We identified **a new strategy** of **Innovate in non-BNs** to soften the toughness of the BN
- We added new insights to the dynamics of ecosystems strategies in nascent ecosystem.

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