



Service Solution

ConSite

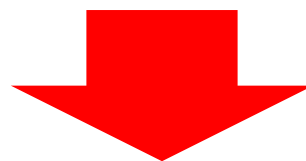
March 7, 2019

Satoshi Inose

General Manager, ConSite Business IoT Dept.
Customer Support Div., Life Cycle Support Operations Div.

 **Hitachi Construction Machinery Co., Ltd.**

We want to be that partner that best understands the customer machine's conditions.



“Remote monitoring,
failure prevention technology”



Characteristics of Construction Machinery

(1) Is operated over a prolonged period

Operated for over 10 years, sometimes for over 30 years

(3) Is operated in various environments

Dust, rain, wind, vibration, temperature (-50°C to +50°C)

(2) Handles heavy loads

Mining machines shovel up 70 tons of earth with one scoop

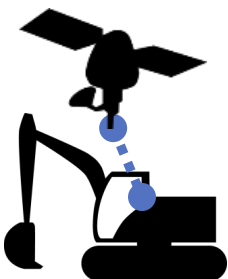
(4) Operating environment changes

Moves to different site with each job

Machine trouble leads to loss for customer

Is operated under different conditions at each site and sometimes in remote locations

Work stops if the machines break down, so service is an important deciding factor when purchasing new machines



Customers' needs

Enhancement of
safety

Improvement of
productivity

Reduction of
life-cycle cost

Solution Linkage

ICT/IoT solutions solving problems together with customers

AHS Solutions
[Autonomous Haulage
System]



Fleet Management
Solutions



ICT Solutions
for i-Construction



Service
Solutions



One Hitachi

Hitachi Construction
Machinery

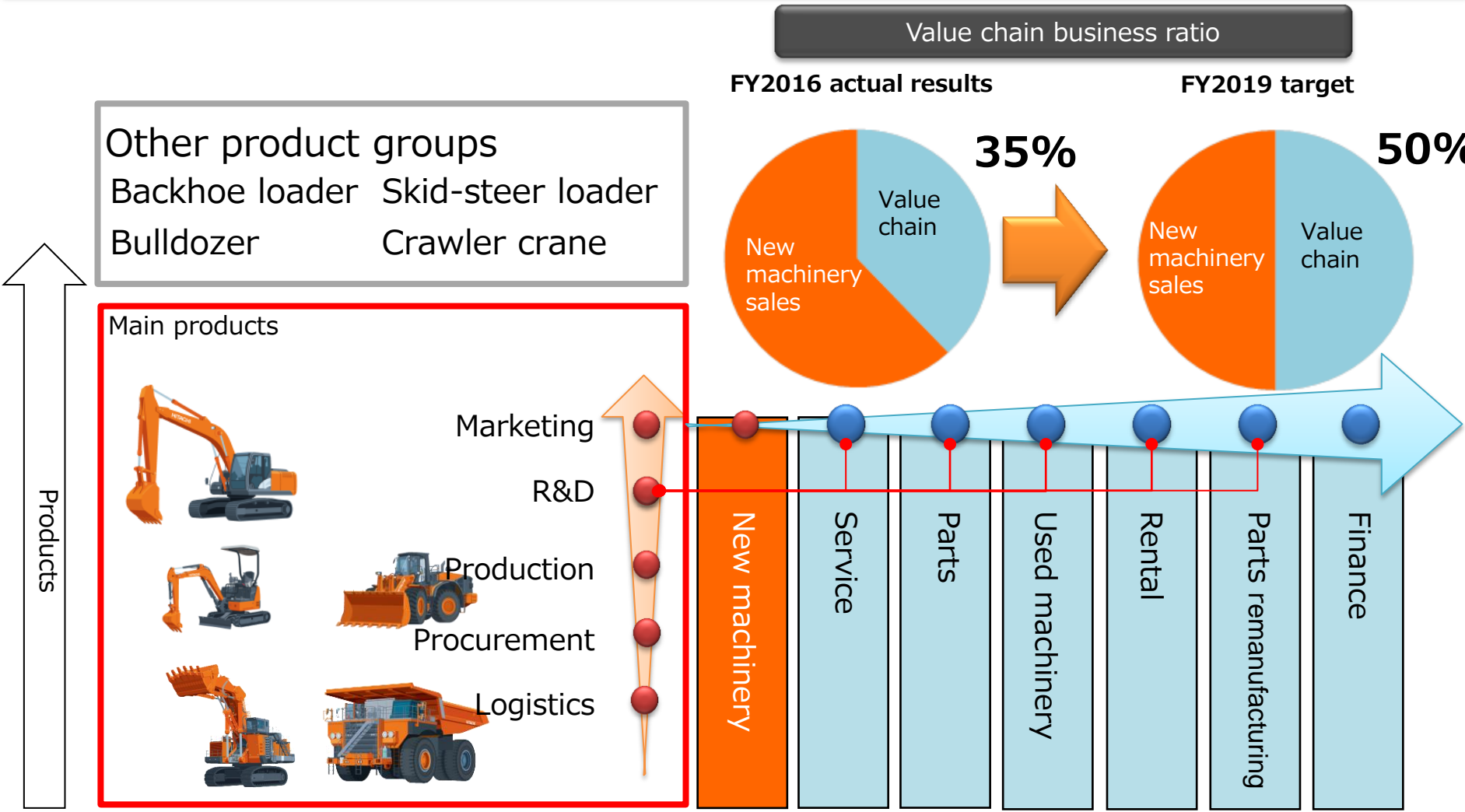
Open Innovation

ConSite Explanatory Meeting

Contents

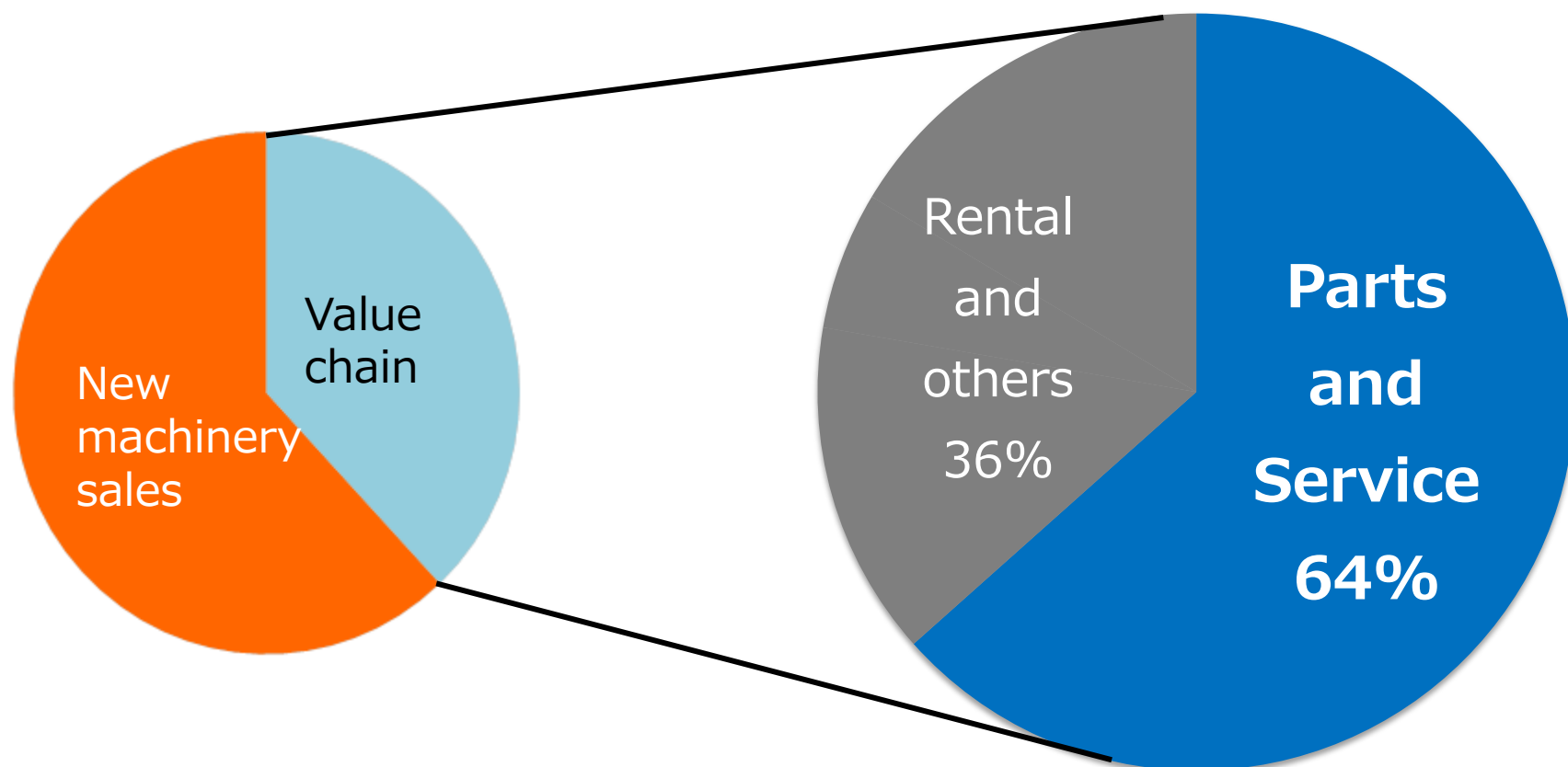
- ▶ 1. Mid-term Management Plan and ConSite
- 2. What is ConSite?
- 3. Development of Smartphone App
- 4. Conclusion

Increasing the value chain to half of consolidated sales revenue by FY2019



Parts and service business is an important element of the value chain and will be further strengthened in future

