

2021 IR Day

Activities to Achieve the Long-term Vision -Acquire Next-generation Technologies and Create New Businesses-

Managing Executive Officer,

Senior General Manager, Technology and R&D Division

Kazumasa KIMURA

General Manager, Intellectual Property Dept. Hiroyuki INOUE

29th November, 2021

The forecast data presented herein reflects assumed results based on conditions that are subject to change.

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1. R&D activities in Nabtesco

**Managing Executive Officer,
Senior General Manager, Technology and R&D Division
Kazumasa KIMURA**

<Biography>

- Jun. 2011 General Manager, Manufacturing Department, Tsu Plant, Precision Equipment Company
- Mar. 2017 Executive Officer and President, Power Control Company
- Jan. 2019 Executive Officer, Corporate Planning, Accounting & Finance, Information Systems and Corporate Communication
- Mar. 2019 Director of Nabtesco Corporation (to present)
- Jan. 2021 Managing Executive Officer (to present), Component Solution Segment, Senior General Manager, Technology and R&D Division, and in charge of Production Innovation (to present)



2. Intellectual Asset Management in Nabtesco ~Ambidexterity with IP landscape~

**General Manager, Intellectual Property Dept.
Hiroyuki INOUE**

<Biography>

- 1995 Join Technology and R&D Division
- 2003 Join Intellectual Property Dept.
- 2007 Resisted as CPA
- 2020 General Manager, Intellectual Property Dept. (to present)

R&D activities in Nabtesco

Management materiality

Measures to improve our financial performance

Achieve the revenue targets

Distribute managerial resources efficiently

Continue to improve capital efficiency

Measures to enhance our management foundation

ESG items having a major impact on financial issues

Increase the effectiveness of our management entities

Countermeasures for climate change

Deliver solutions for social challenges through business

Build a resilient supply chain

ESG items that drive sustainability power

Ensure management transparency

Foster environmental management

Pursue safety, comfort and a sense of security

Respect diversity and various expertise in the workplace

Enhance work style reforms

Promote engagement with local community

Specific measures to achieve the long-term vision

Acquire next-generation technologies and create new businesses

Foster smart manufacturing

Strengthen global bases



<Missions>

1. Acquire leading-edge technologies in advance with each business unit

Acquire and R&D of leading-edge technologies(Fostering open innovation)

2. Start-up new businesses

Promoting innovation through enhancement of basic technologies and Corporate Venture Capital

3. Cross functional actions for group R&D team synergies.

Fostering the sharing of advanced technologies and know-how across the business units and providing opportunities for education.

<Organization>

Technology and R&D Division

Strategic Business Development Dept.

Quality Promotion Dept.

Intellectual Property Dept.

Nabtesco R&D Center





Electric & Electronics Engineering Dept.

CAE Engineering Dept.

AM Engineering Dept.

System Development Dept.

Establish global R&D hubs in Technology and R&D function

<p>Hubs</p> <p>Missions</p>	<p>Headquarter (Tokyo)</p> 	<p>Nabtesco R&D center (Kyoto)</p> 	<p>Nabtesco R&D center (Kawasaki)</p> 	<p>Oversea (Germany)</p> 
<p>Acquire leading-edge technologies in advance with each business unit</p>		<ul style="list-style-type: none"> - CAE - AM^{*1} - Digital Twin - Power electronics 	<p>IoT</p>	<ul style="list-style-type: none"> - V-model development - MBD^{*2}
<p>Start-up new businesses</p>	<p>Marketing</p>	<ul style="list-style-type: none"> - Enhance basic technologies - IP management 		
<p>Cross functional action for group R&D team synergies.</p>	<ul style="list-style-type: none"> - Conduct the Technology and R&D strategy council - Provide educations/training - Create opportunity for new technologies and know-how sharing 			

*1 AM: Additive Manufacturing *2 Model Based Development

Located in KRP*¹ (Kyoto Research Park) and consolidate main functions of Technology and R&D div. to improve the R&D environment and upgrade open innovation.

■ Fostering innovation with open communication



Drop-in meeting rooms



Open communication space for the lively discussion

Office



■ Laboratories by technology to improve the R&D environment



Metallic AM*² Lab.



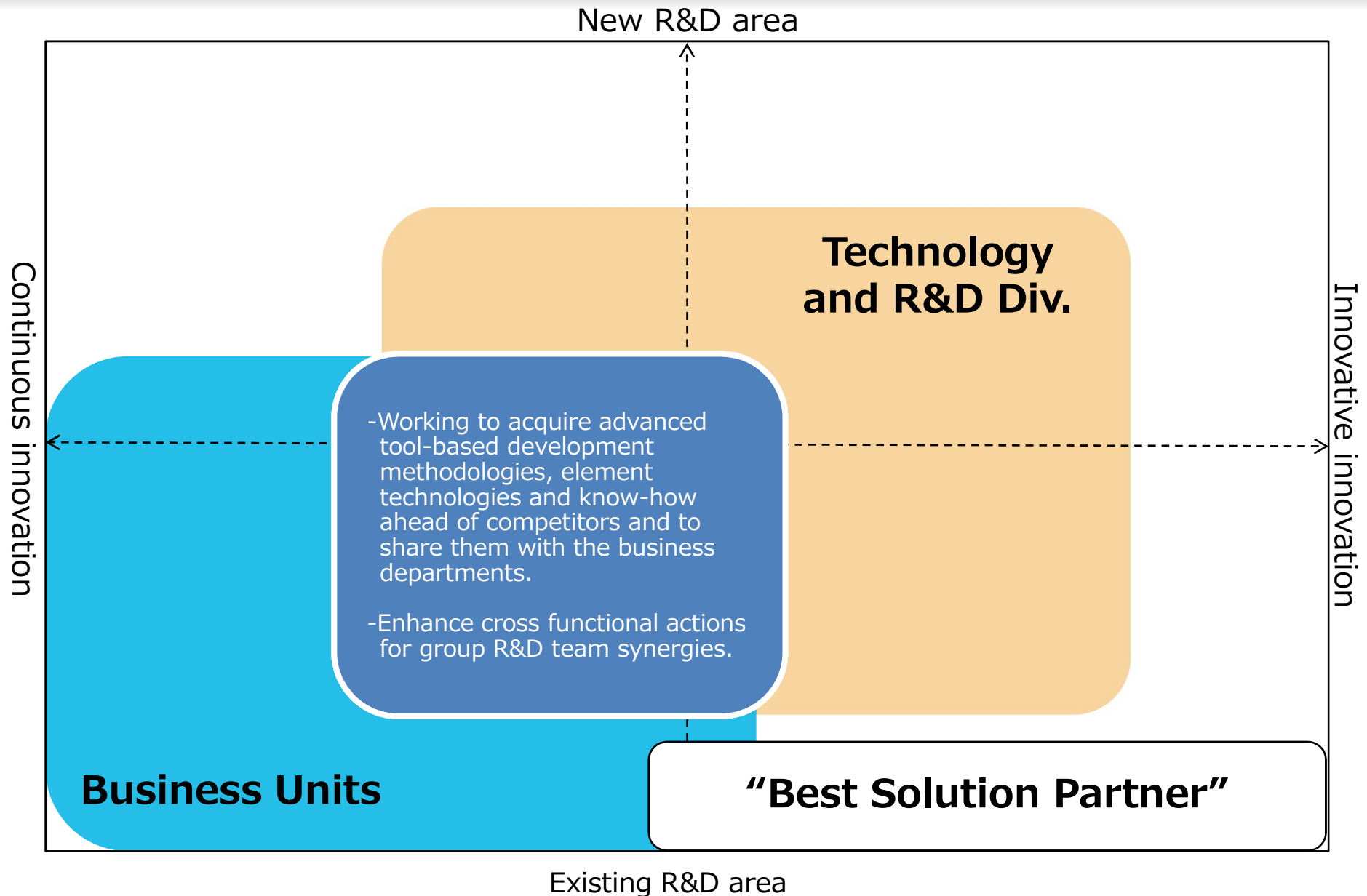
Elements Lab.

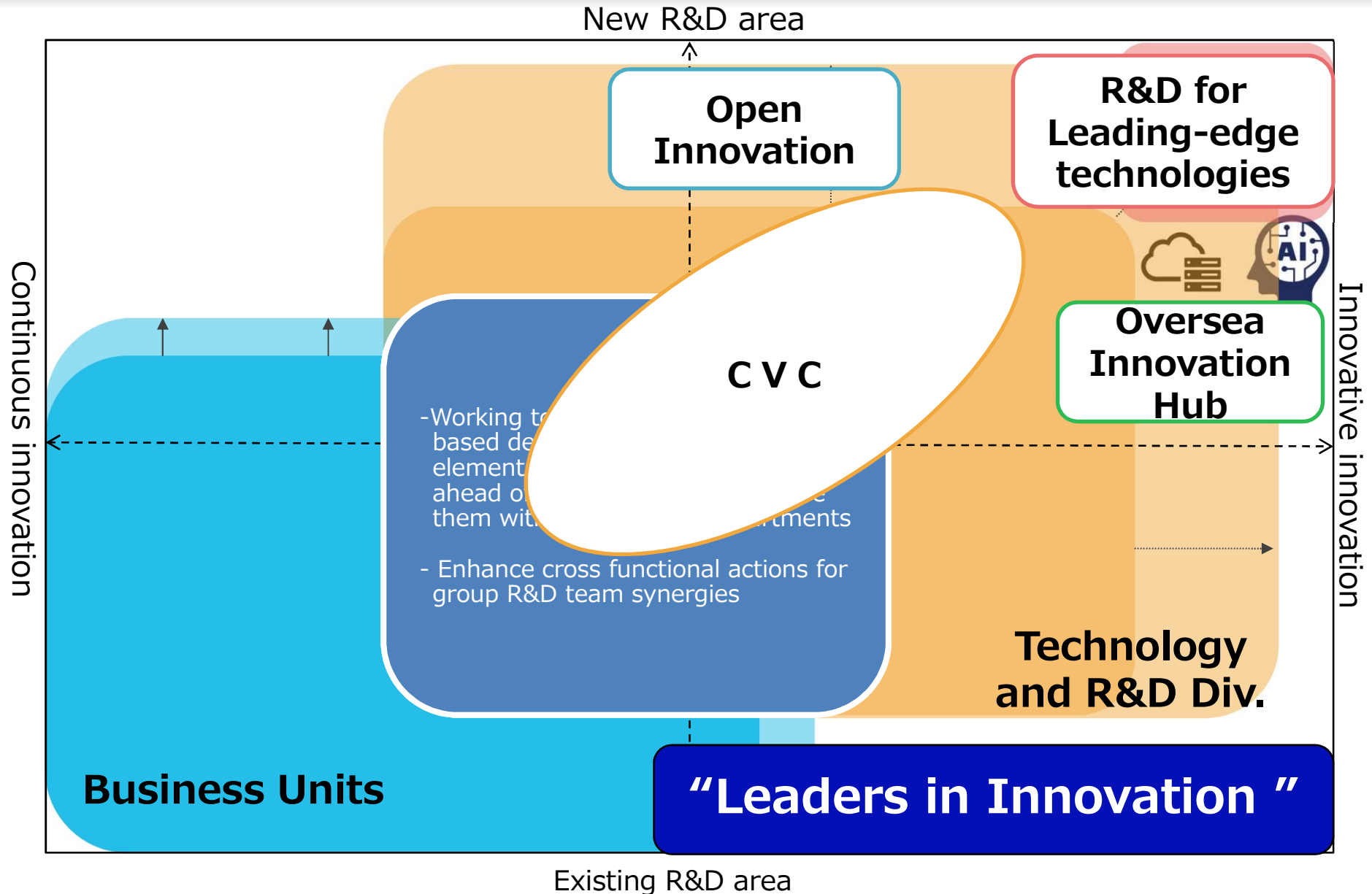


Power electronics Lab.

*¹KRP: It is an organization to support innovations with new business, R&D and so on since 1989. There are over 500 organization.

