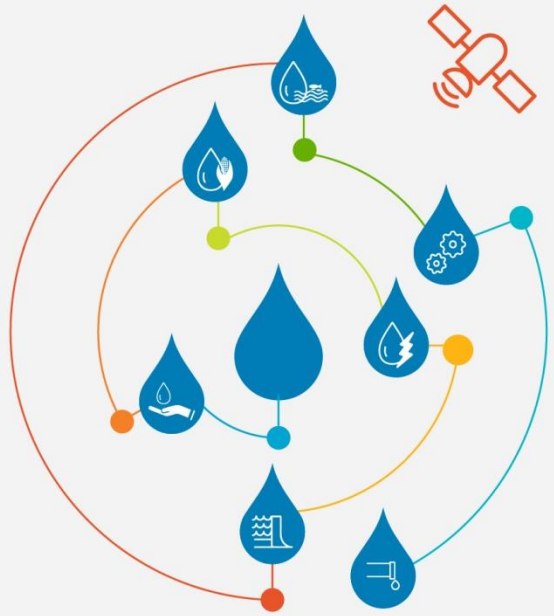
Blinded by technologies- refocusing on stakeholders' needs to improve water management in irrigated rice systems



Sudhir Yadav

International Rice Research Institute

About me

Sudhir Yadav

Scientist: Water management
Outcome Theme Leader: Environmental Sustainability
International Rice Research Institute

Research interest:

- Water governance, Digital tools, Soil water dynamics, Environmental sustainability

Work experience:

- Outcome theme leader, IRRI, 2018-Till date
- Scientist, IRRI, *2011-Till date*
- Research Fellow, Punjab Agricultural University, *2005-2007*

Education and training:

- 2011: PhD, Water Management, The University of Adelaide, Australia
- 2005: MS, Agronomy, Punjab Agricultural University, India

Publications:

- 25 journal articles, 3 book chapters, 6 outreach/extension manual

Mentored/Mentoring: 4 PhD and 5 MS

Vota, 2017 (ICT Works)

Technology development cycle

>700 publications on testing and validation of AWD

Republic of the Philippines
Office of the President
National Irrigation Administration
(PAMBANSANG PANGASIWAAN NG PATUBIG)
Quezon City

Office Address: National Government Center, EDSA, Diliman, Quezon City, Philippines
Telephone No.: (02) 929-6071 to 78
Website: www.nia.gov.ph

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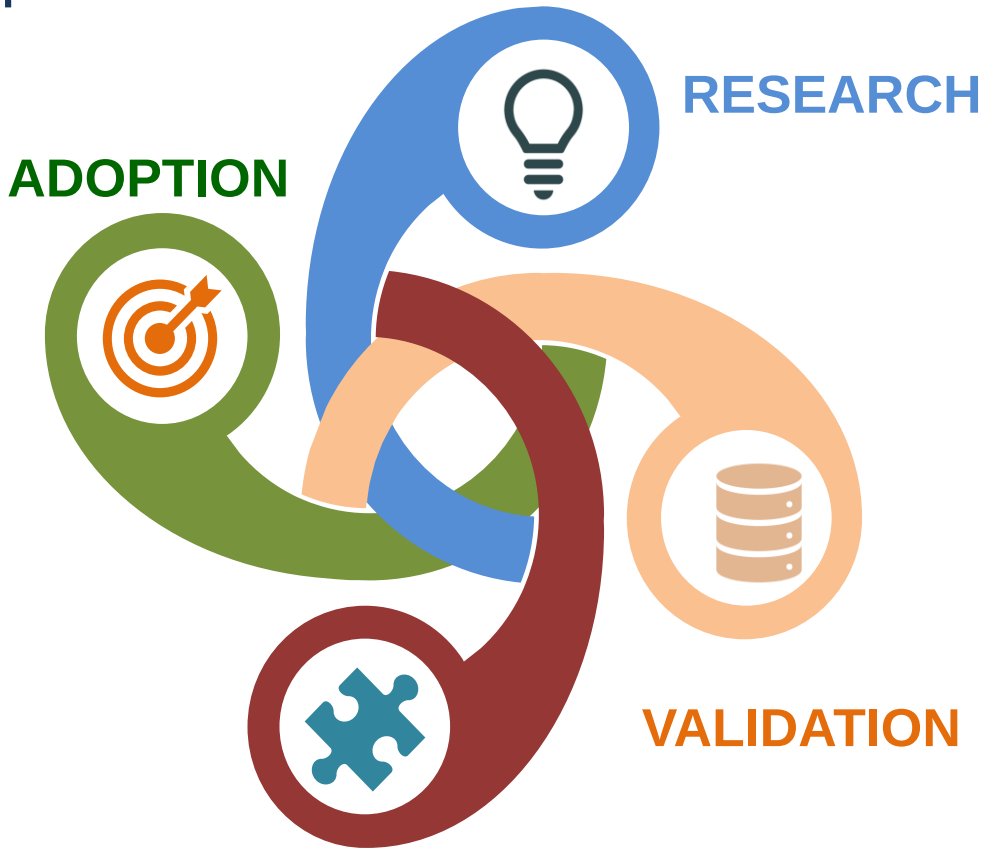
MEMORANDUM CIRCULAR