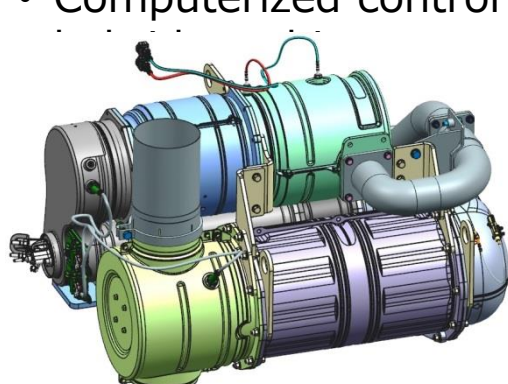
Breakdown of value chain business ratio in FY2016



Issues related to flexible response to social change

(1) Sophisticated machinery and repair skills

- Hi-tech equipment due to exhaust emission standards
- Advanced control technology for hydraulic systems
- Computerized control technology for



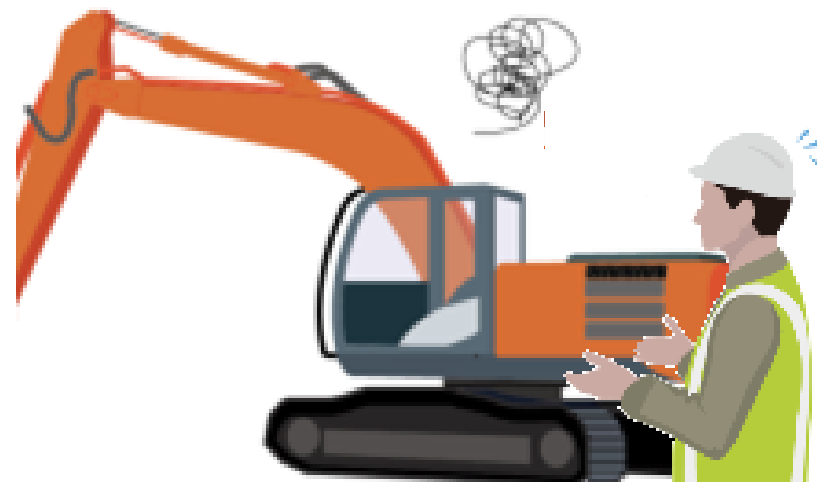
After-treatment device
(urea SCR system)



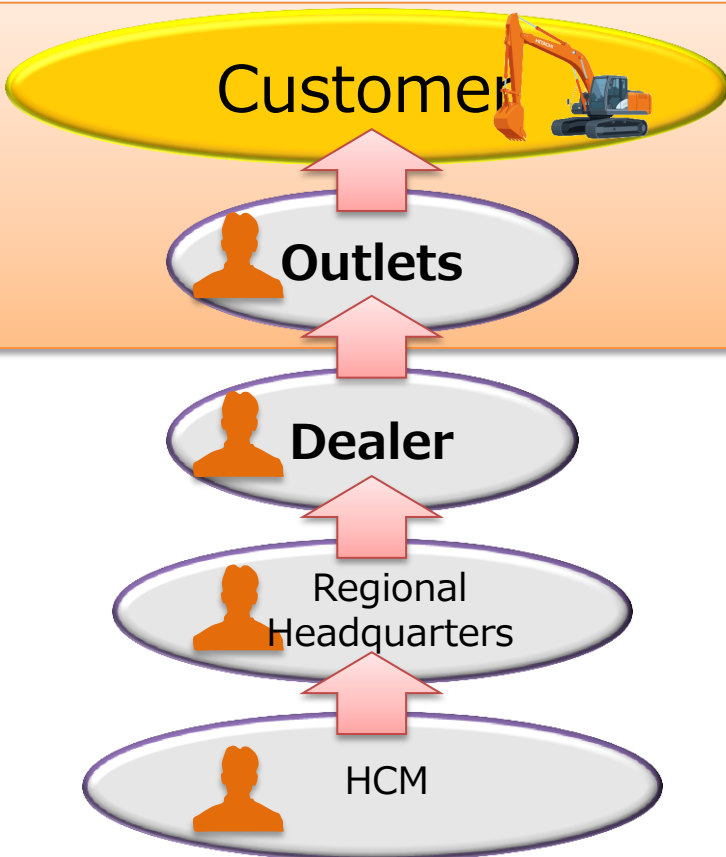
Hybrid engine
(with integrated motor)

(2) Global shortage of engineers

- Dramatic decline in skilled construction workers and lack of successors
- Takes time to train engineers with advanced diagnosis skills

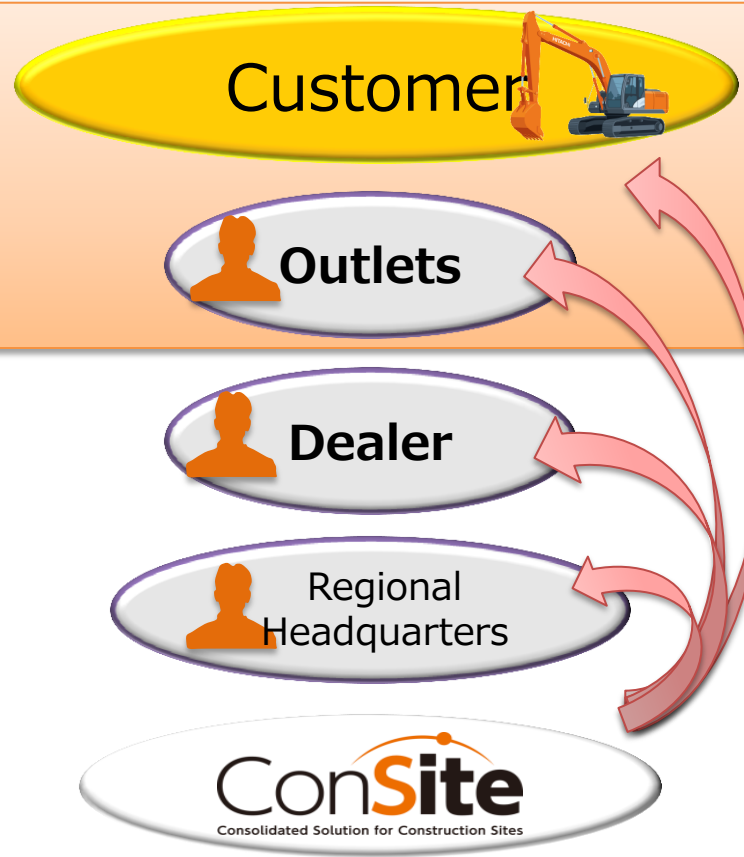


(1) Strengthening of organization



Organization-based action

(2) Strengthening of IoT (ConSite)

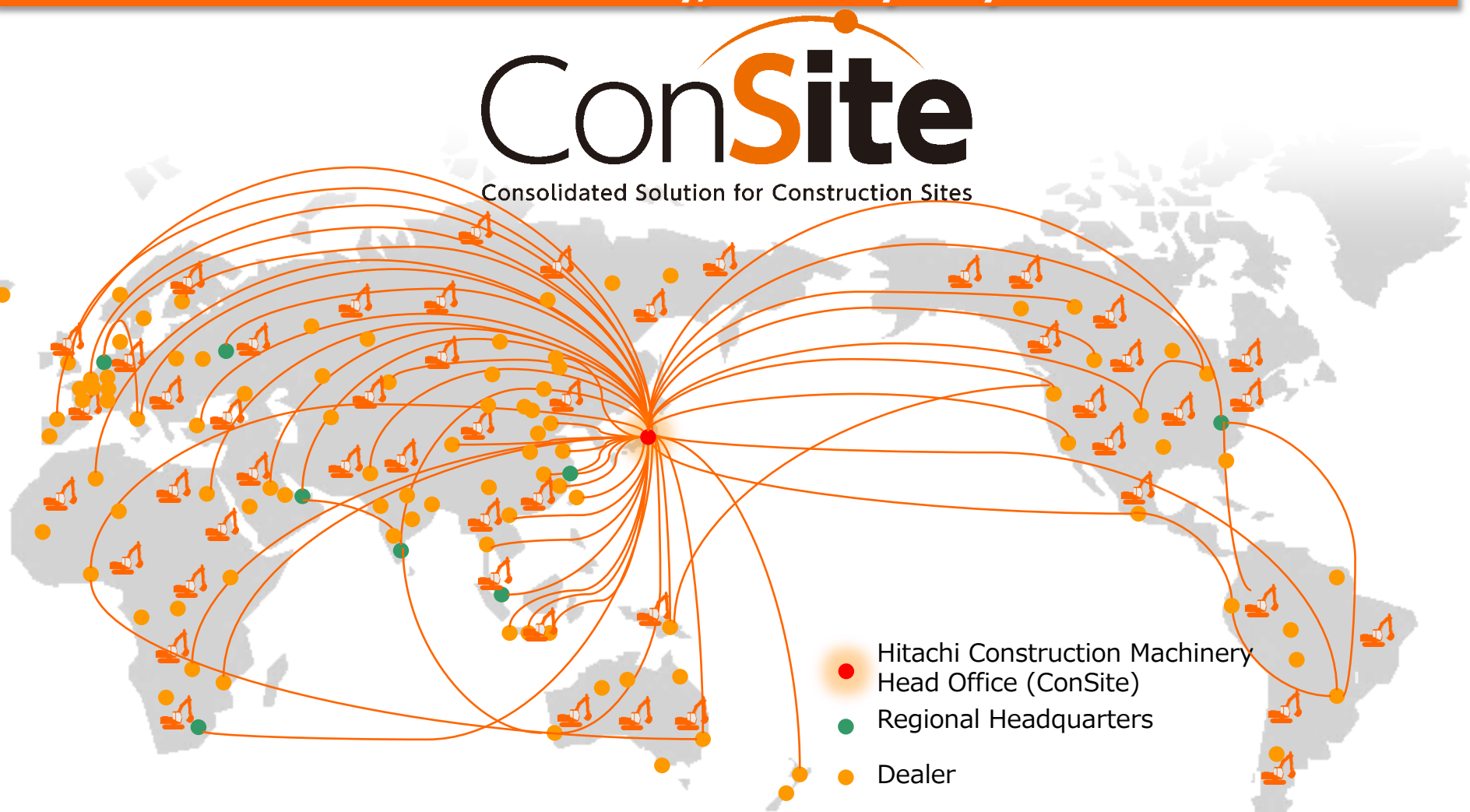


Information-based action

ConSite is an information infrastructure linking customers, dealers and regional headquarters all over the world 24 hours a day, 365 days a year