*²AM: Additive Manufacturing



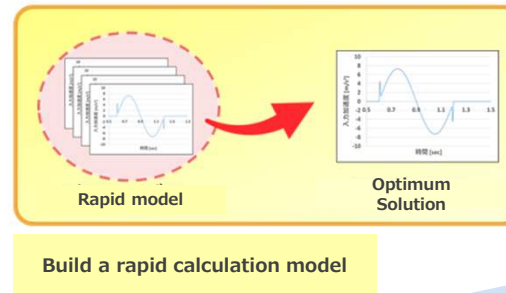
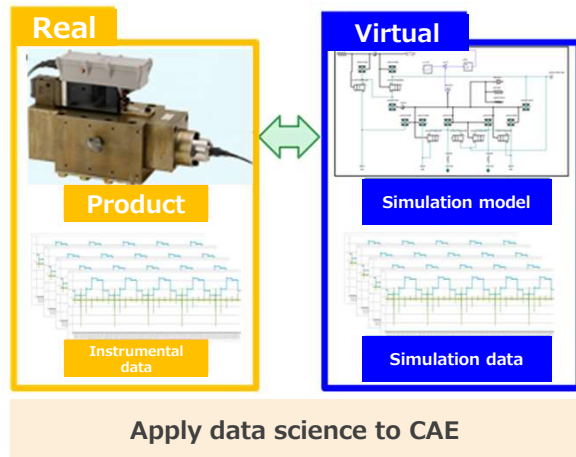


Activities to Achieve the Long-term Vision

**Proactively introduce and build
leading-edge element technologies,
development methodologies,
manufacturing technologies
to create innovation**

- Build Digital Twins
- Utilize new R&D methodologies
- Use AI

Build Digital Twins to innovate design and R&D process



- [Pros of Digital Twins]**
- Estimate deterioration level to support Condition Based Maintenance Business
 - Able to find the most robust design

Step2

- Build Digital twin partially**
- Use rapid calculation for the best design and validate by actual product
 - System building

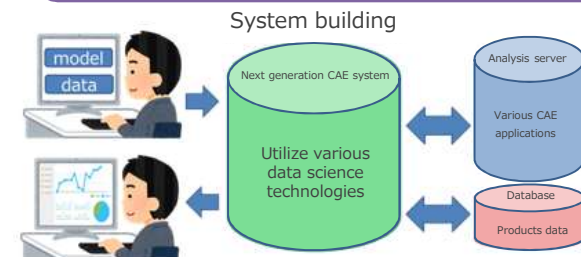
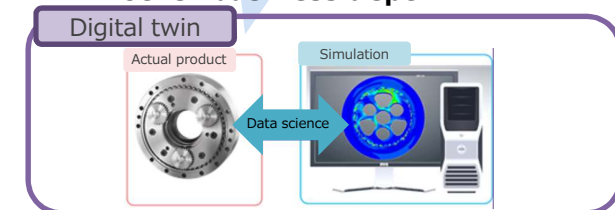
Step1

- Preparation for Digital twin**
- Preparation of Model and utilize data science

Step3

Completion of Digital twin building

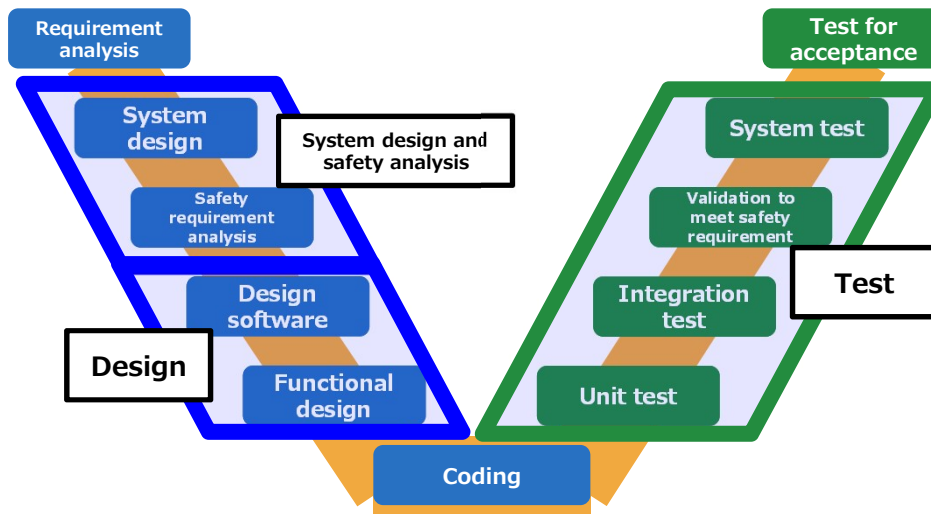
- Run the system
- Share the methodology to the other business dept.



Digital Twin: Collect various information into digital space and reflect real world.

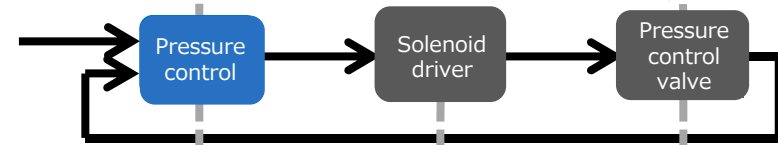
Utilize **V-model development***1 and **MBD***2 to innovate design and R&D methodology

V-model development

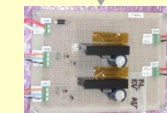


MBD (Model Based Development)

MILS (Model In the Loop Simulation)



Real time simulator



Prototype for functional testing



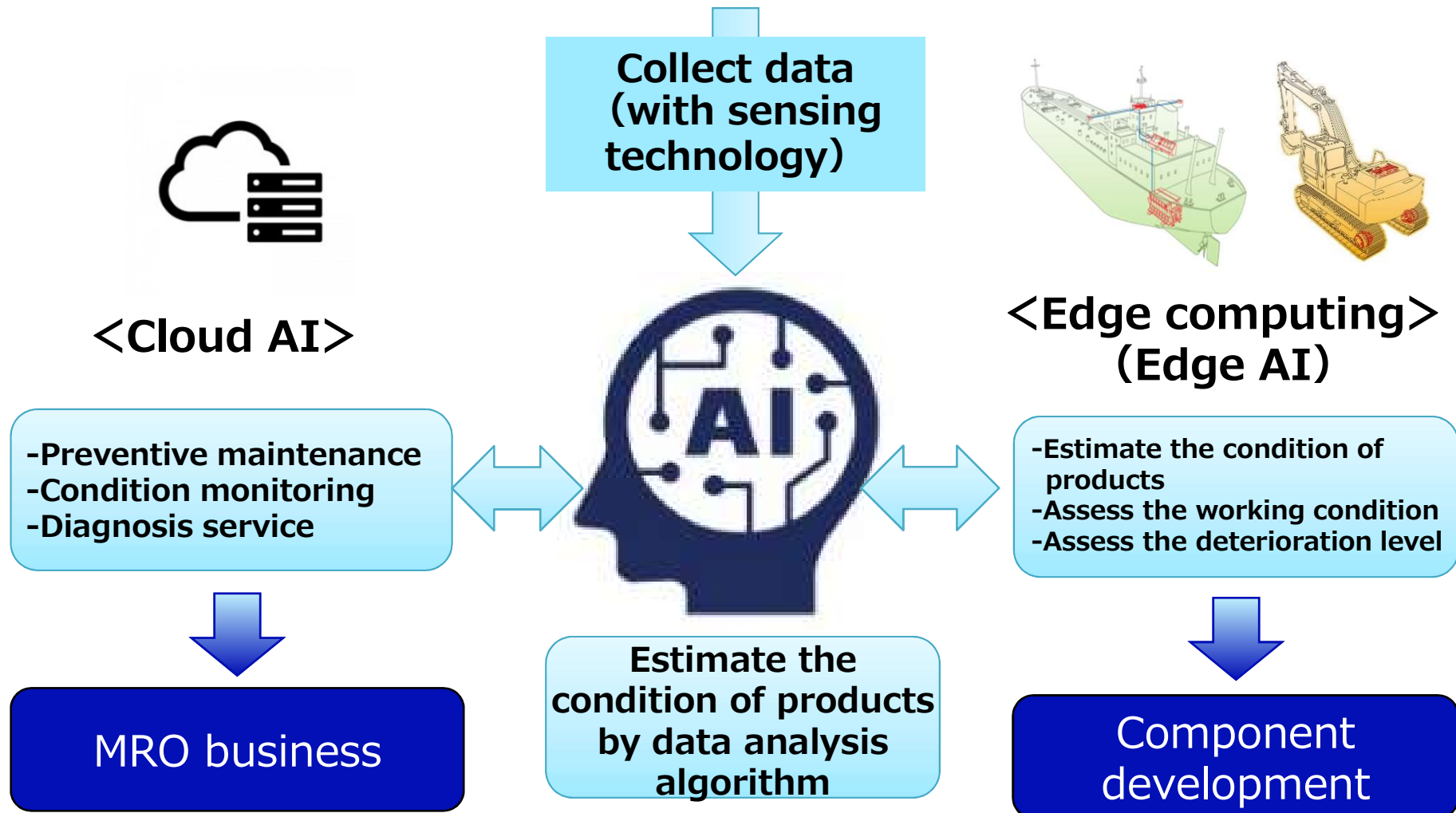
Prototype for functional testing

RCP (Rapid Control Prototyping)

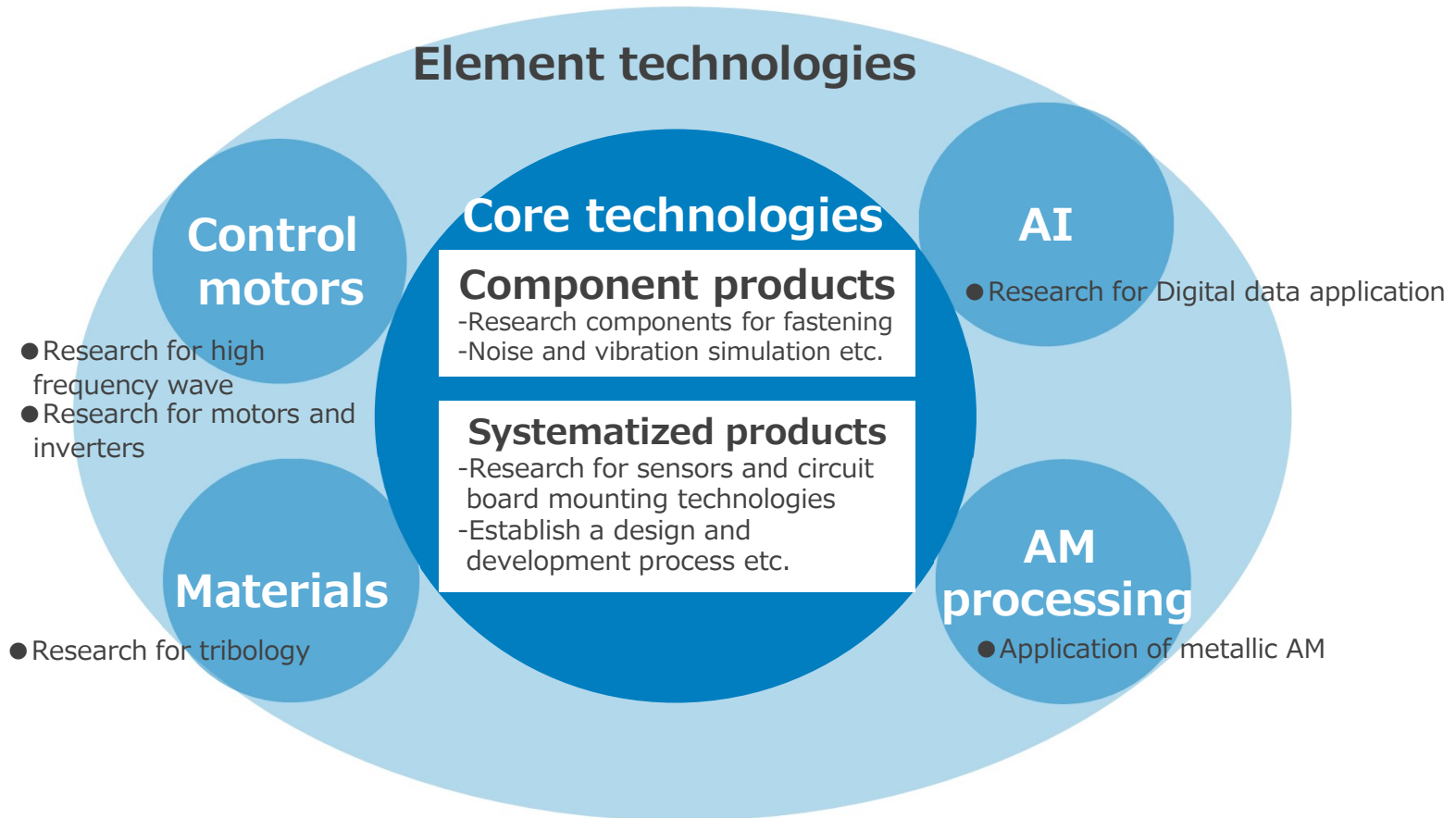
*1 V-model development;
Set the same level process in developing(left) and testing steps (right), and show each process by V shape to the correspondence.