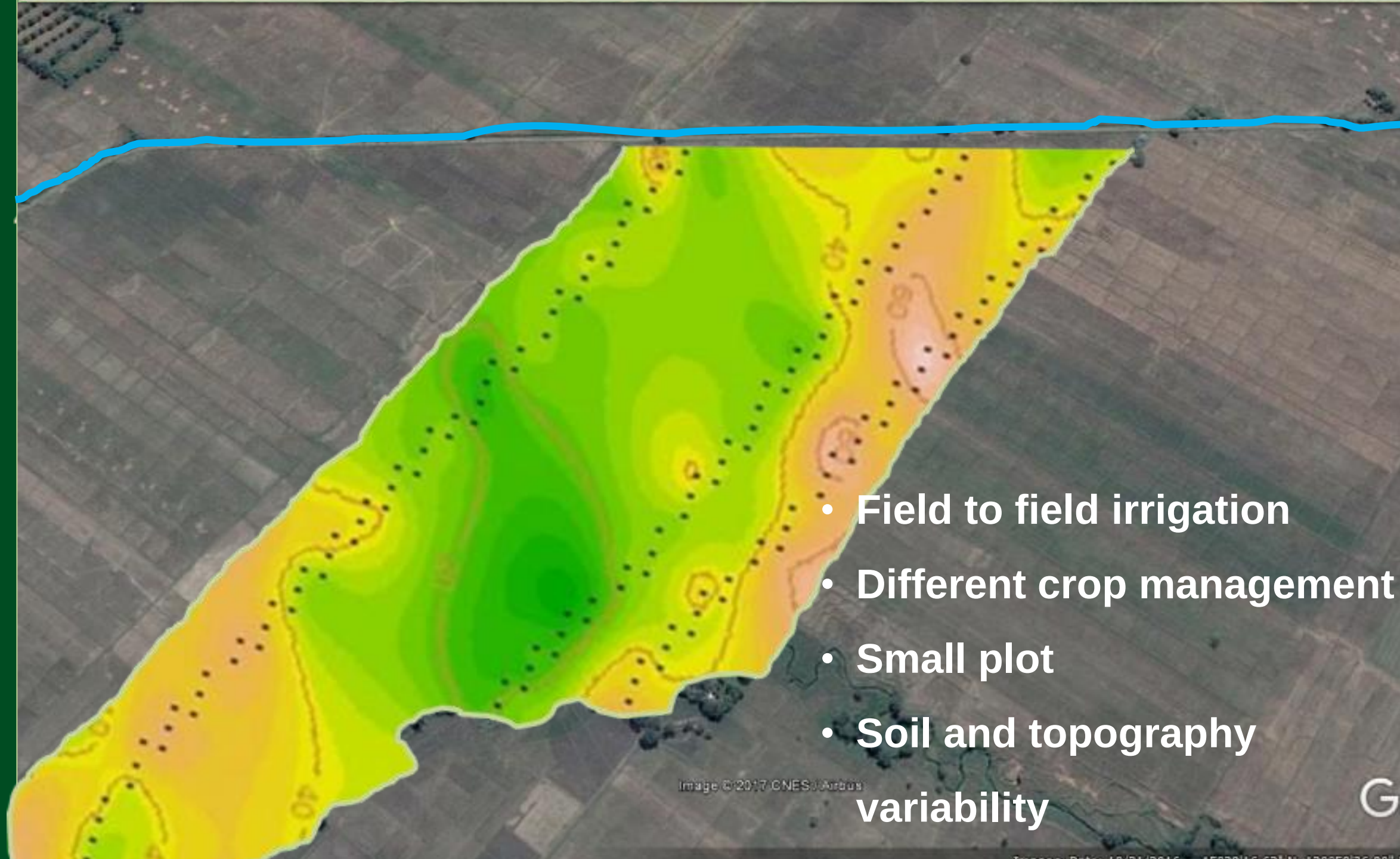
TO : THE DEPUTY ADMINISTRATORS, DEPARTMENT MANAGERS, REGIONAL / OPERATIONS / PROJECT MANAGERS, IRRIGATION MANAGEMENT OFFICERS AND ALL OTHER CONCERNED