ConSite

Consolidated Solution for Construction Sites

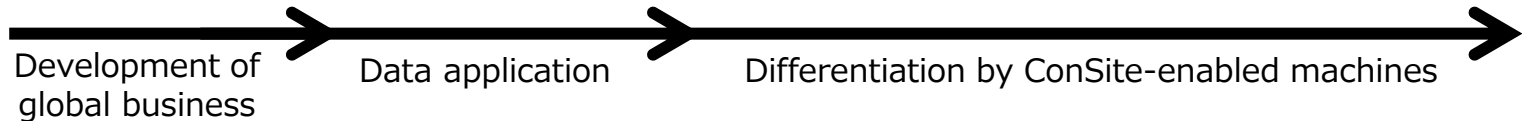


Fully automated system for remote fault prediction

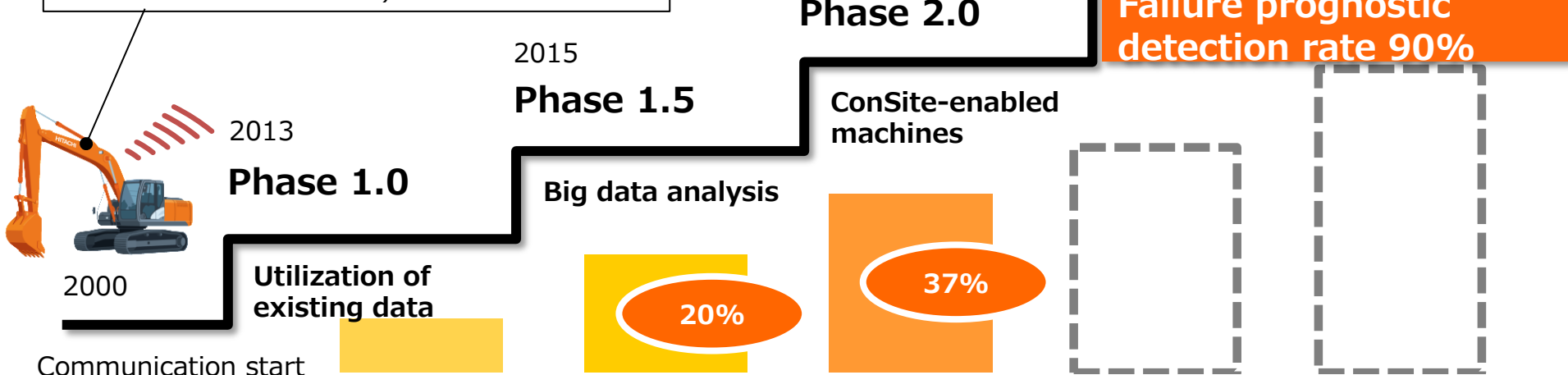
KPI: Remote prognostic detection rate by sensing

The failure prognostic detection rate shows the percentage of faults that were remotely detected or predicted

Steps to the target



World's first all-purpose hydraulic excavator with communication terminal loading machines (June 2000)



Integration of other industry technologies is key point

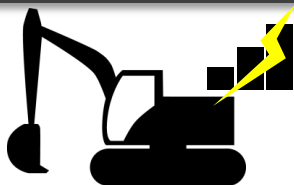
(1) Utilization of accumulated technical knowledge



- Design know-how
- Service know-how
- Fault diagnosis know-how

Technical knowledge of machine breakdowns

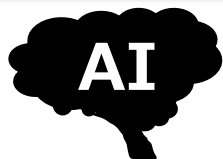
(2) Technical innovations



Intelligent machines

- Sensors
- Detection technologies
- Communication technologies

(3) AI technologies



- Determination of combinations
- Automatic feedback function

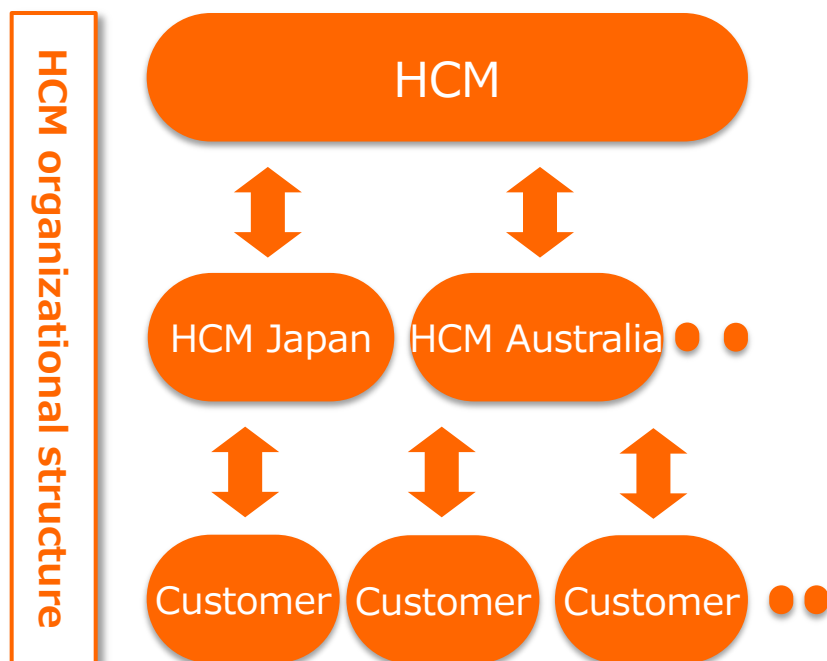
- Mechanical engineering technologies
- Control technologies
- ICT
- IoT technologies
- Service technologies
- AI technologies
- Physical property (oil, etc.) technologies

Technologies are
integrated and optimized

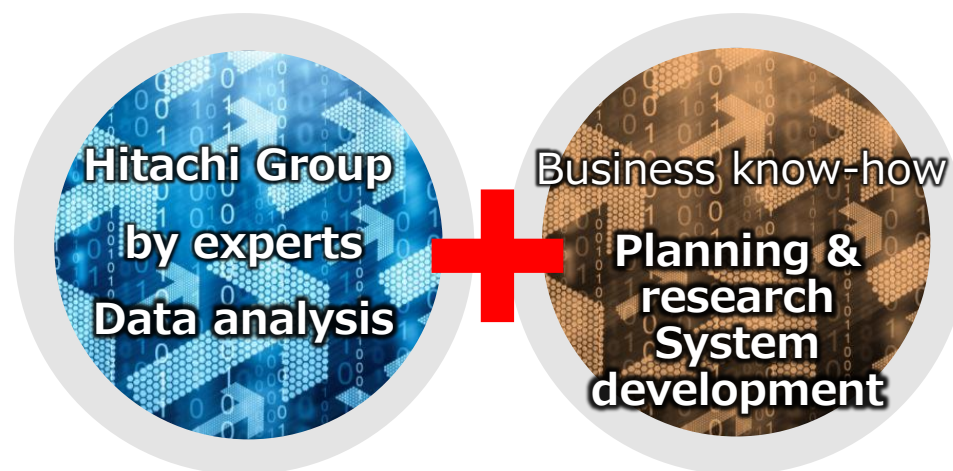
Prognostic
detection rate
90%

(1) Accumulation of know-how and information at company-owned distributors over many years

(2) Organizational capability with flexibility to incorporate leading-edge engineers



**HCM organizational structure
for direct sales and service**



Dedicated organization of 45 persons including Hitachi Group experts established in 2017

**One Hitachi - the Group
power of 300,000 employees**

ConSite solves problems facing customers and companies while at the same time creating business profit for HCM

Value for customers

- ◆ Reduces customers' lifecycle costs
- ◆ Prevents breakdowns and maintains productivity

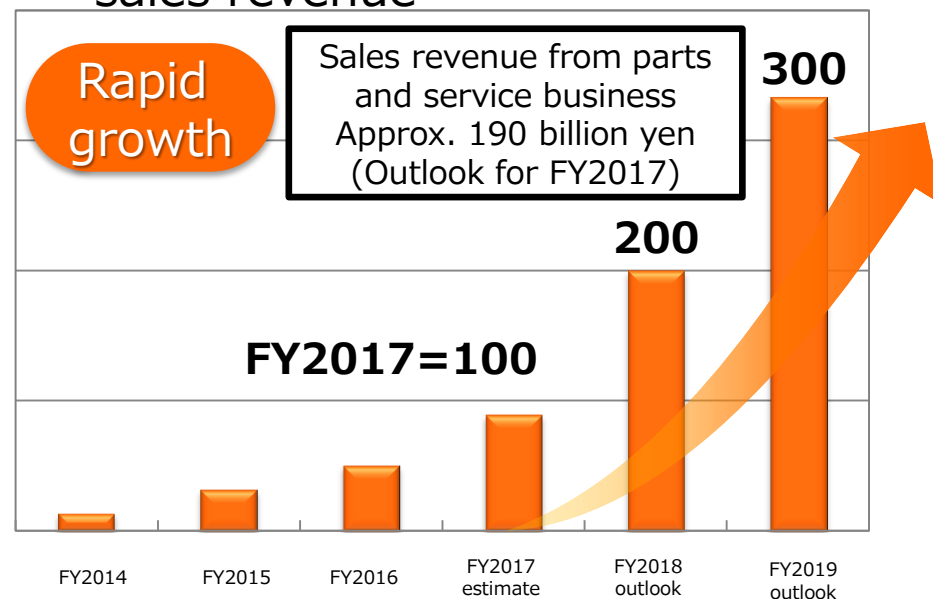
Response to social change

- ◆ Responds to sophistication of machines and repair technology
- ◆ Meets global shortage of engineers