*2 MBD; Model Based Development
Development with prior evaluation through 1D-CAE or other simulation models

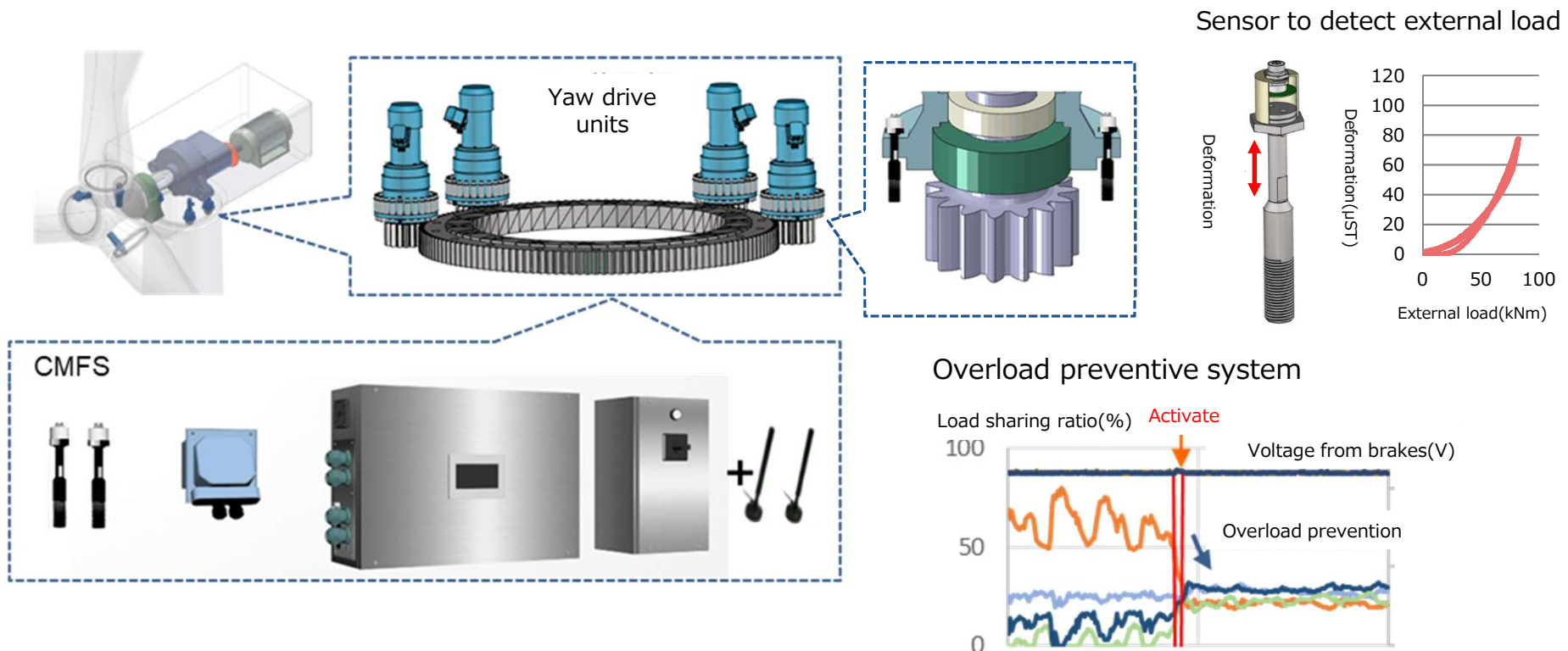
Use AI to innovate data application



Promote open innovation to acquire leading-edge technologies and new technologies from companies, universities and research institutions globally



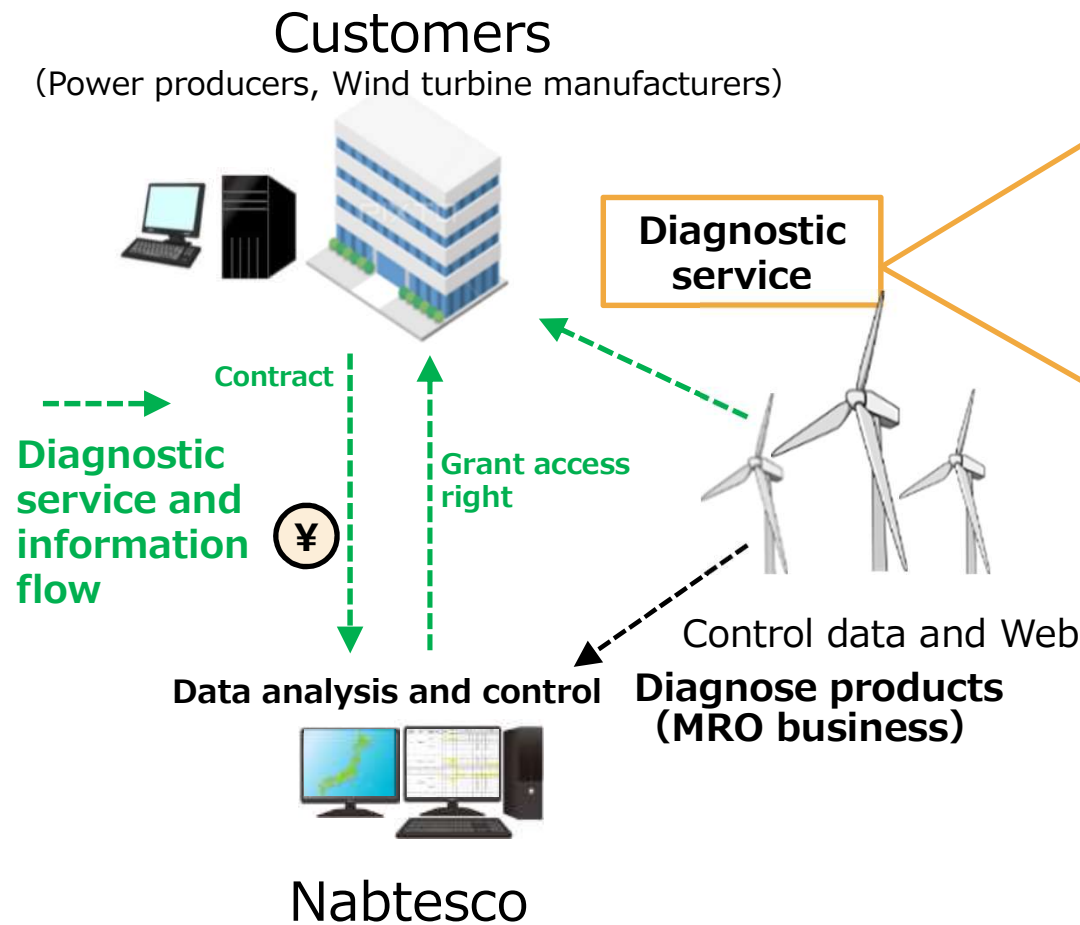
Technology and R&D div. develop a technology and **start a new business**



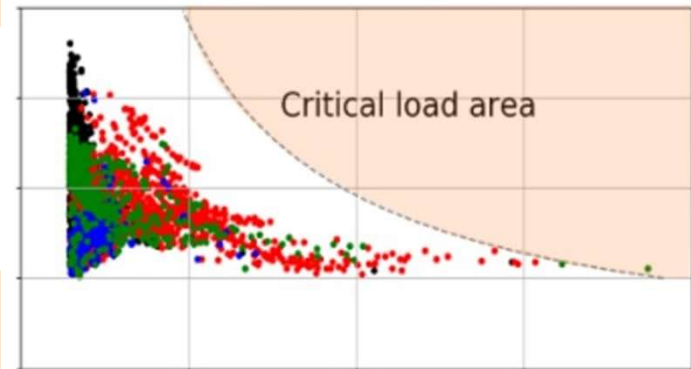
CMFS(Condition Monitoring system with Fail-Safe)

Sensors are monitoring the load conditions within yaw driving units and equalize the load imposed on each of the yaw drive units when it paused and prevent overload.

The first launch of data business for Nabtesco <Subscription of diagnostic service >



Diagnostic service
Yaw load monitoring map



Error record for yaw drive units

発生時刻 年月日、時、分、秒	判定要因	発生 Yaw No.			
		Yaw 1	Yaw 2	Yaw 3	Yaw 4
2021/09/27 17:23:31	旋回中過負荷	51	73	47	96
2021/09/27 17:23:30	旋回中過負荷	51	88	49	94
2021/09/27 17:23:29	旋回中過負荷	2	113	10	81
2021/09/27 17:23:28	旋回中過負荷	4	54	19	96
2021/09/27 17:23:25	旋回中過負荷	84	77	104	58
2021/09/27 17:23:24	旋回中過負荷	10	89	88	68
2021/09/27 17:23:23	旋回中過負荷	38	11		103

Established Nabtesco Technology Ventures AG in Switzerland in 2018 and CVC promotion div. in July 2021 to accelerate new technology development

Regarding the business domains to be invested

Motion control and peripheral technologies (including artificial intelligence and IoT)
Or, domains related to "disruptive innovation"