SUBJECT : POLICY TO ADOPT ALTERNATE WETTING AND DRYING (AWD) IN ALL NATIONAL IRRIGATION SYSTEMS (NIS)



- **but technology adoption has been very slow**

Surface irrigation system



- Field to field irrigation
- Different crop management
- Small plot
- Soil and topography variability

Challenges in adoption of technology

- **Complex network of interaction** among different stakeholders before water reach to rice farm.
- The technology at this stage is **field-specific** and can't be extrapolated to command area.
- The approach lacks the interface for converting data into information and insights.
- The new technique requires more **management oversight** and puts higher demands on farmers' time.
- **No incentives**

WATER

The paradox of irrigation efficiency

Higher efficiency rarely reduces water consumption

By R. Q. Grafton[1,2], J. Williams[1], C. J. Perry[3], F. Molle[4], C. Ringler[5], P. Steduto[6], B. Udall[7], S. A. Wheeler[8], Y. Wang[9], D. Garrick[10], R. G. Allen[11]

Reconciling higher freshwater demands with finite freshwater resources remains one of the great policy dilemmas. Given that crop irrigation constitutes 70% of global water extractions, which contributes up to 40% of globally available calories (*1*), governments often support increases in irrigation efficiency (IE), promoting advanced technologies to improve the "crop per drop." This provides private benefits to irrigators and is justified, in part, on the premise that increases in IE "save" water for reallocation to other sectors, including cities and the environment. Yet substantial scientific evidence (*2*) has long shown that increased IE rarely delivers the presumed public-good benefits of increased water availability. Decision-makers typically have not known or understood the importance of basin-scale water accounting or of the behavioral responses of irrigators to subsidies to increase IE. We show that to mitigate global water scarcity, increases in IE must be accompanied by robust water accounting and measurements, a cap on extractions, an assessment of uncertainties, the valuation of trade-offs, and a better understanding of the incentives and behavior of irrigators.

LOGIC AND LIMITS

Field IE is the ratio of the volume of all irrigation water beneficially used on a farmer's field [predominantly, evapotranspiration (ET) by crops and salt removal to maintain soil productivity] to the total volume of irrigation water applied (adjusted for changes in water stored for irrigation in the soil) (*2*). Annually, governments spend billions of dollars subsidizing advanced irrigation technologies, such as sprinklers or drip systems (*3*). Sometimes their goal is to increase IE on the understanding that this will allow water to be reallocated from irrigation to cities (*4*), industry, or the environment, while maintaining or even increasing agricultural production.