Value for HCM

Contributes to parts and service sales revenue



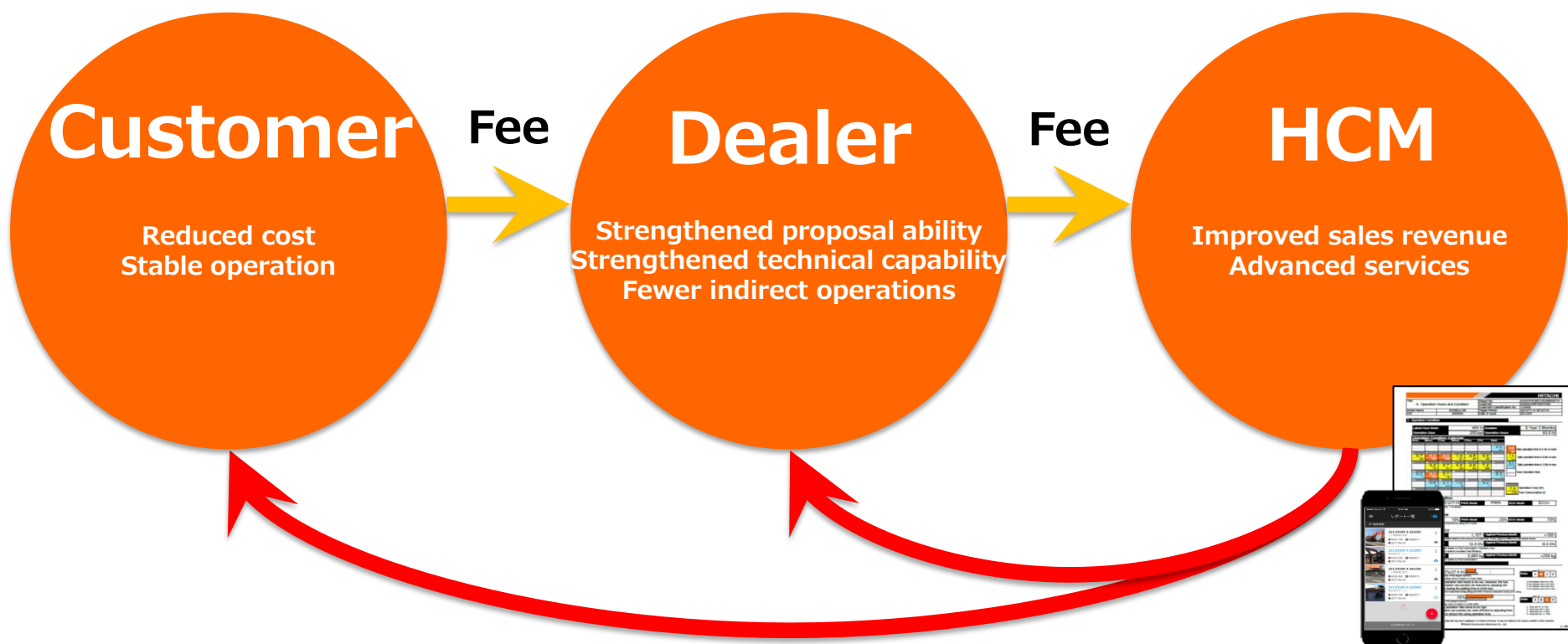
- ◆ Improves operating income and ensures stable management
- ◆ Enhances HCM brand value
- ◆ Realizes HCM strategy

ConSite Explanatory Meeting

Contents

1. Mid-term Management Plan and ConSite
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ConSite realizes fee-based digital contents including data-reporting