<Example>

Robotics, construction machinery, medical/welfare equipment, AM, motors, sensors

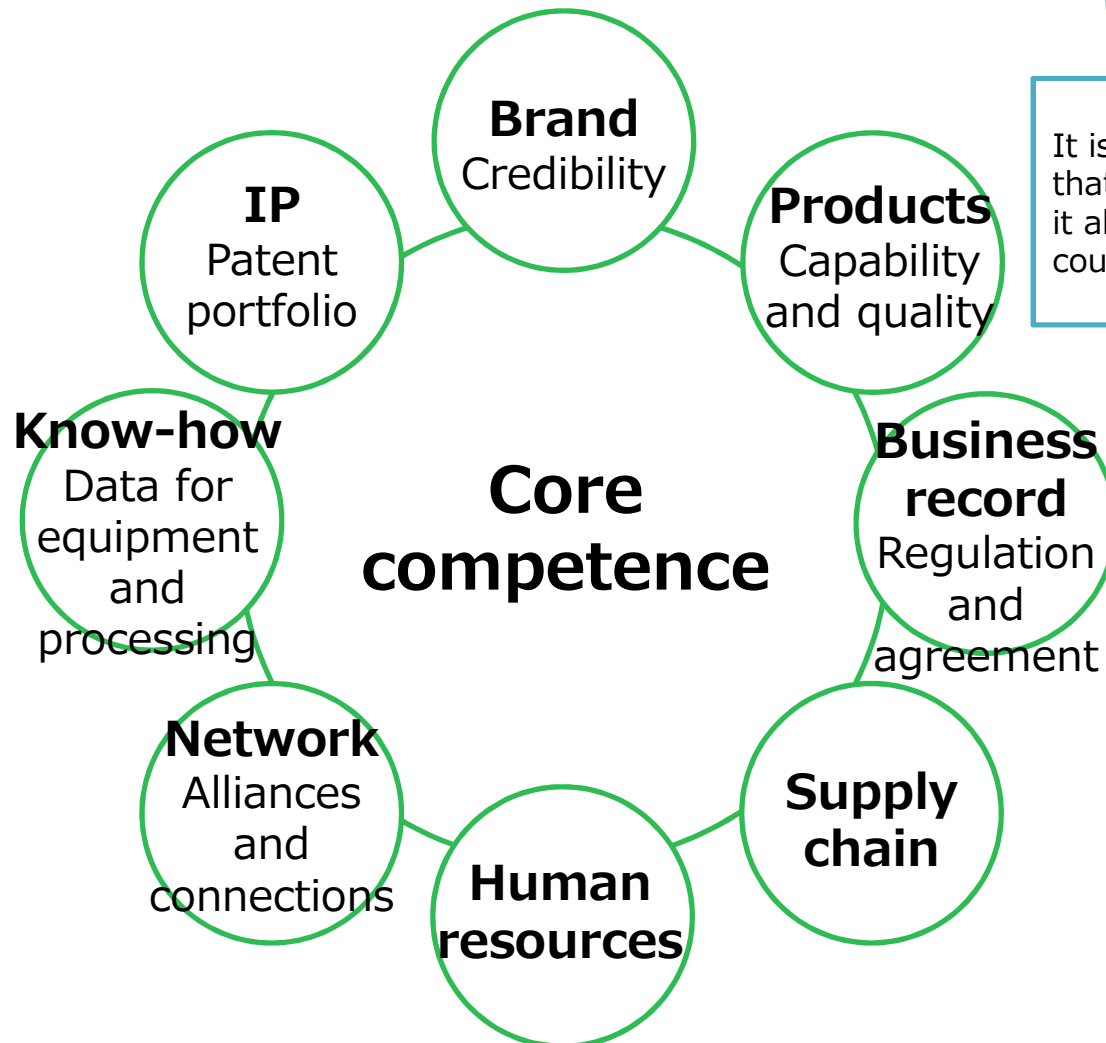
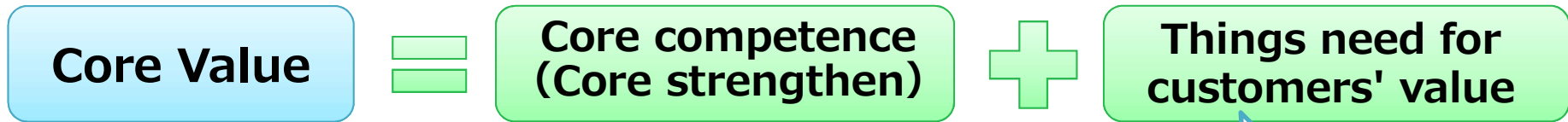
Domains related to production technologies; Machining and surface processing technologies, model base development and others

Example of investment :

July, 2021 Invest for R.K. Deep Sea Technologies Ltd.

Through this collaboration, Nabtesco will contribute to digital transformation (DX) of ship operations, decarbonisation in the shipping industry, and reduction of environmental impact, by leveraging Nabtesco's main engine remote control system together with Deep Sea's world-leading AI technology.

Intellectual Asset Management in Nabtesco ~Ambidexterity with IP landscape~

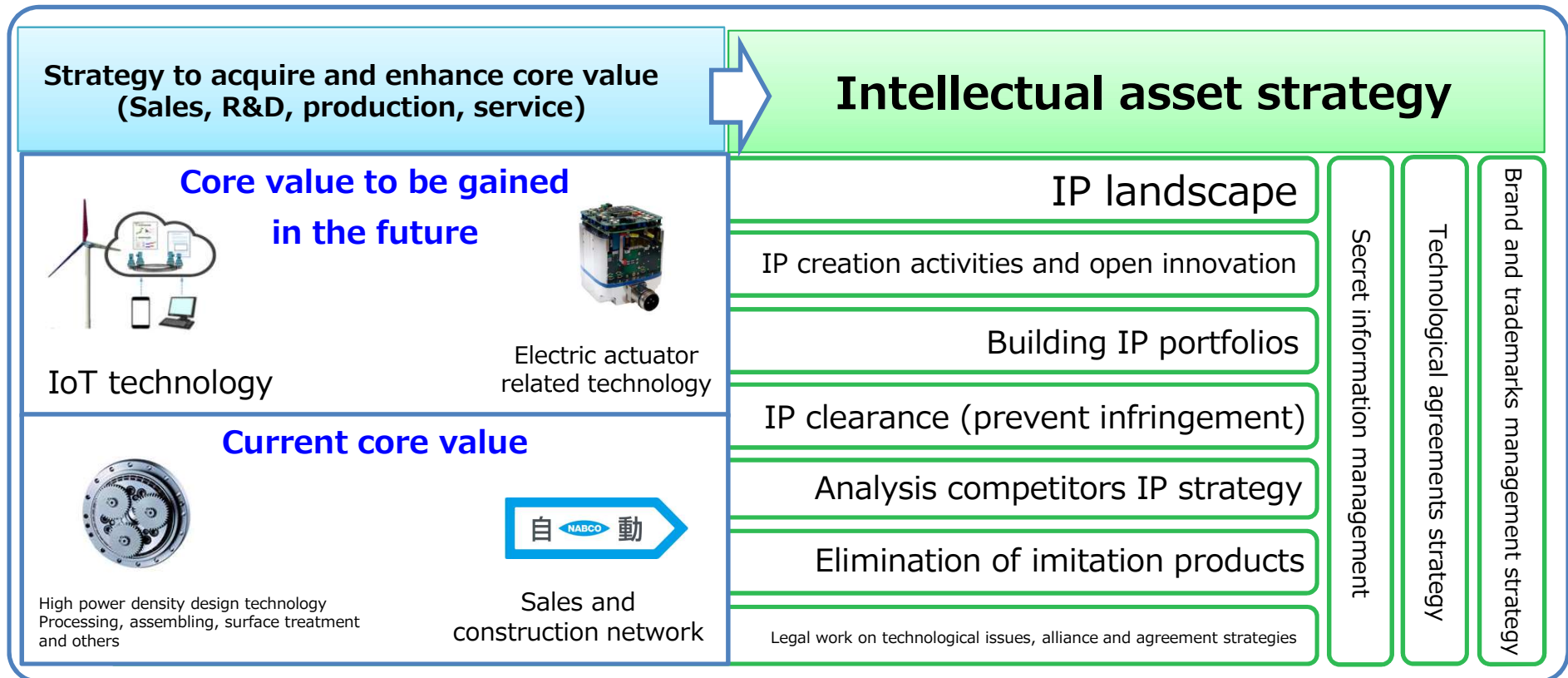


It is including something that competitors may have it already but new players could not have it easily.

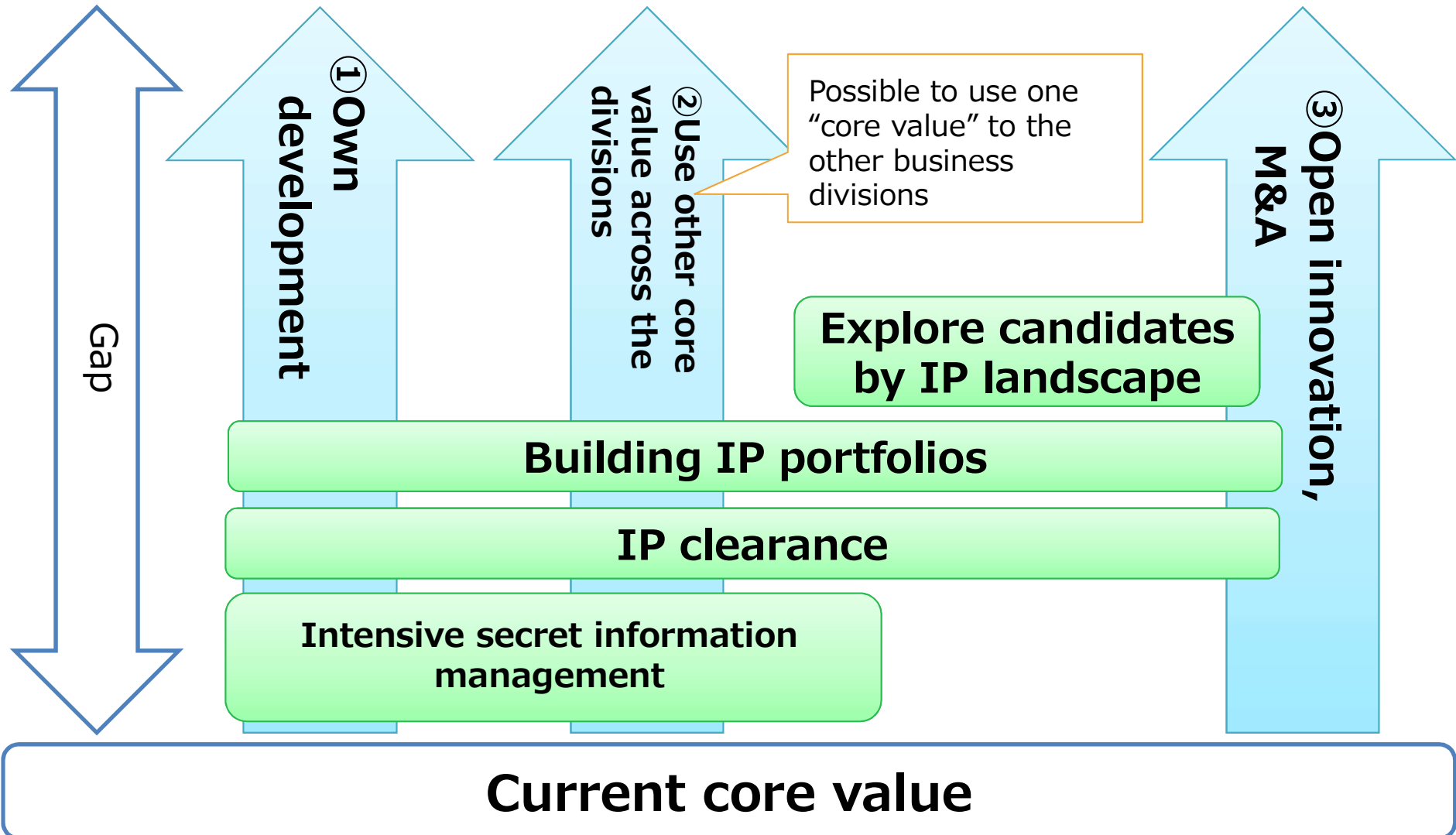
Long-term Vision

Leaders in innovation for the future

Mid-term Management Plan



Future core value to be gained



Definition of Intellectual Asset Management*1

Identify original "Intellectual Asset" in the company

Use and compound the asset effectively

Manage the asset to gain profit

IP strategy activity in Nabtesco

Identify current core value

Identify core value to be gained in the future

Integration of our core value and open innovation partner's core value through IP landscape

Intensive secret information management

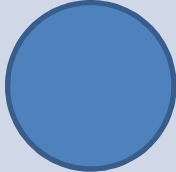
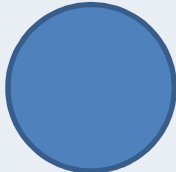
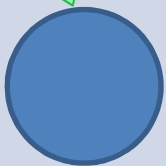
Turn disadvantage to the advantage by IP management