But water saved at a farm scale typically does not reduce water consumption at a watershed or basin scale. Increases in IE for field crops are rarely associated with increased water availability at a larger scale (*5*), and an increase in IE that reduces water extractions may have a negligible effect on water consumption. This paradox, that an increase in IE at a farm scale fails to increase the water availability at a watershed and basin scale, is explained by the fact that previously nonconsumed water "losses" at a farm scale (for ex-

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Published by AAAS

Substantial scientific evidence has long shown that increased irrigation efficiency rarely delivers the presumed public-good benefits of increased water availability.

AutoMon: An IoT-based tool for empowering decision and policy makers

IRRI Rice science for a better world

- Catalyzing the adoption of water-saving technologies by improving **access to information**, effective coordination among stakeholders, and transparency in water governance

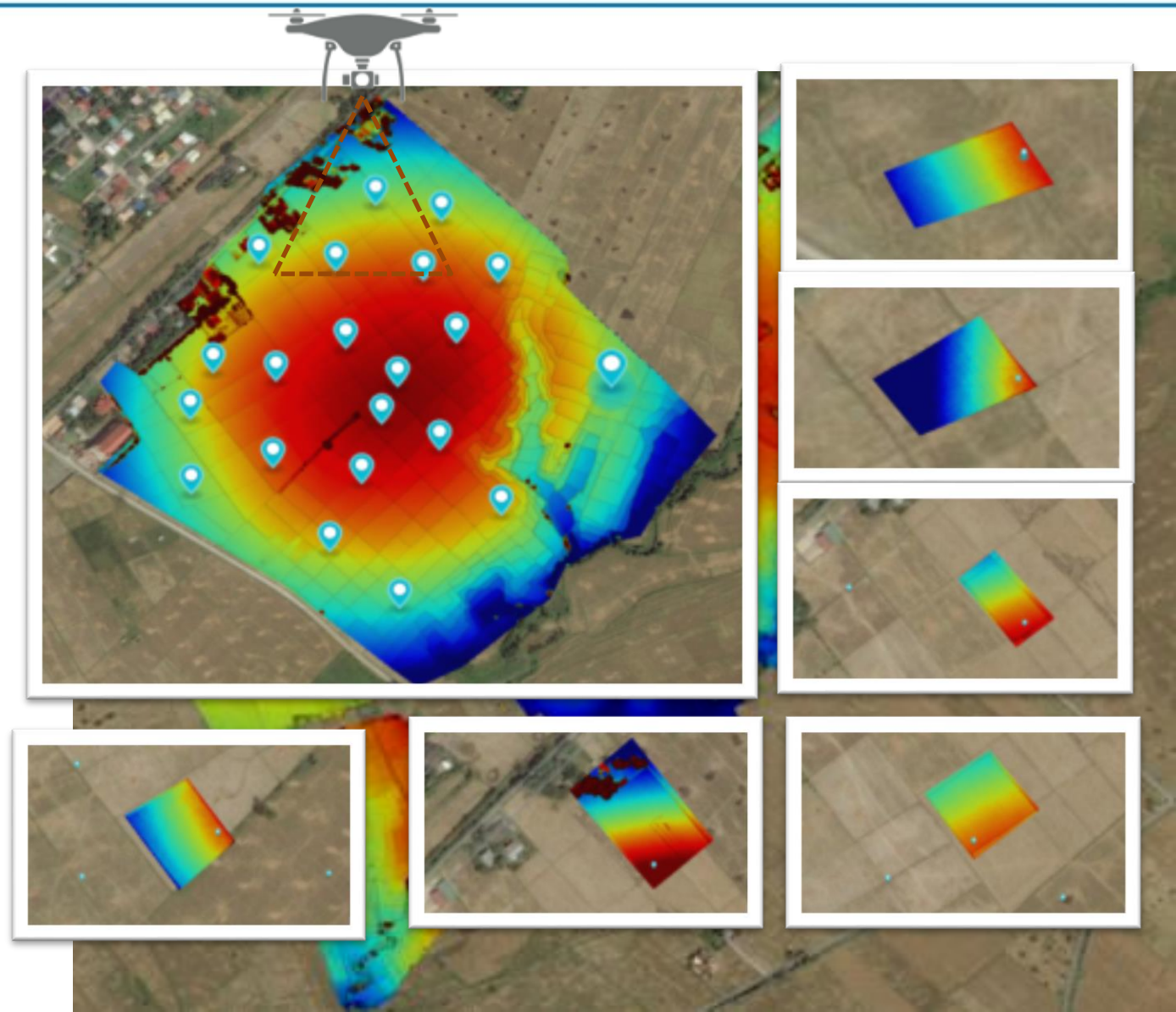
ADB

IRRI Rice science for a better world

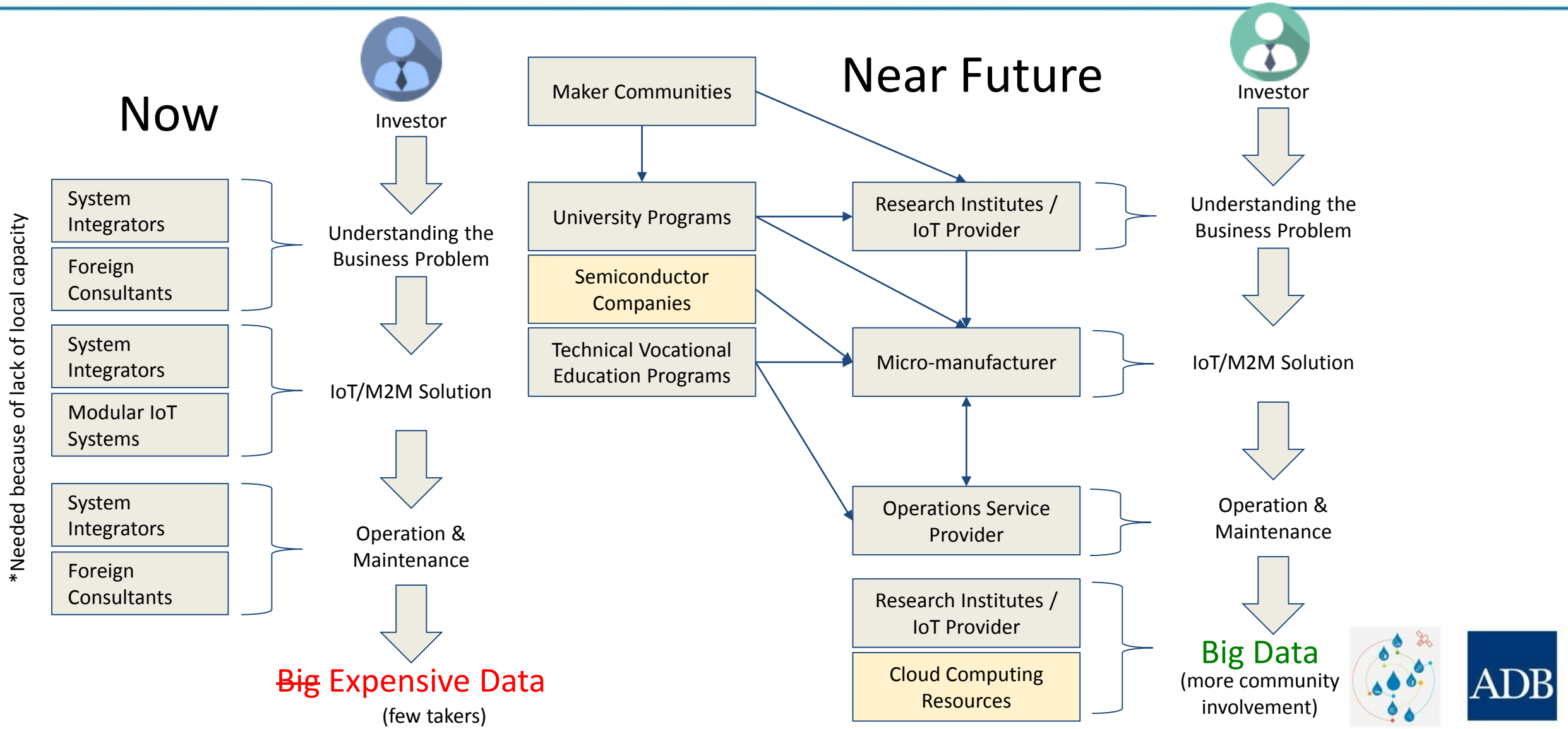
How many and where?