Number of contractors increased dramatically after development in 2014

113 countries and regions 33 languages

Including Hindi, Hebrew, etc

Number of contracts

Result: 123,000

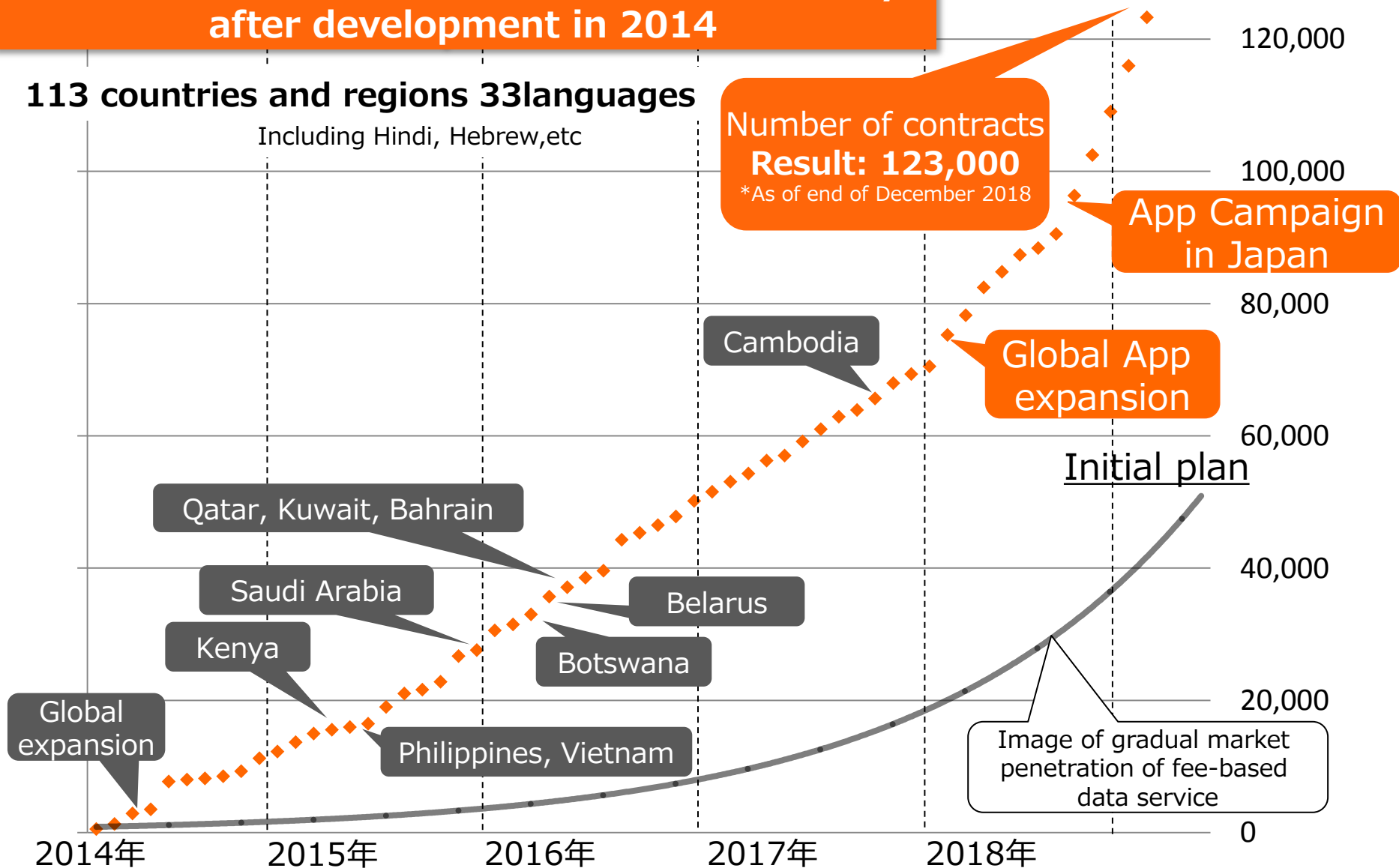
*As of end of December 2018

App Campaign in Japan

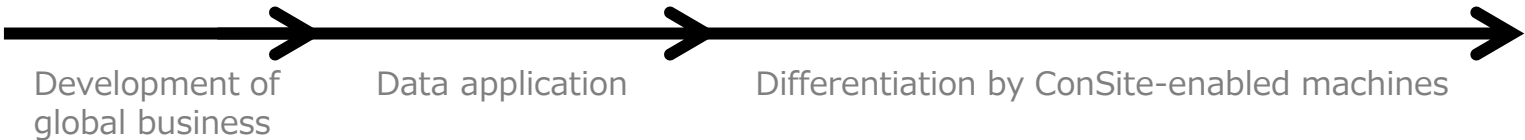
Global App expansion

Initial plan

Image of gradual market penetration of fee-based data service



Steps to the target



2020~

Phase 3.0

Failure prognostic
detection rate 90%

2017

Phase 2.0

ConSite-enabled
machines

37%

2015

Phase 1.5

Big data analysis

20%

2013

Phase 1.0

Utilization of
existing data

2000

Communication start



Notification of an **urgent failure** in the worksite



Work site

0101000100



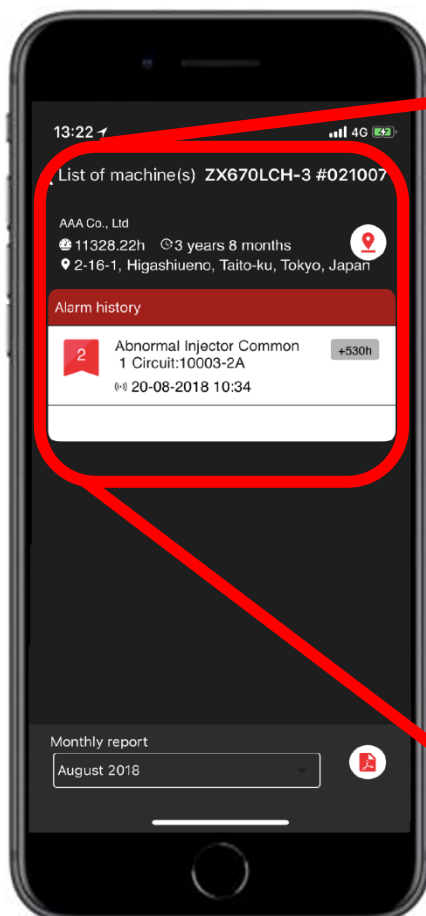
Worksite operator



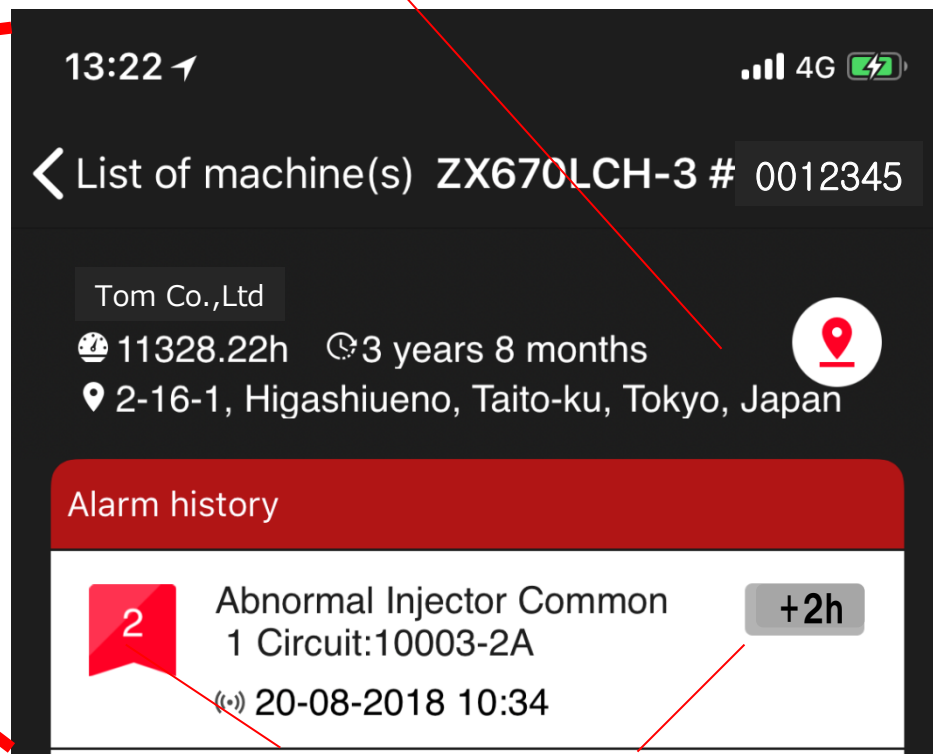
Office



HCM



You can also verify the address, map location, type of alarm and troubleshooting manual




Sent 2 times

2 hours since


Troubleshooting Manual for Dealers the alarm

14:25 ZX200-5G 5,219HR Engine damage avoided thanks to the emergency alarm.


14:27 Contact  Taichung branch ▶▶▶▶▶ Customer



①I received an alarm regarding low pressure on engine oil. Is everything ok?




②It seems the machine just hit an iron fence while operating. How did you know?




③Please so not operate the machine until the mechanic arrives.

15:10 Contact  Taichung branch ▶▶▶▶▶ Customer



④There is a risk of burning or damaging some parts of the engine if you operate the machine under this conditions.



⑤Thank you very much for the fast service.



Customer worksite



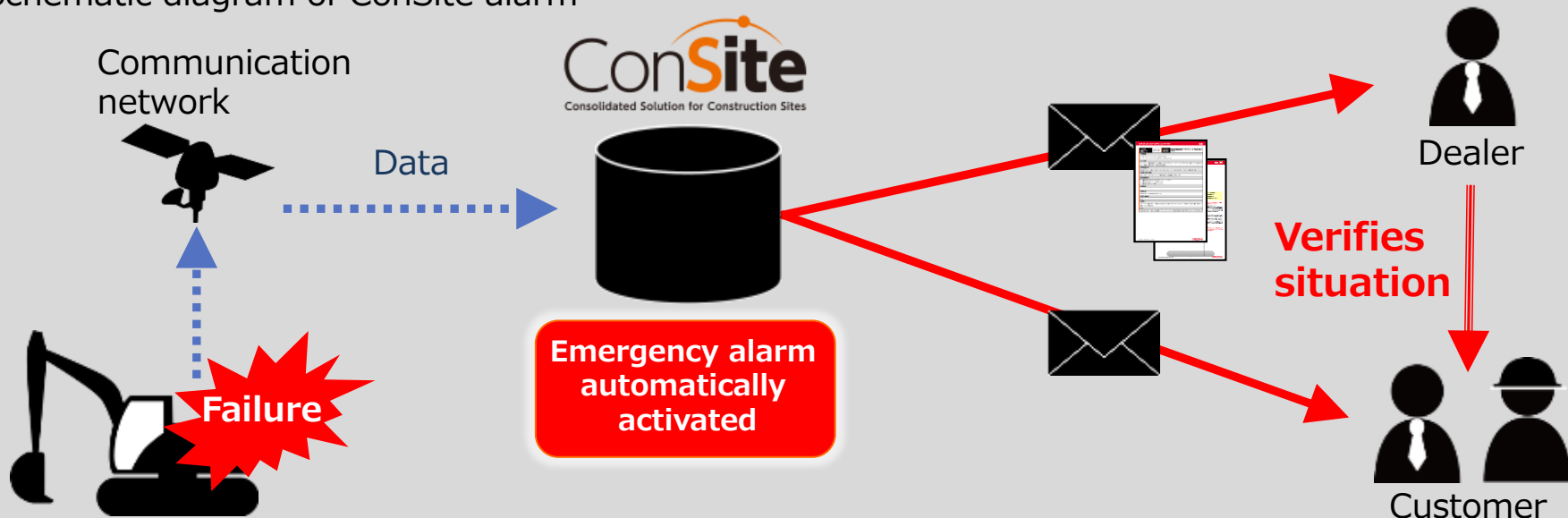
Filter damage



We were able to get the customer trust and a better relationship.

1. As in the example, the **alarm is automatically activated in real time** when a machine abnormality occurs.
2. As the dealer contacted the customer before the customer called, the customer was **impressed by the faster-than-expected response**.

Schematic diagram of ConSite alarm



Every month performance recorded.



Worksite

You can verify operating information such as:
Daily, monthly fuel consumption, hours & years operating.

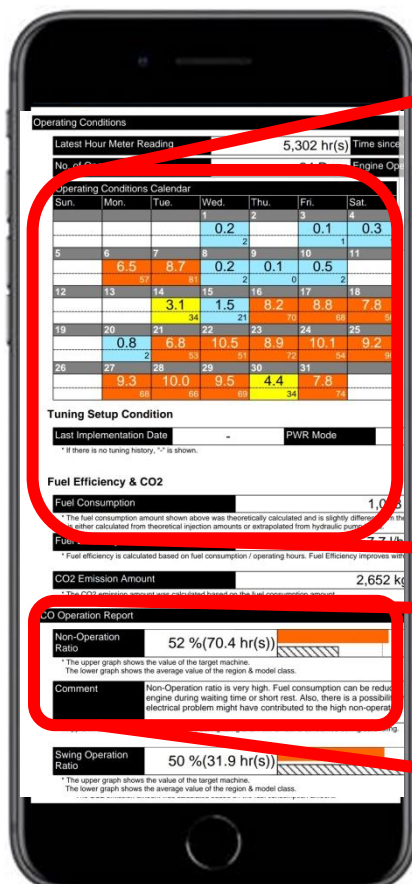
0101000100



Site director



Office



Operating Conditions

Latest Hour Meter Reading 5,302 hr(s) Time since

No. of Operating Days 24 Days Engine Op

Operating Conditions Calendar

Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.
			1	2	3	4
			0.2		0.1	0.3
5	6	7	8	9	10	11
6.5	8.7	0.2	0.1	0.5		
12	13	14	15	16	17	18
19	20	21	22	23	24	25
0.8	6.8	10.5	8.9	10.1	9.2	
26	27	28	29	30	31	
9.3	10.0	9.5	4.4	7.8		

ECO Operation Report

Non-Operation Ratio 52 % (70.4 hr(s))

* The upper graph shows the value of the target machine.
The lower graph shows the average value of the region & model class.

ECO operation report (non operation, swing ratio)
Able to compare to same class on same region

Thanks to ConSite monthly report productivity improved by 21%

ZX220-GI (2machines)Compare operational status using the monthly report

Customer



It is the same worksite and same model. But ECO Rank is lower ?
Let's go to the field and check it.

Customer



I'll reward the team with a better fuel consumption!

Site enhancement meeting



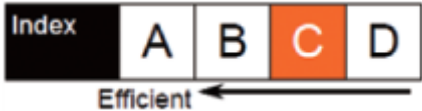
Let's operate more ECO

Let's change the machine position.