Prevent dilution of our advantage by other company's IP

Elimination of imitation products by our top brand value

*1 METI :

https://www.meti.go.jp/policy/intellectual_assets/teigi.html

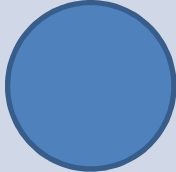


Competitive environment Remarks for the strategies	Monopolistic environment with profit* ¹	Competitive environment with reasonable competition* ²	Volatile environment with uncertainty* ³
Important to watch the market change and adjust it quickly*³		Example Railroad vehicle equipment	
Management resources for differentiation are important*²	Example Precision reduction gears		
Important to create a high entry barrier and avoid direct competition*¹			

*1 Competitive environment; Industrial Organization type

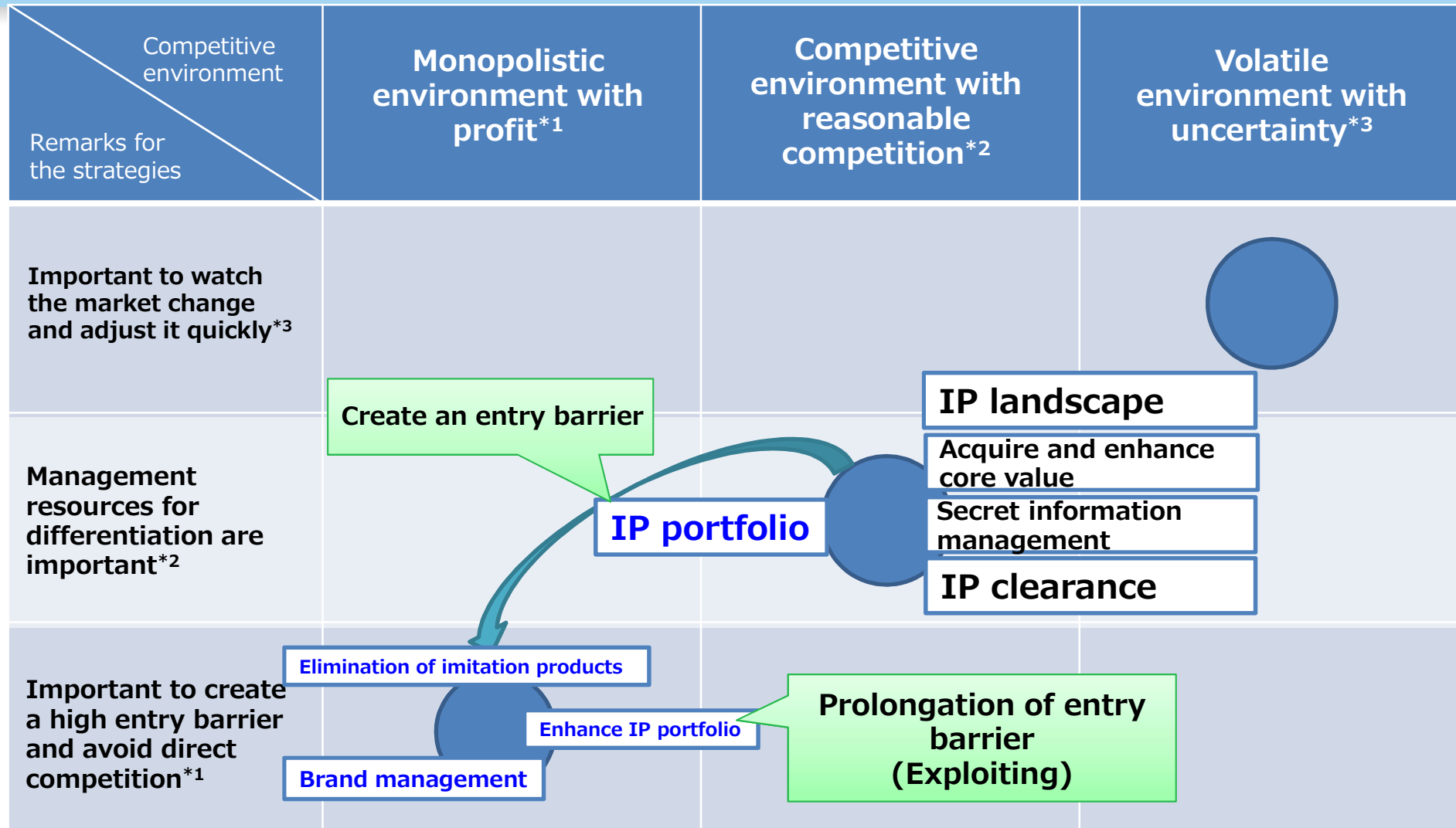
Corresponding management theories; SCP : Structure Conduct Performance (Structure, Conduct, Performance) , Michael Porter

*2 Competitive environment; Chamberlainian competition, Corresponding management theories; RBV : Resource Based View, Jay Barney

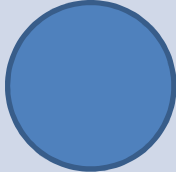
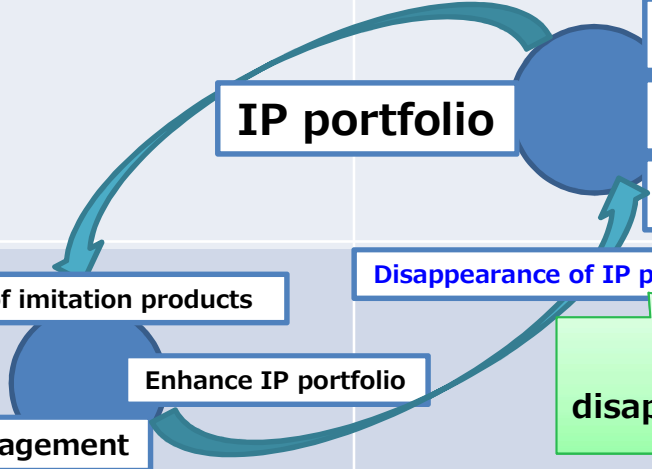
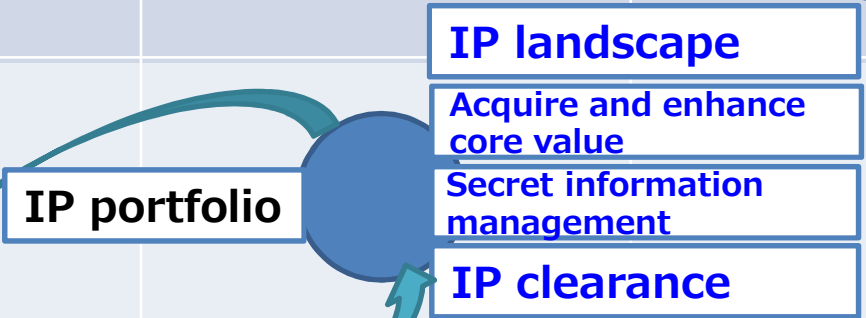
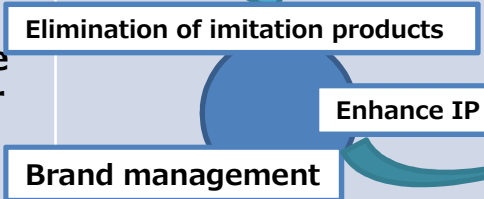

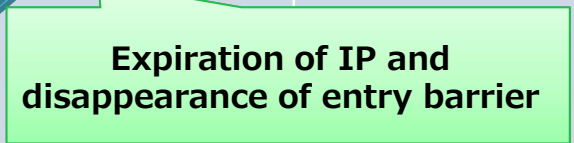
*3 Competitive environment; Schumpeterian competition, Corresponding management theories; Exploring and Exploiting (ambidexterity), Dynamic Capability, etc.

Competitive environment Remarks for the strategies	Monopolistic environment with profit*1	Competitive environment with reasonable competition*2	Volatile environment with uncertainty*3
Important to watch the market change and adjust it quickly*3	Identify the fount of the differentiation (Needs, technological changes, competitive analysis)		
Management resources for differentiation are important*2	The fount of the differentiation	Maintain the differentiation	 <p>IP landscape</p> <p>Acquire and enhance core value</p> <p>Secret information management</p> <p>IP clearance</p>
Important to create a high entry barrier and avoid direct competition*1		Confirm not to have any infringement of other company's IP	

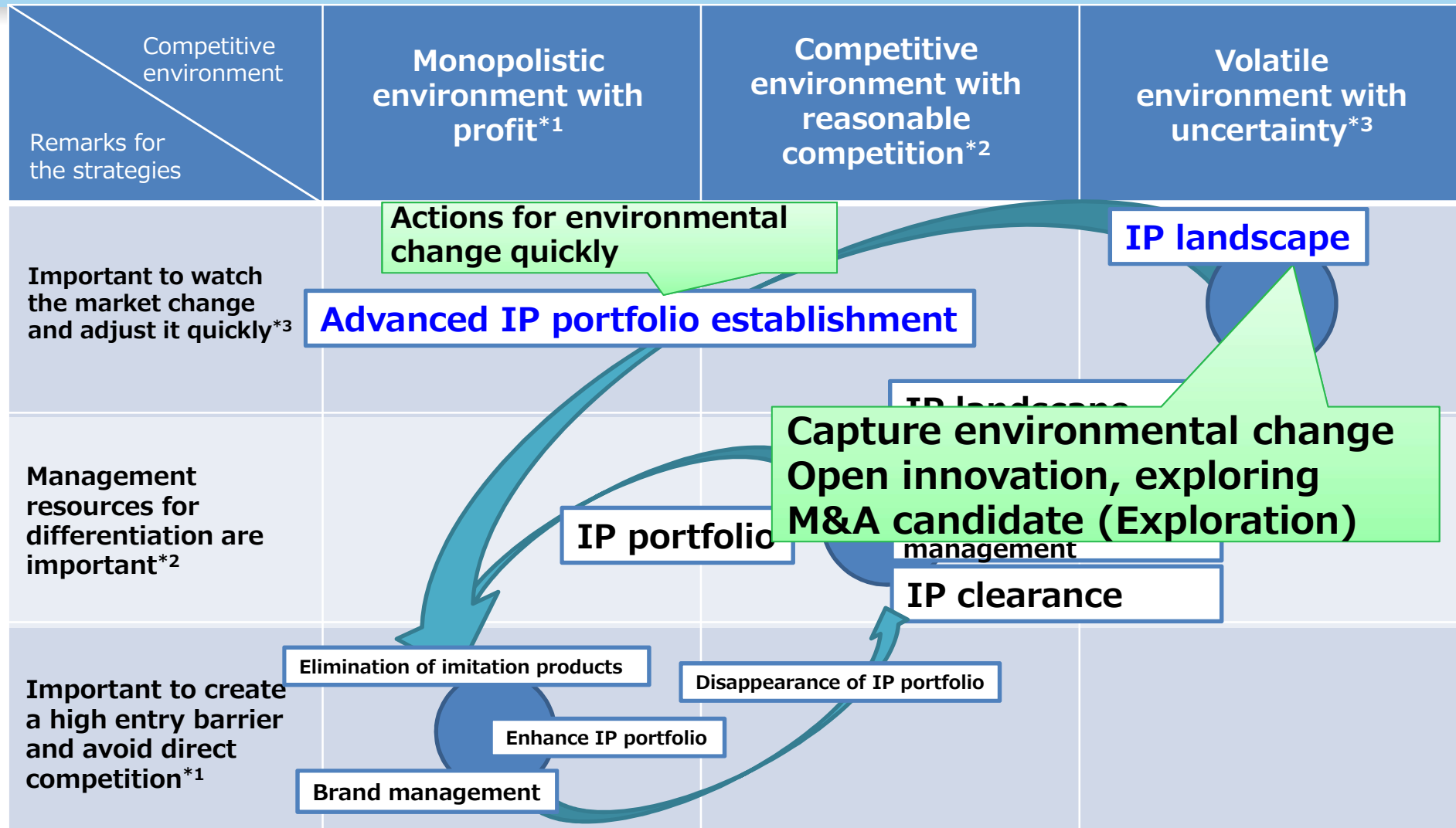
*1 Competitive environment; Industrial Organization type
 Corresponding management theories; SCP : Structure Conduct Performance (Structure, Conduct, Performance) , Michael Porter
 *2 Competitive environment; Chamberlainian competition, Corresponding management theories; RBV : Resource Based View, Jay Barney
 *3 Competitive environment; Schumpeterian competition, Corresponding management theories; Exploring and Exploiting (ambidexterity), Dynamic Capability, etc.