- Small plot size in Asia and Africa
- Scattered land holding
- Large variability

Inclusive approach
Using GIS and RS for strategic deployment of sensors

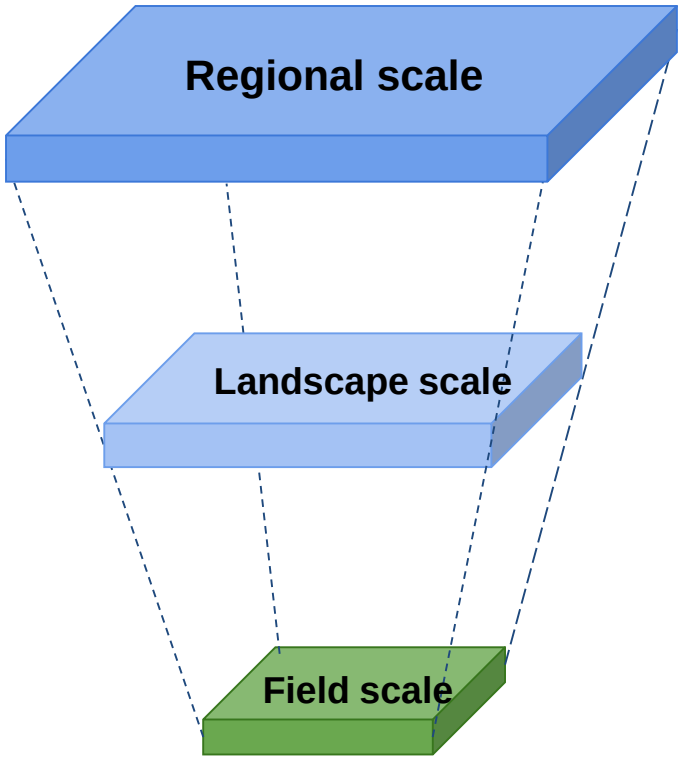


Digital tools as catalyst



Slide: TechAguru Inc

Policy consideration for scaling of AutoMon



Cross-cutting

Policy change for developing and sustaining infrastructure and operation

Policy change for inter-agency cooperation

- Farmer community-Dept of Agri-Irrigation dept
- Telecommunication commission
- Environmental Ministry
- Private companies

- **Policy change to incentivize farmers** for adoption of technologies for reducing water and carbon-footprints

Take-away message

- Technology and stakeholders needs are two different things. Technology is just one component of meeting stakeholder’s requirements
- Decision support tools catalyze the change with an embedded technology
- Digital technology is not one-size-fits-all. Designing and implementing sustainable technology solutions requires an understanding of stakeholders need.
- More than technologies, agriculture needs decision-enabling environment

Thanks

For more details

s.yadav@irri.org

http://irri.org/our-work/research/rice-and-the-environment