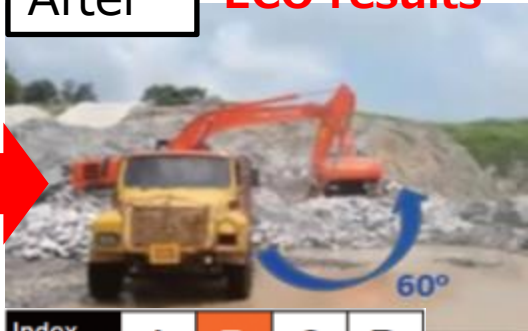
ECO



Before



After



ECO results

1. The monthly report is sent automatically once a month. Keep track of your machines even if you don't have IT knowledge.
2. You can think of the monthly report as a monthly medical check up.

Customer
IDEA

Instead of scolding that bad managed worksite.

He awarded the one that improved the ECO operation.

Results : 「Financial reward」 < 「Fuel cost savings」
Which ended up being company profits.

Original technology



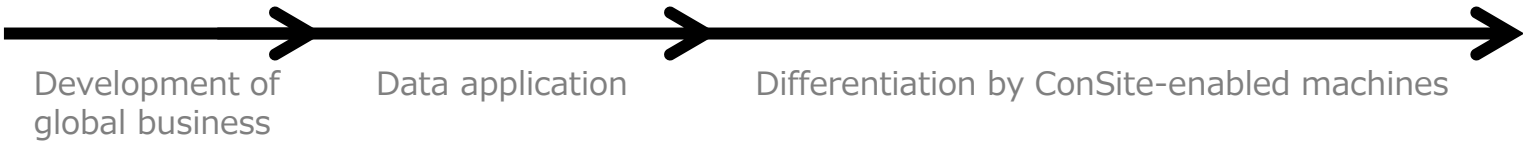
Monthly report

Auto creates monthly summary of machine operation

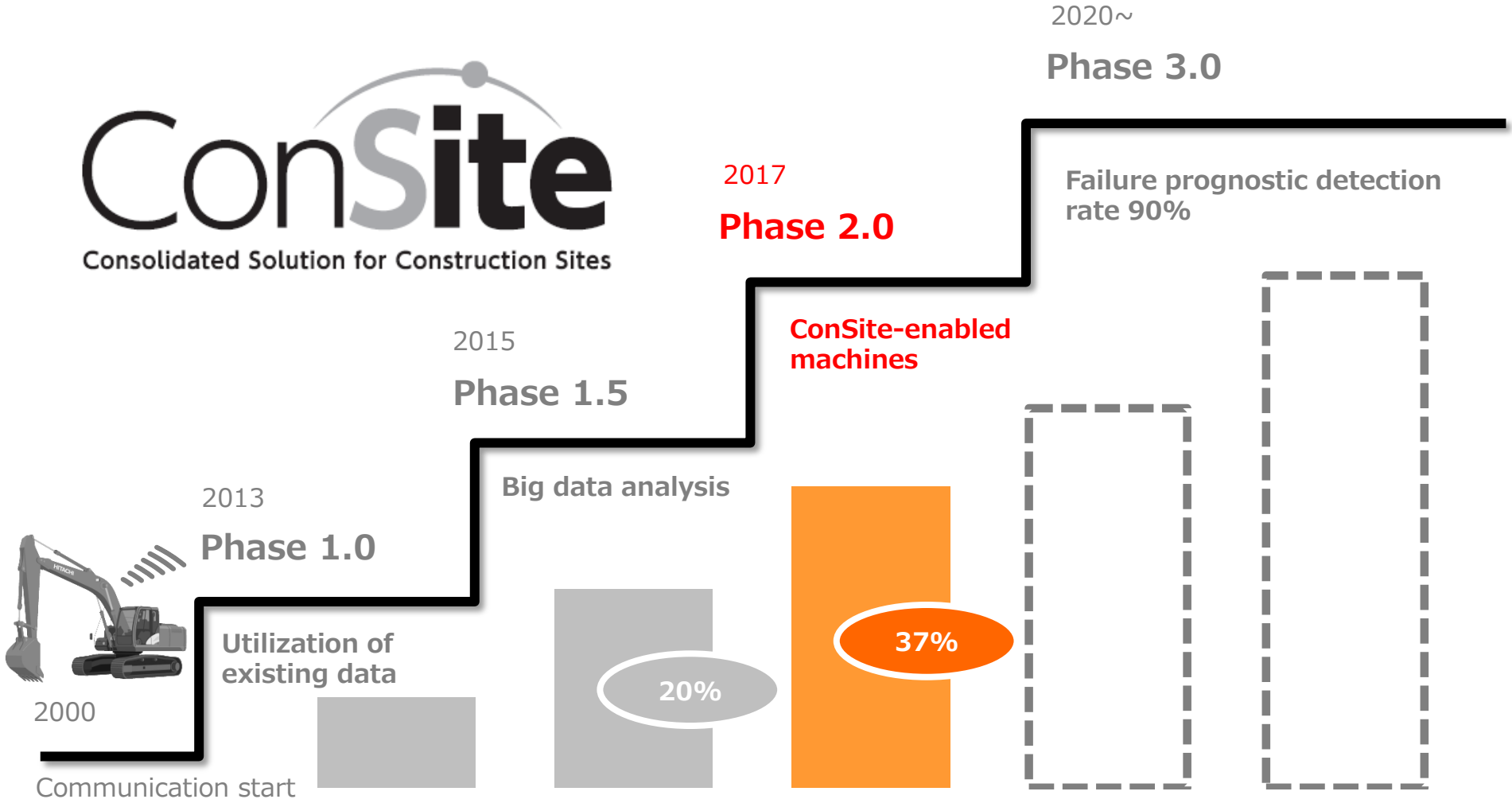
Parameter	Judgment			
	June	July	August	Sep
Non-operation ratio	C	C	B	B
Swing operation ratio	C	B	B	B
Non-operation ratio	C	C	B	B
Swing operation ratio	B	B	B	B

**Even the Dump truck driver
joined the team and improved
is driving fuel consumption.**

Steps to the target



ConSite
Consolidated Solution for Construction Sites



Oil sensors were introduced for first time in the construction industry and prognostic detection technology was improved

Oil sensor

Previously oil analysis was not possible without sampling, but now 24-hour monitoring by sensing is possible

Two kinds of monitoring oil

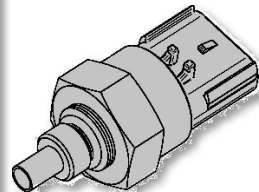
Engine oil

Hydraulic oil

Monitors deterioration and contamination

Oil deterioration (life): oxidation, viscosity, additive degradation

Oil contamination (abnormality): moisture, soot, fuel mixture

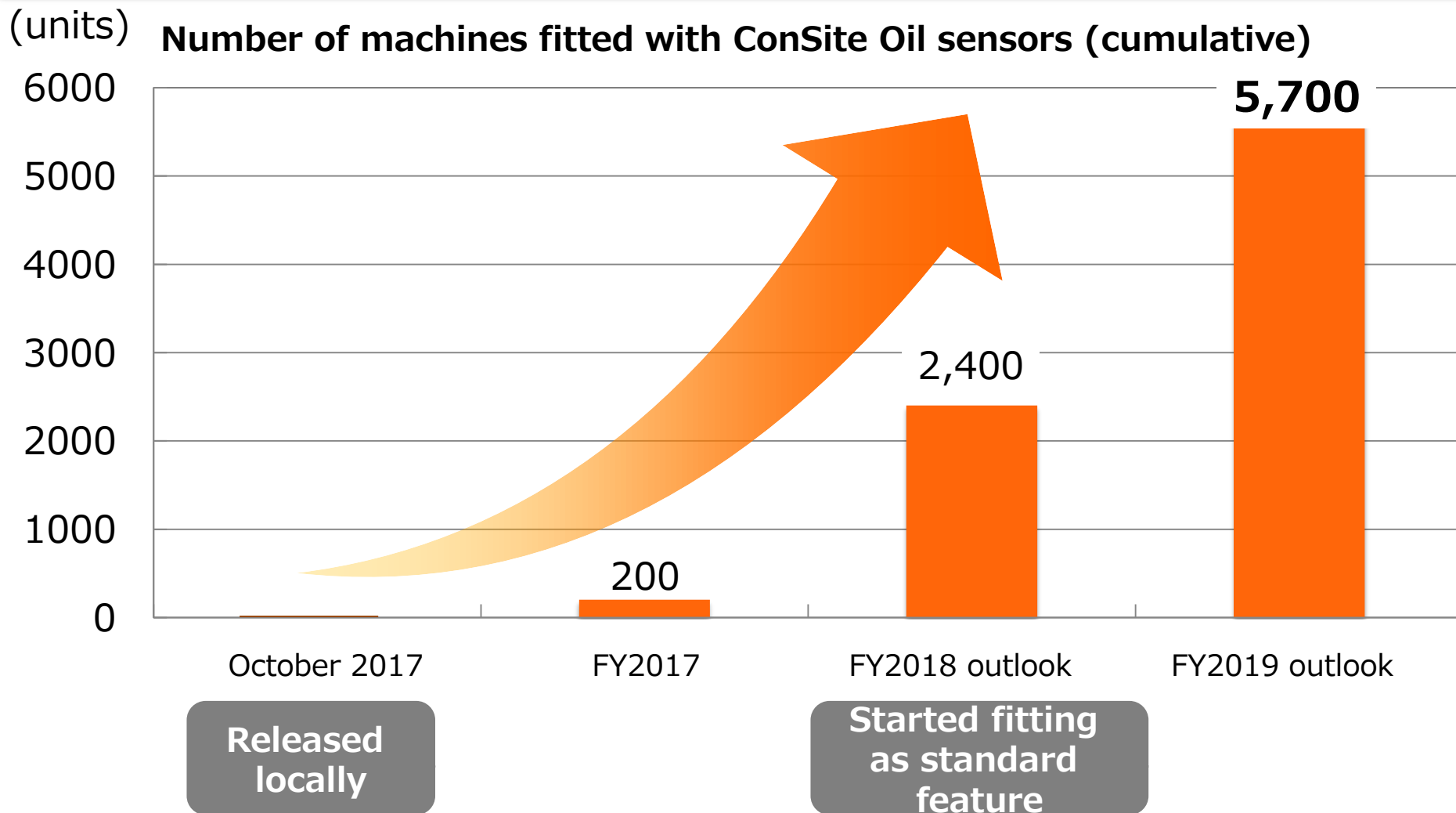


Sensors were fitted as standard equipment for the first time, not for controlling the machines, but for service purposes