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Competitive environment Remarks for the strategies	Monopolistic environment with profit*1	Competitive environment with reasonable competition*2	Volatile environment with uncertainty*3
Important to watch the market change and adjust it quickly*3			
Management resources for differentiation are important*2			
Important to create a high entry barrier and avoid direct competition*1			

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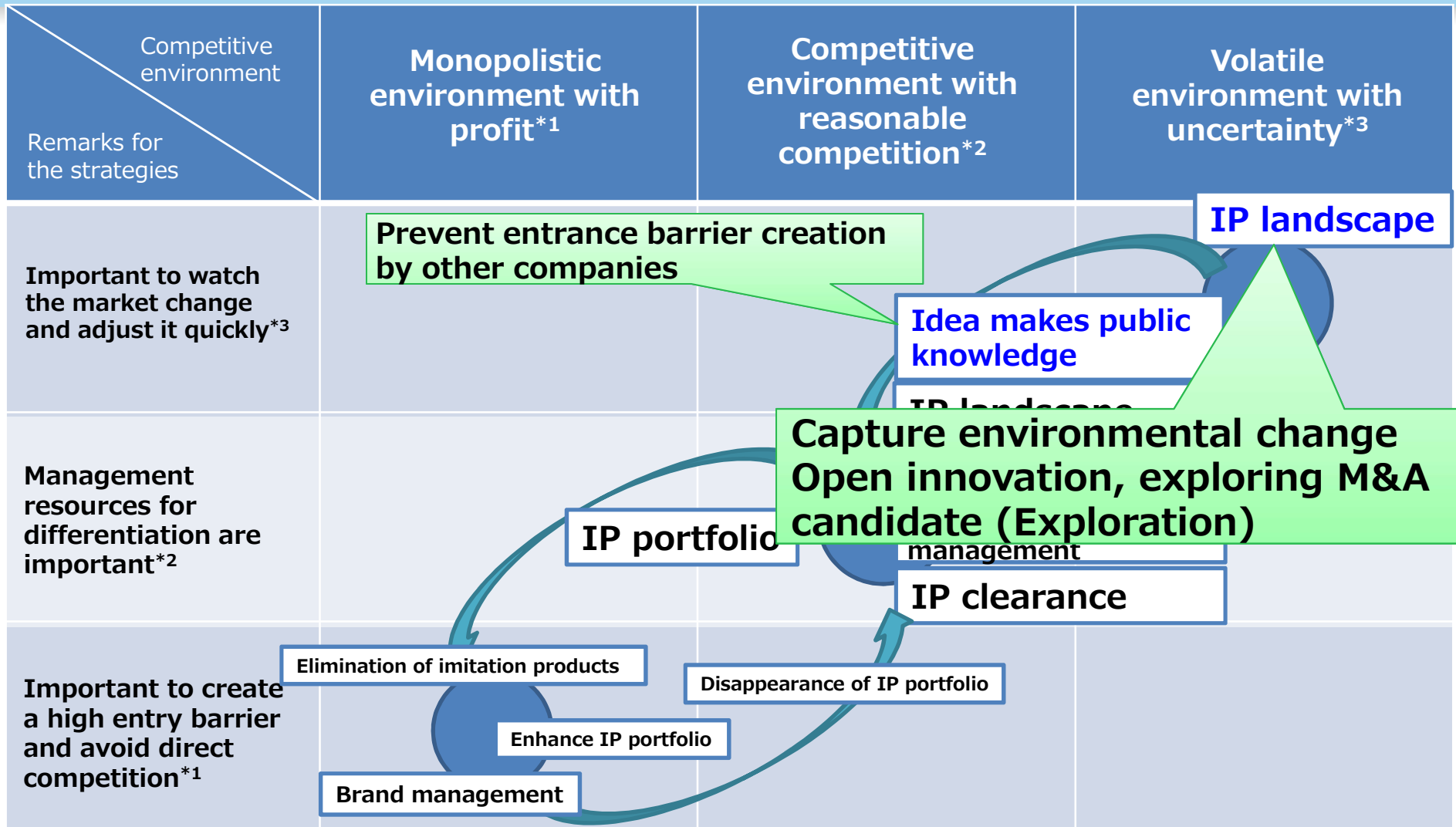


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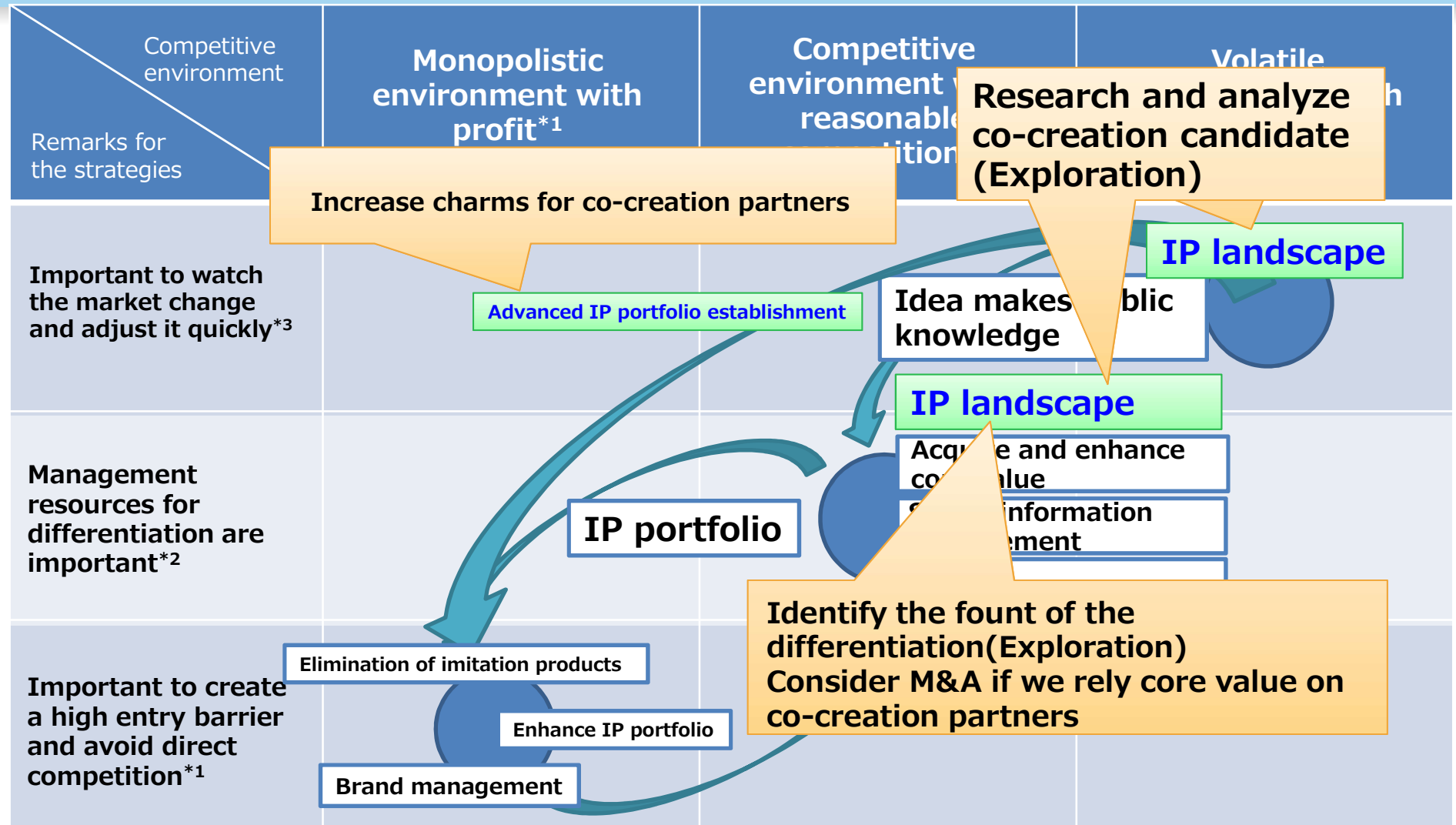
*2 Competitive environment; Chamberlainian competition, Corresponding management theories; RBV : Resource Based View, Jay Barney

*3 Competitive environment; Schumpeterian competition, Corresponding management theories; Exploring and Exploiting (ambidexterity), Dynamic Capability, etc.



**Capture environmental change
Open innovation, exploring M&A candidate (Exploration)**

*1 Competitive environment; Industrial Organization type
Corresponding management theories; SCP : Structure Conduct Performance (Structure, Conduct, Performance) , Michael Porter
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 *3 Competitive environment; Schumpeterian competition, Corresponding management theories; Exploring and Exploiting (ambidexterity), Dynamic Capability, etc.



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*3 Competitive environment; Schumpeterian competition, Corresponding management theories; Exploring and Exploiting (ambidexterity), Dynamic Capability, etc.

Promote intellectual asset management by the organic collaboration of the three committees to be a leader in innovation

Nabtesco Intellectual Property Strategy Committee (approx. once a year)

Deliberates on the firm-wide intellectual property strategies

Members are CEO and other managements and organized by General Manager of IP dept.

Nabtesco Intellectual Property Strategy Subcommittee

Horizontally cross-functional activities
(approx. twice a year)

1. Sharing intellectual property strategy activities
2. Discussing about common IP issues in in-house companies and group companies

Members; Senior general manager of the technology and R&D div., General manager of the IP dept., General managers and those in similar positions of the in-house companies

Company Intellectual Property Strategy Committee

Vertically cross functional activities
(approx. twice a year)

1. Discuss to acquire and enhance core value and IP strategy
2. Discuss on each in-house company's intellectual property strategies

Members; President of the in-house company, General manager of the IP Dept., General managers and those in similar positions, head of each dept.

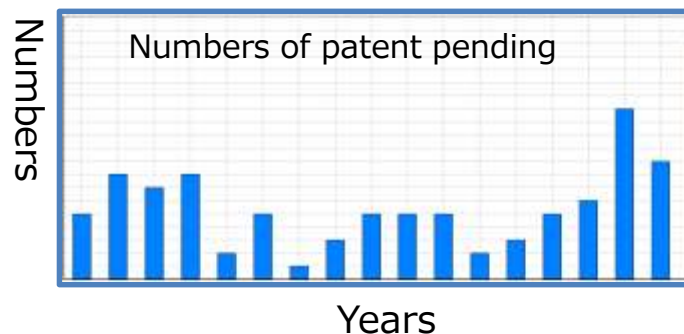
Effective use of use IP landscape

IP landscape, is not a patent map, is an technology information snapshot generating by various information collected from Nabtesco, competitors, R&D trend in the market, management strategies, IP and other information to indicate our current market position and future trend.

