ReCAMA Workshop on
Smart and Sustainable Agricultural Mechanization
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Toward the realization of Smart Agriculture in Japan

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NARO

Society 5.0 in Agri-Food Industries:
Smart Food Value Chain

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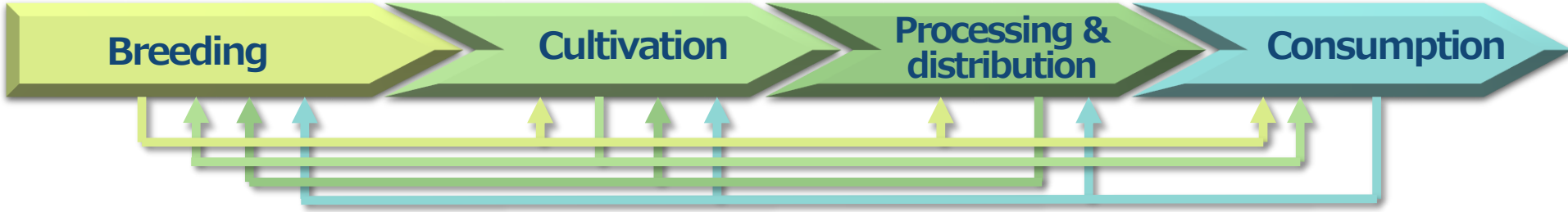
- The entire process in the food value chain is made 'smart' by utilizing AI and 'WAGRI,' the Agricultural Data Collaboration Platform.
- Productivity optimization, total costs cut, food waste reduction, high value adding and technology matching are anticipated.



Smart Breeding	Smart Production	Smart Processing Smart Distribution	Smart Selling Smart Export
Objectives Speeding up crop breeding	**Objectives** Optimizing productivity to cope with labor shortages	**Objectives** Controlling fluctuations of supply and price	**Objectives** Increasing demand Promotion of exports

Feedback analyzed data ⇅ Data collection, AI analysis

The 'WAGRI' AI and Agricultural Database Platform

Basic Research for Agriculture
(plant/animal protection, GHG reduction, disaster prevention/mitigation, genetic resources)

Technologies for smart agriculture by SIP

- SIP is a Cross-ministerial project which Minister of State for Science and Technology Policy and the Prime Minister takes leadership

the cross-ministerial Strategic Innovation Promotion Program

Robot tractors

Robotic transplanter

Robot combine harvester

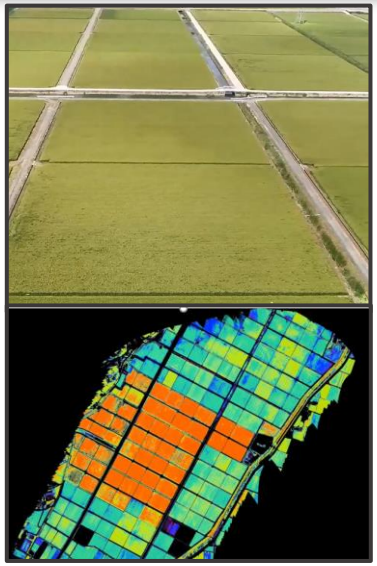
* Labor efficiency is 160% by use of two **robot tractors**.
* Combined use of these four ICT agri-machines resulted in a 45% increase in one farmer's income through farm-size expansion. †
* Automatic & remote **water management system** reduces working hours by 80%.

Automatic & remote water management system

† In the case of the field trials in Chiba.

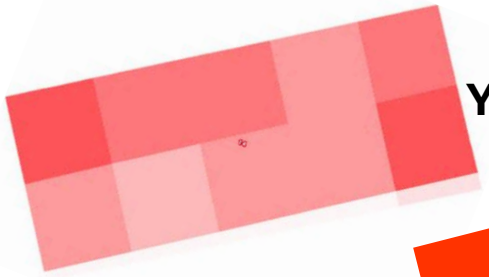
An Example of Smart Agriculture in Paddy:
Realization of Labor-saving by precision farming

Sensing by drone



Plant growth mapping

Combine harvester with yield monitoring



Yield mapping

Map-based variable rate fertilization according to growth

- Map-based variable rate fertilization resulted in the increase of productivity by 10% (400kg/ha) and the decrease of nitrogen applied per yield by 22% in one instance.

Map-based variable rate fertilization according to yield

Automated agri-machinery test

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◆ In Japan, various automated agri-machines have been put on the market and are being introduced into agricultural fields gradually.

Autonomous Tractor

Cited from Yanmar Holdings Co., Ltd. Robot Tractor
https://www.yanmar.com/jp/technology/robotics.html

Autonomous Tea Harvester

Cited from MATSUMOTO KIKO Co., Ltd. Robot Tea Harvester MCRT12VF
http://matsumotokiko.co.jp/custom.html

Auto-steering Combine

Cited from KUBOTA Corporation. Auto-steering Combine WRH1200A
https://agriculture.kubota.co.jp/product/combine/wrh1200a/

Auto-steering Transplanter

Cited from ISEKI & CO.,LTD. Auto-steering transplanter NP-80D
https://www.iseki.co.jp/products/taueki/taue-np80dz/

Automated agri-machinery test

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Publication of Certified Machines (as of Dec. 2021)

- Auto-steering agri-machinery test :
  38 types for 3 kinds of machines
- Autonomous agri-machinery test :
  3 types for 2 kinds of machines
- If the machine passes the optional test, the machine will be able to indicate “Two Stars”.

IAM will continue to revise the test based on the results of the MAFF’s trial project for introducing automated agri-machinery.

Thank you for your attention!