ConSite-enabled machines



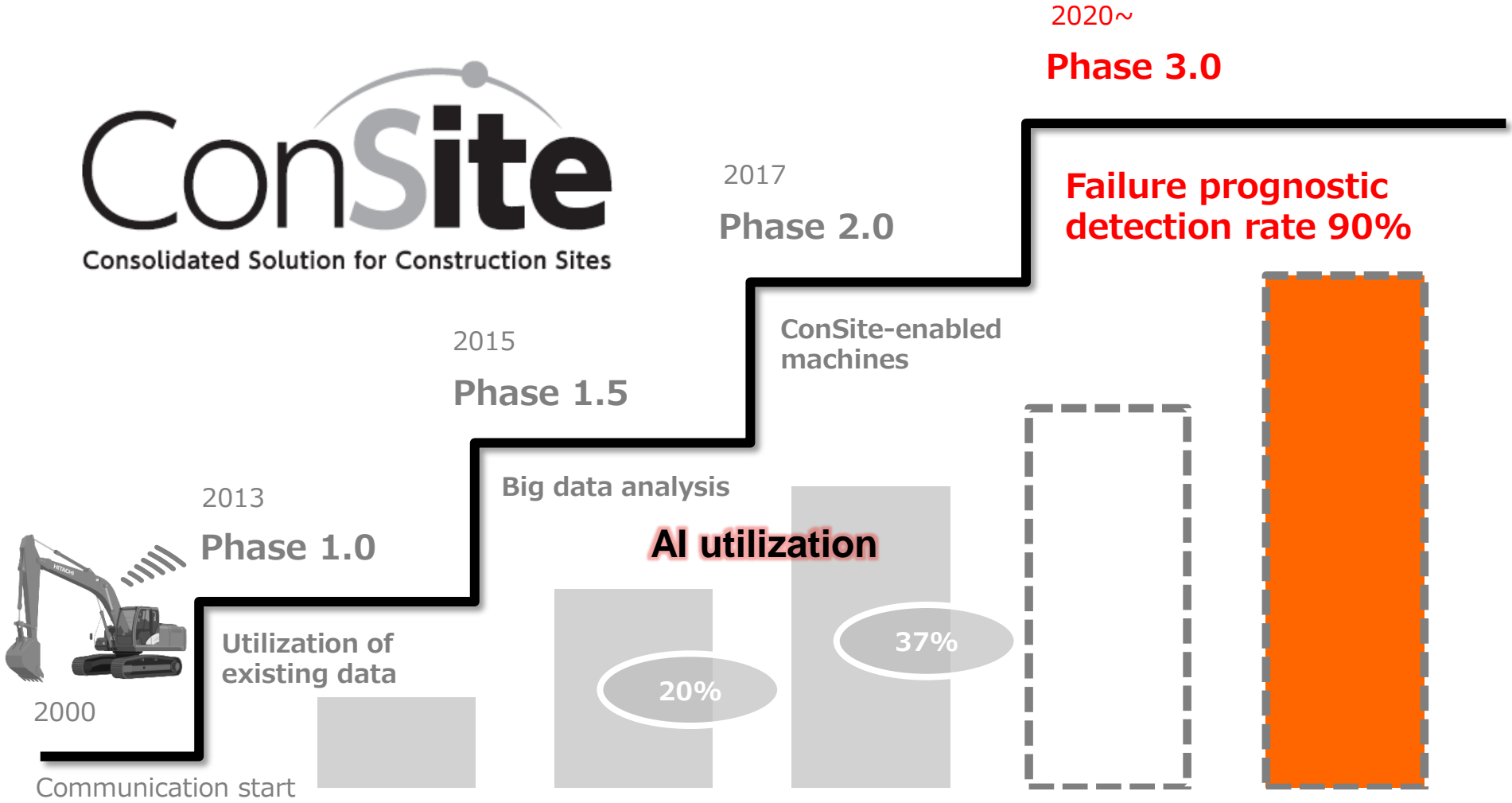
ConSite OIL sensors were fitted as a standard feature starting from core machine models



Steps to the target



ConSite
Consolidated Solution for Construction Sites



Until 2016

AI Phase 1

**Finds unexpected
correlations unnoticed by
humans**

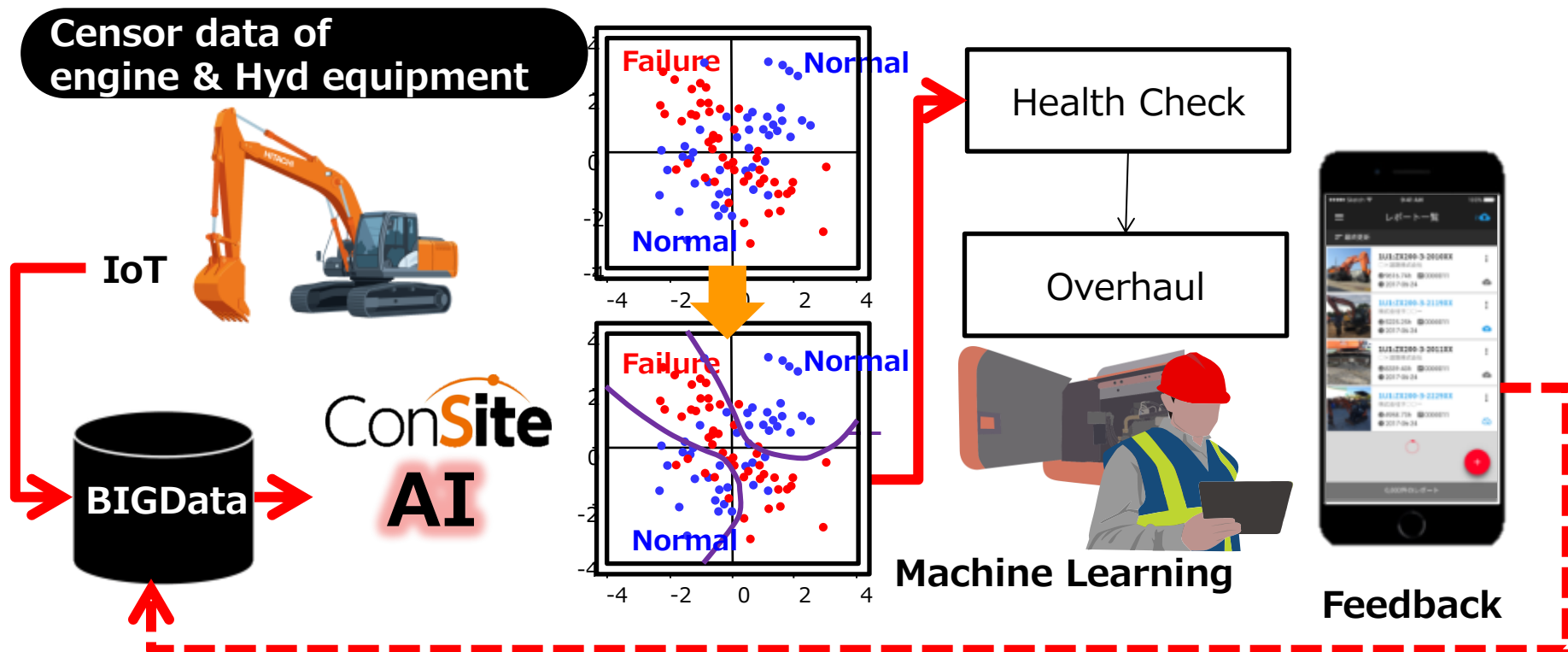
Present

AI Phase 2

**Hypothesis based on
operation data and
technical knowledge leads
to correct answer**

Let AI learn hypothesis based on Engineering Knowledge. (Operation & technical knowledge)

- AI forecasts abnormal trend with BIGData analysis(e.g. repair data, etc)
- Health check with the particular tool before breaking
- Improve AI accuracy by feedback and learning results of health check and overhaul



**If we could plan the 90% of the service,
parts & service strategy will be dramatically change.**

[Past]
Time based, failure based



[Future]
Parts & service condition based
on prediction



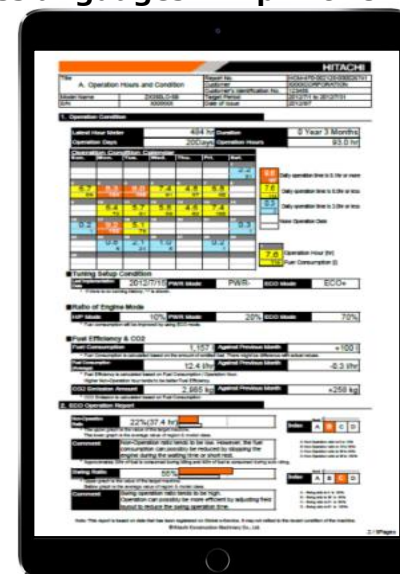
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Expansion of ConSite which was developed mainly for PCs to smartphones

- 3 languages available in Nov 2017 (English, Japanese, Chinese)
- 33 languages in Apr 2018



Available from Google
Play® and App Store®

Features
Equipped with push notification function
Displays alarms for all of the customer's
machines

Allows monthly
reports to be
checked

Further enhances ConSite's usefulness

*Google Play and the Google Play logo are trademarks of Google LLC.