Refer from patent office; Research regarding skill standard for IP resources with changing in corporate IP strategy and industrial structure

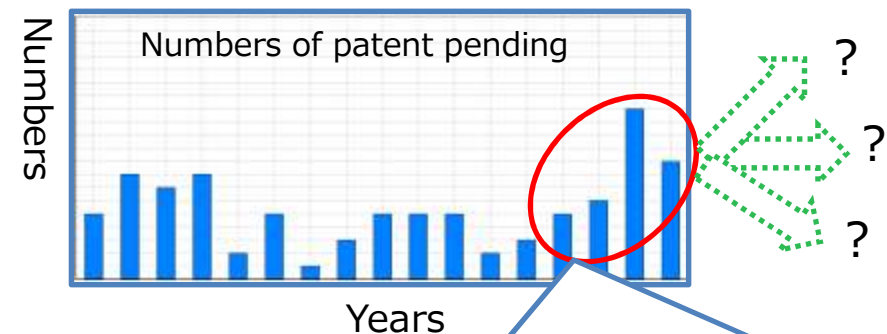
Patent map

Analysis only patent info



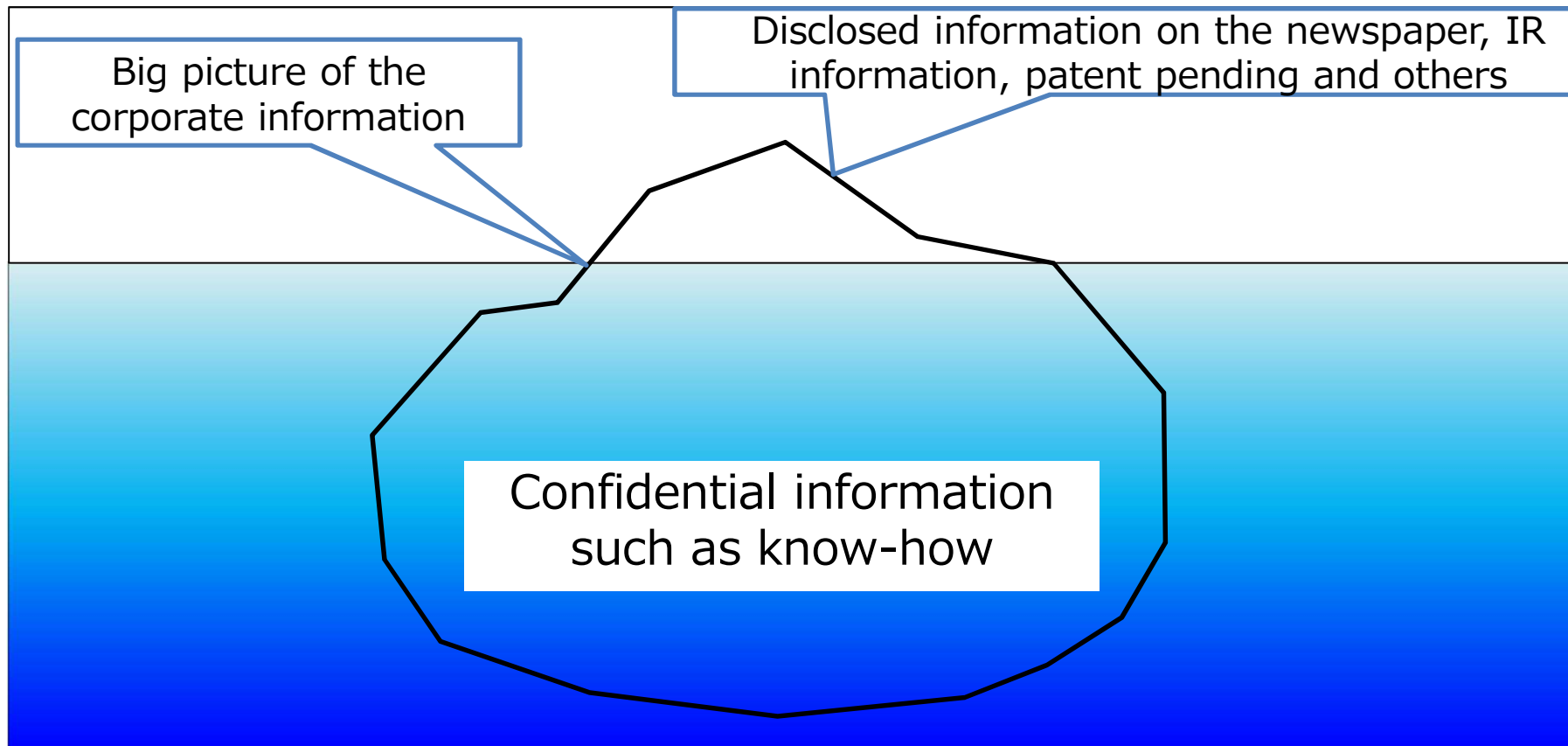
IP landscape

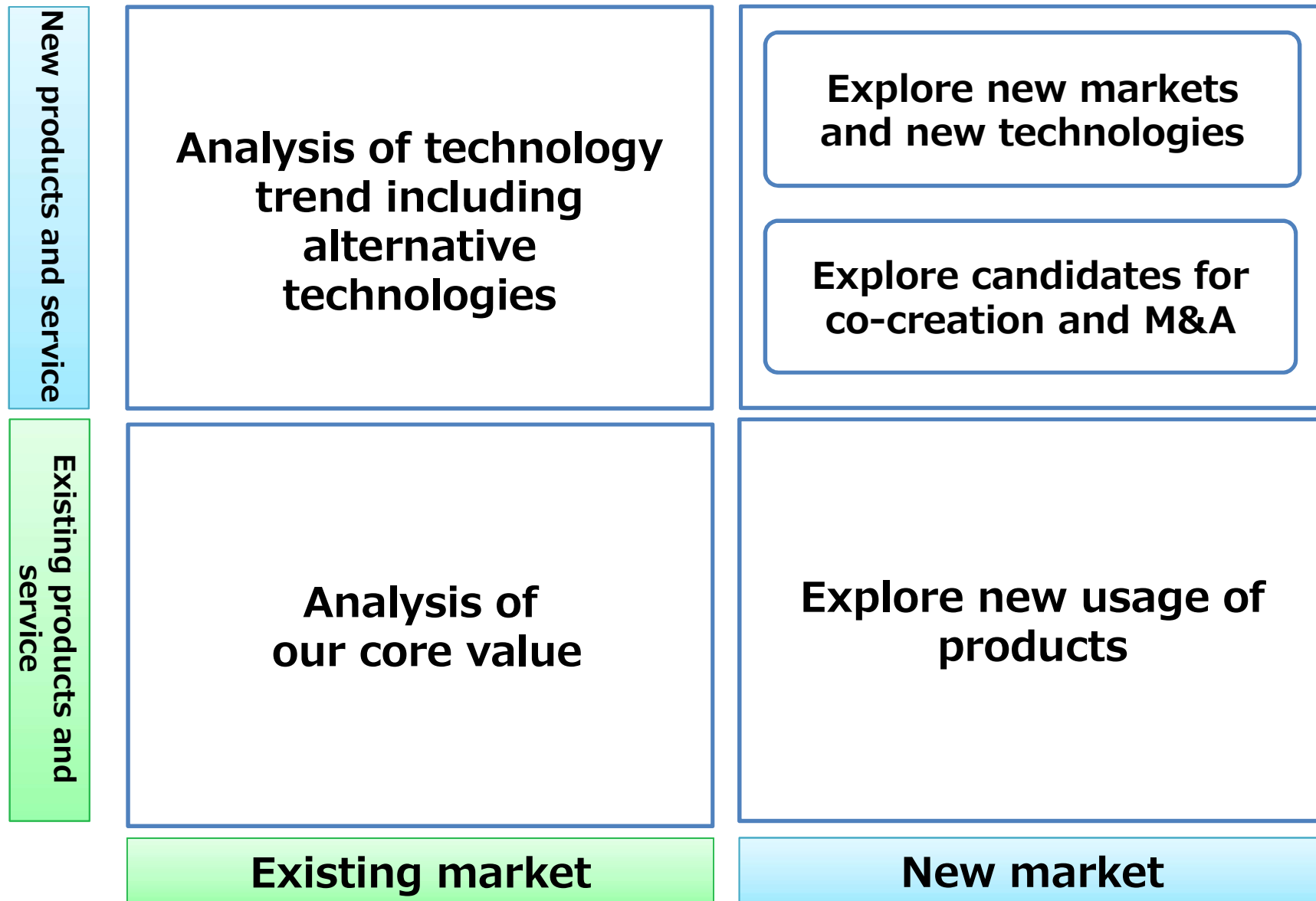
Analysis various disclosed information related to patent, IR and others



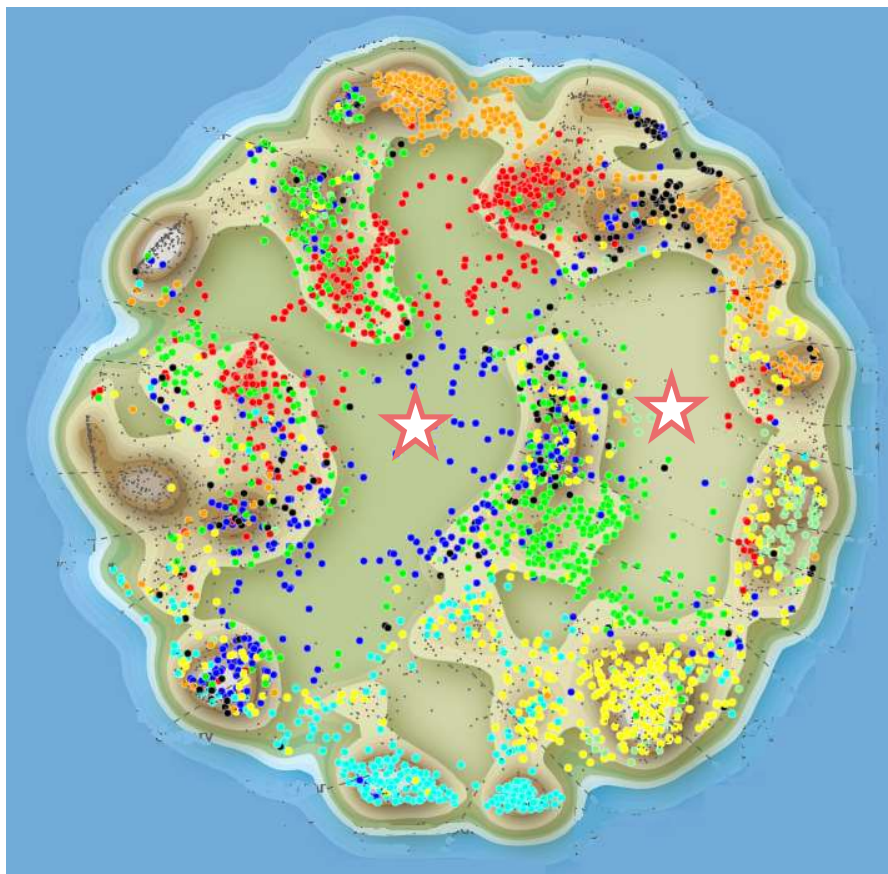
Use various different information to foresee the market change and decide IP strategy with business dept.

IP landscape make visible the part of information from corporate disclosures, although there are not only current technology trend such as patents but also **potential technologies to be used in the future and issues to be solved**. Therefore, use of **IP landscape could improve the prediction for the business strategy**





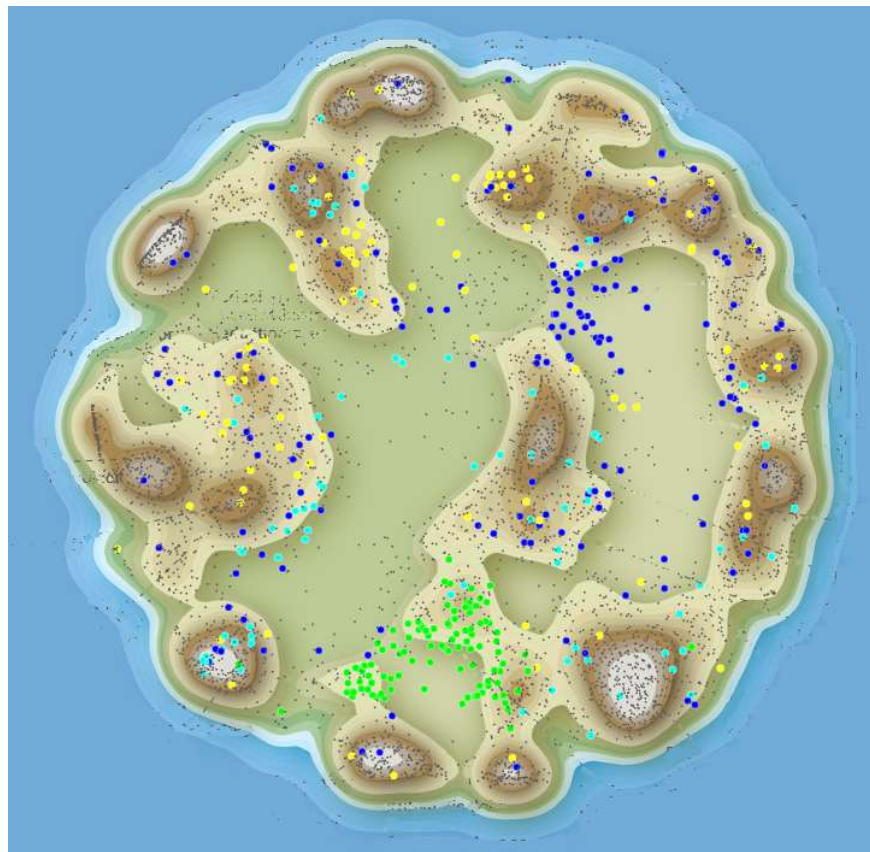
- Each dots show patent pending and those are allocated closely based on the technological similarity.
- Dots could show mountain and valley by density of the patents.
- If there are overlap at the landscape, there are technological correlation and one's core value can utilize to the other businesses.
- Stars; Those areas are able to strengthen current core value or put together other core values for new value.