*App Store is a trademark of Apple Inc.

Mechanics can easily make proposals at the site

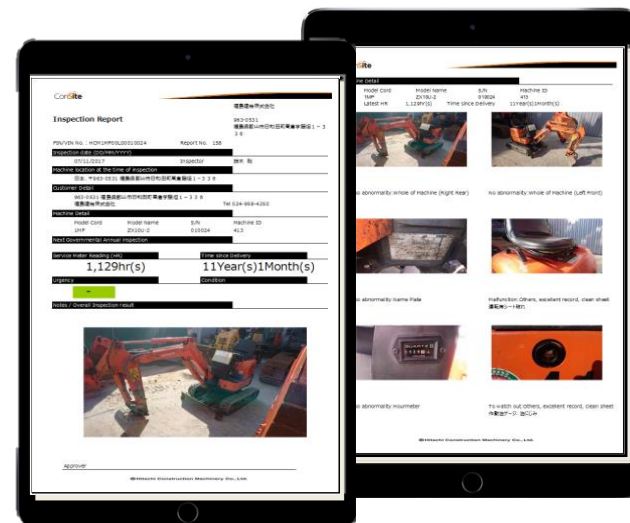
Globale-Service

Database



Tie-up

Text input is virtually unnecessary due to tie-up with server



Inspection and reporting can be completed in 5 minutes

It's so easy to do inspections with the smartphone app!



Mechanic

Customer

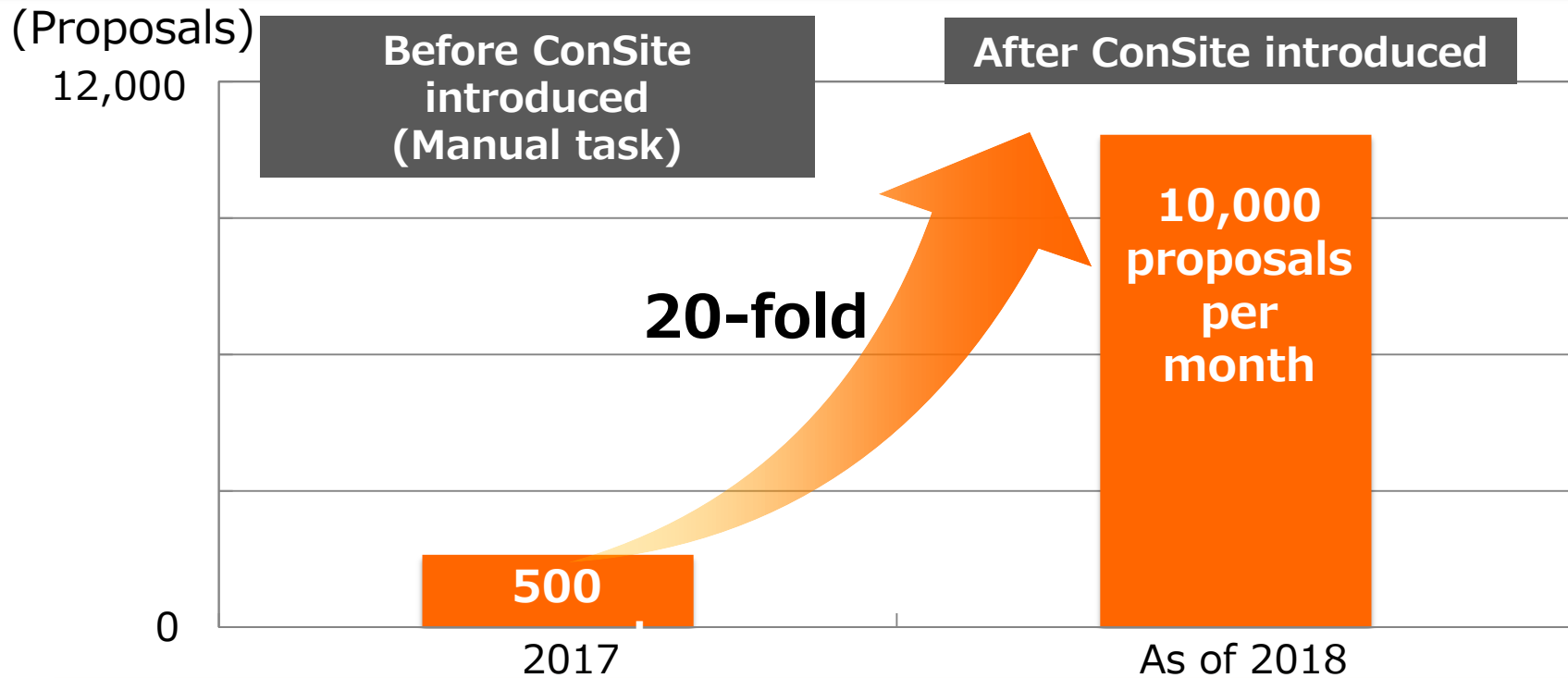


Inspection reports with photos are so easy to understand!

The report is automatically prepared simply by taking photos

Operation started
- in Japan since Apr 2016
- in the world since Feb 2017

Number of repair proposals by mechanics multiplied 20times



Tool was generated by knowhow and needs in the site,
and is spread all over the world

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Key factor - Effective and efficient sales activities of parts & services based on ConSite data

In addition to part & services,
Contribute sales of new machinery

Door Opener (Individual information)

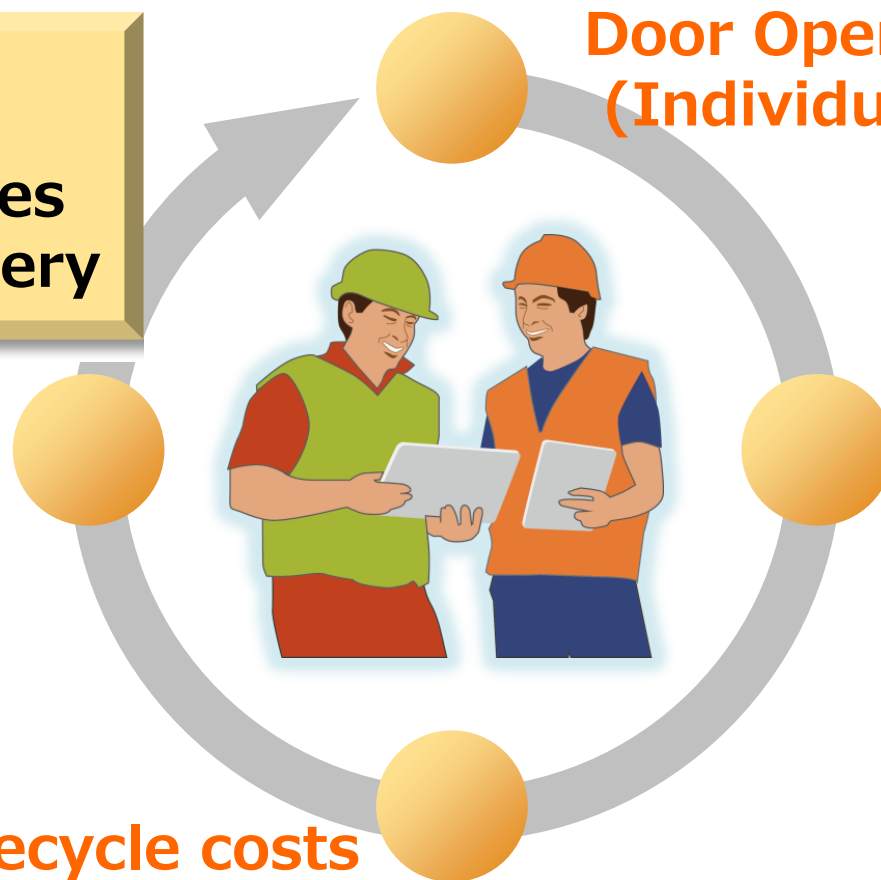
- Strengthen contacts between dealers and customers through ConSite 's periodical report

Lead, Suggestion

- Timely and appropriate suggestions using tools(e.g.ConSite Shot) onsite

Reduce lifecycle costs

- Lower fuel consumption, lower maintenance costs, machine-down prevention, asset value preservation



Ultimate targeting

Customer, machine, affected part, phenomenon, timing

Customer

The mechanic is
there when needed!

High quality service is
assured anywhere in the
world!

Society

Effective tool to
compensate for
shortage of mechanics
and lack of experience!

Trust

HCM & Dealer

Action can be taken
proactively for target at
appropriate time!

Standardized service
quality is delivered!

Enables mechanics all
over the world to
make proposals!





WIN x WIN x WIN
Reliable solutions

【Explanatory note on this document】

This document contains information that corresponds to our company's "statements on the forecast for the future".

The future expectations, plans, outlooks, etc. covered in this material are those that the Company has judged to be rational based on currently available information.

The reality may differ greatly from the forecasts, plans and outlooks described in the document due to changes in various factors. Such factors may include changes in economic conditions and demand for products in major markets, fluctuations in exchange rates, changes in domestic and overseas regulations, as well as in standards and practices of accounting.

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End

Service Solution ConSite

March 7, 2019

Satoshi Inose

General Manager, ConSite Business IoT Dept.

Customer Support Div., Life Cycle Support Operations Div.

 **Hitachi Construction Machinery Co., Ltd.**

Classified and introduced with appropriate icons according to 17 goals described in the Sustainable Development Goals (SDGs).

SUSTAINABLE DEVELOPMENT GOALS

17 GOALS TO TRANSFORM OUR WORLD