- Precision reduction gears
- Hydraulic equipment
- Railroad vehicles equipment
- Aircraft equipment
- Marine vessel equipment
- Commercial vehicle equipment
- Automatic doors
- Packaging machines

*IP landscape above generated based on the patents from Nabtesco group as of October, 2021

- Each dots show patent pending and those are allocated closely based on the technological similarity.
- Dots could show mountain and valley by density of the patents.
- **Our products and services will contribute SDGs indirectly through our customers.**
- **Nabtesco will enhance SDGs related IP creation.**



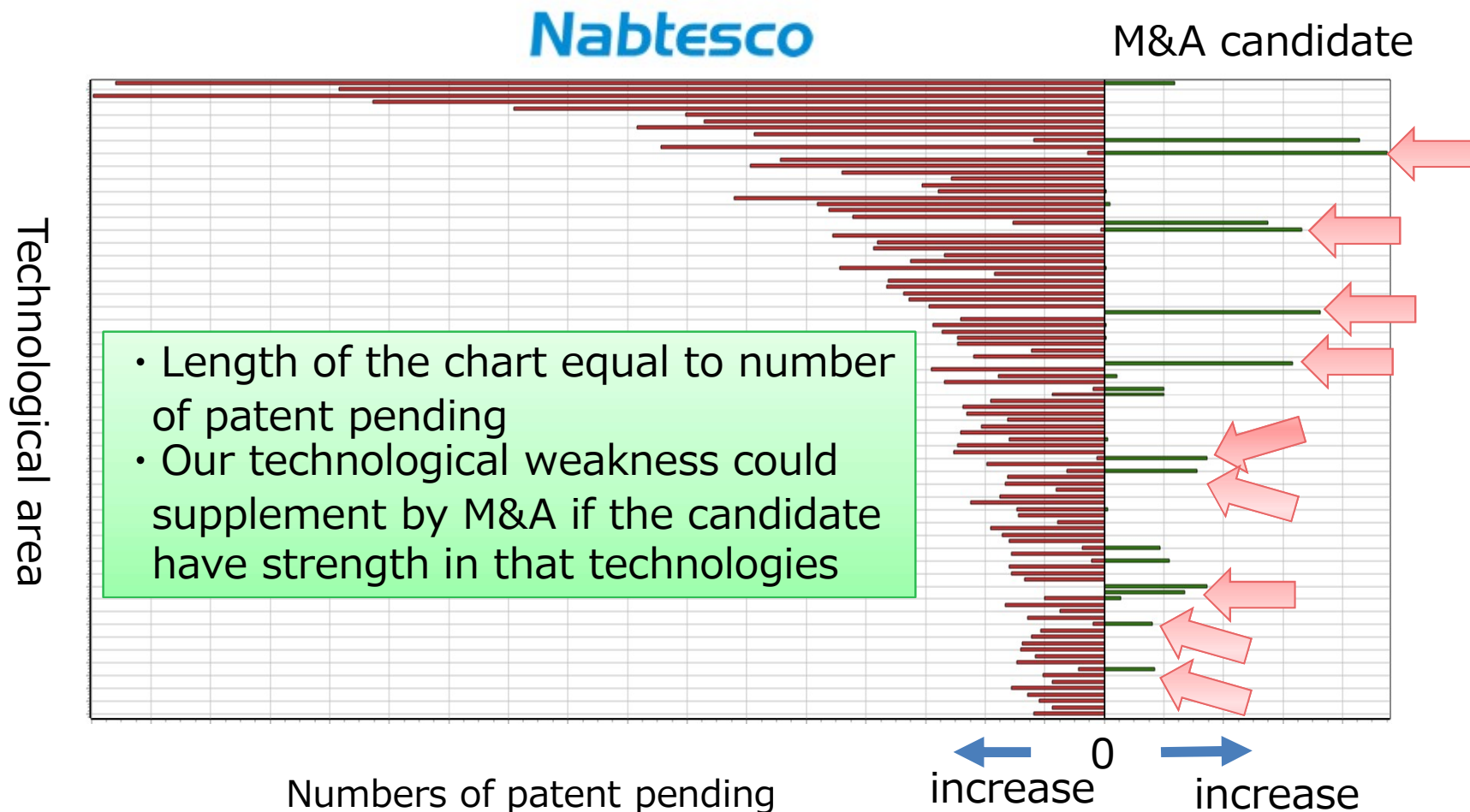
Relevant patents

- 

 - Wind turbine related.
 - Improve the efficiency of power consumption and decrease the failure.
- 

 - Platform doors
 - Safety drive for buses
- 

 - Downsizing and weight saving in mobility.
 - Prolong life cycle, improve durability, disposal and recycling.
- 

 - Weight saving in mobility and excavators.
 - High efficiency, accommodation to emission regulation by region and electrification of actuators.

*IP landscape above generated based on the patents from Nabtesco group as of October, 2021

Comparison of technological areas between Nabtesco and M&A candidate to know **whether there are a complementally relationship in technologies**

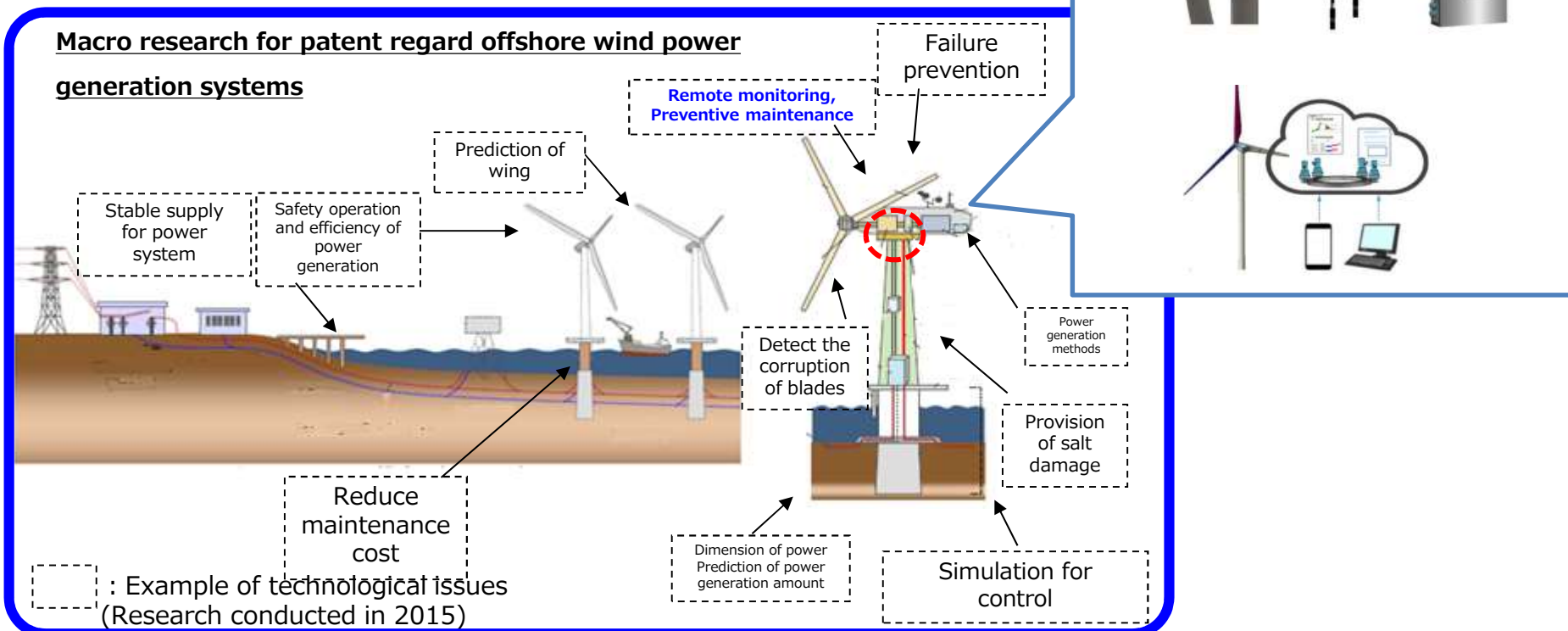
Red arrow show the technologies has complementally relationship with Nabtesco



Analyze entire system to know the actual needs from customers
→ **Utilize it to individual products and services development**

CMFS(Condition Monitoring system with Fail-Safe) will sell from January 2022

<https://www.nabtesco.com/pdf/178f63e2806ac684d11c1f175f3f238e.pdf>



Source: Pictures above was from "NEDO white paper on renewable energy technology, Chapter 3 Wind turbine power generation"

Nabtesco Won FY2018 Intellectual Property Achievement Award, Minister of Economy, Trade and Industry Award

Nabtesco was awarded the Minister of Economy, Trade and Industry Award at the FY2018 Intellectual Property Achievement Awards hosted by the Japan Patent Office of the Ministry of Economy, Trade and Industry in April 2018, for the successful activities driven by the intellectual property management strategy

平成30年度 知的財産権制度活用優良企業等表彰
知財功労賞 経済産業大臣表彰

知財活用企業(特許)

ナブテスコ株式会社 (代表取締役社長/専任特許管理士/CEO) 寺本 浩弘
http://www.nabtesco.com/

会社概要

所在地: 東京都千代田区千代田2-1-9
設立: 2003年
資本金: 10,000万円
従業員: 7,591人
事業内容: 特殊減速機、山登機、鉄道車両用機、新車機、船用機、電気車用機、自動車、産業用ロボット、知財特許の製造販売

受賞のポイント

- 独自の知財管理戦略を掲げ、グローバル企業競争の中で知財戦略を推進する体制を確立し、会社全体のコア競争力とそれを発揮・実行するための知財戦略、事業ポートフォリオの整理・改善等を推進する体制を構築している。
- 特許ビジョンの策定に向けた知財戦略を分析・把握して策定する事による、知財特許を活用したブランドステップの実現、競争優位の確立と事業ポートフォリオの分析、特許を武器とするマーケティング、アフターサービスやM&A戦略立案の推進等を果たして、知財特許が事業戦略の推進に大きく貢献している。
- 独自の知財管理戦略から、産業用ロボット、自動車等の事業分野において特許コア領域を開拓して事業競争を行っている。知財管理の強化のため、知財管理の体制とノウハウの構築を推進し、権利効果として、世界的市場での競争力向上に大きく貢献している。特許の活用は知財戦略の推進に大きく貢献しており、知財特許の活用が事業競争に大きく貢献している。



This material wrote by Nabtesco Intellectual Property Dept. Pictures above are from intellectual property achievement awards ceremony.

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moving it. stopping it.

