

Role of Digital and AI Technologies in Indian Agriculture: Potential and way forward

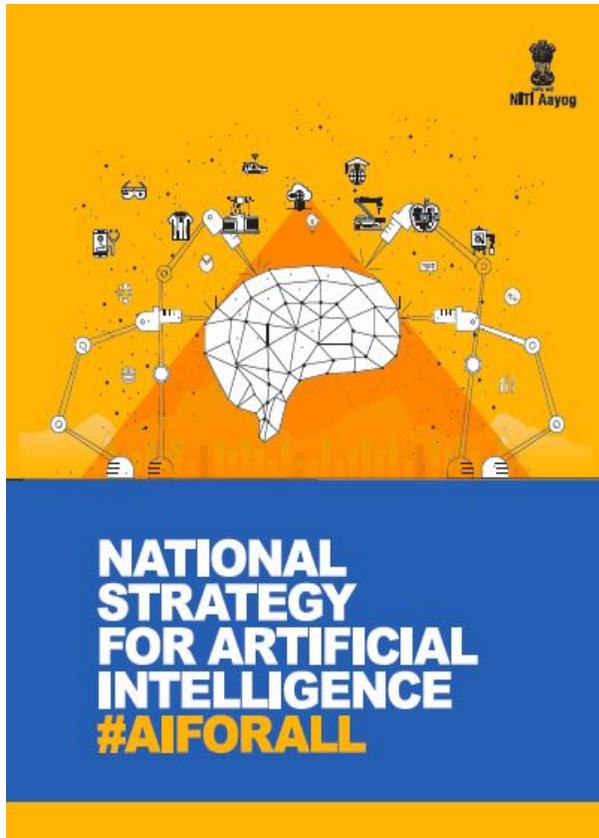
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NITI Aayog

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National strategy on AI

National Strategy on AI aimed to realise the potential economic and social benefits the technology offers



NITI Aayog mandated to create the roadmap for implementation of AI in India in 2018 budget speech



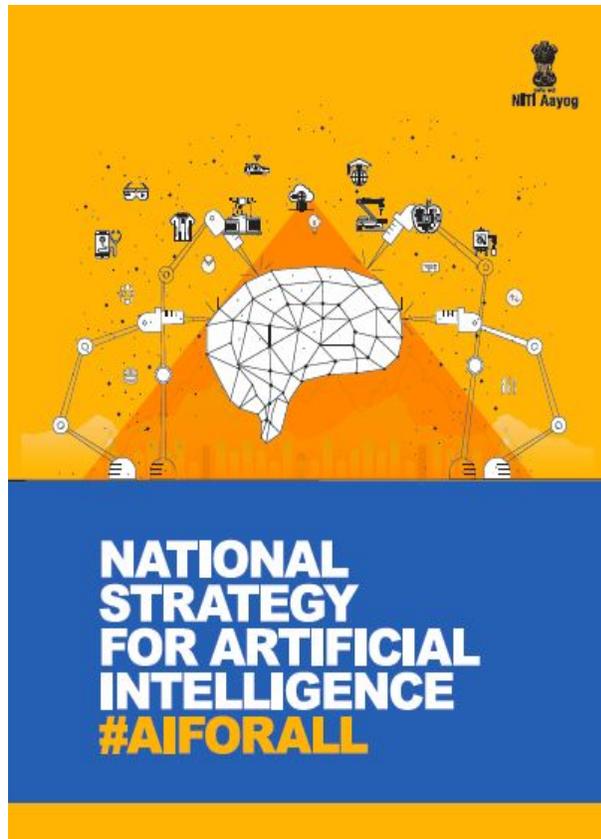
National strategy on AI released in June 2018 to identify AI goals, priority sectors, and major recommendations



Act as the 'AI garage for the world' to realise potential increase of 15% in India's income by 2035

National strategy on AI: Agriculture

The National Strategy on AI recognizes agriculture as one of the priority sector areas for implementation of AI driven solutions



Health

Agriculture

Education

Mobility

Infra

Promote applied research: Two tiered research institute structure with a focus on creation of commercializable products (COREs and ICTAIs)

Guide innovation: 'Moonshot Challenges' to guide research and start-up ecosystems to solve for most pressing government concerns

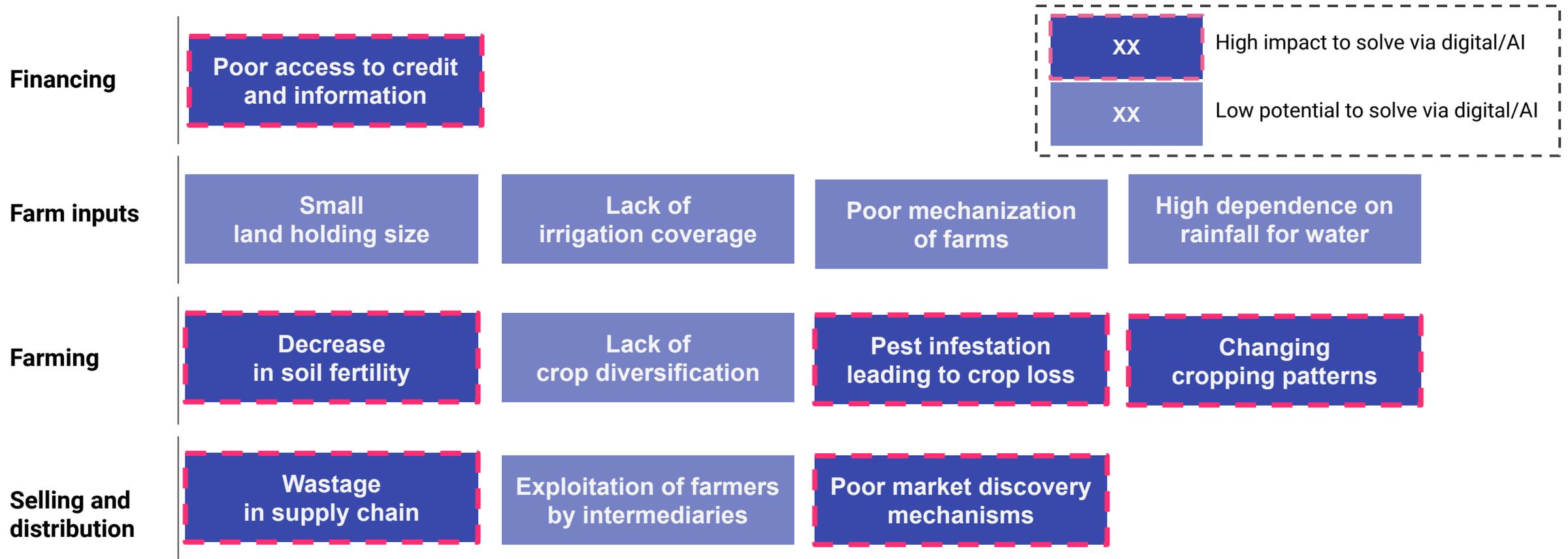
Facilitate application: Create foundational data sets for AI application; Ease access of existing data sets; Define data sharing mechanisms

Skilling and education of the workforce

Cloud based AI hardware infrastructure (AIRAWAT)

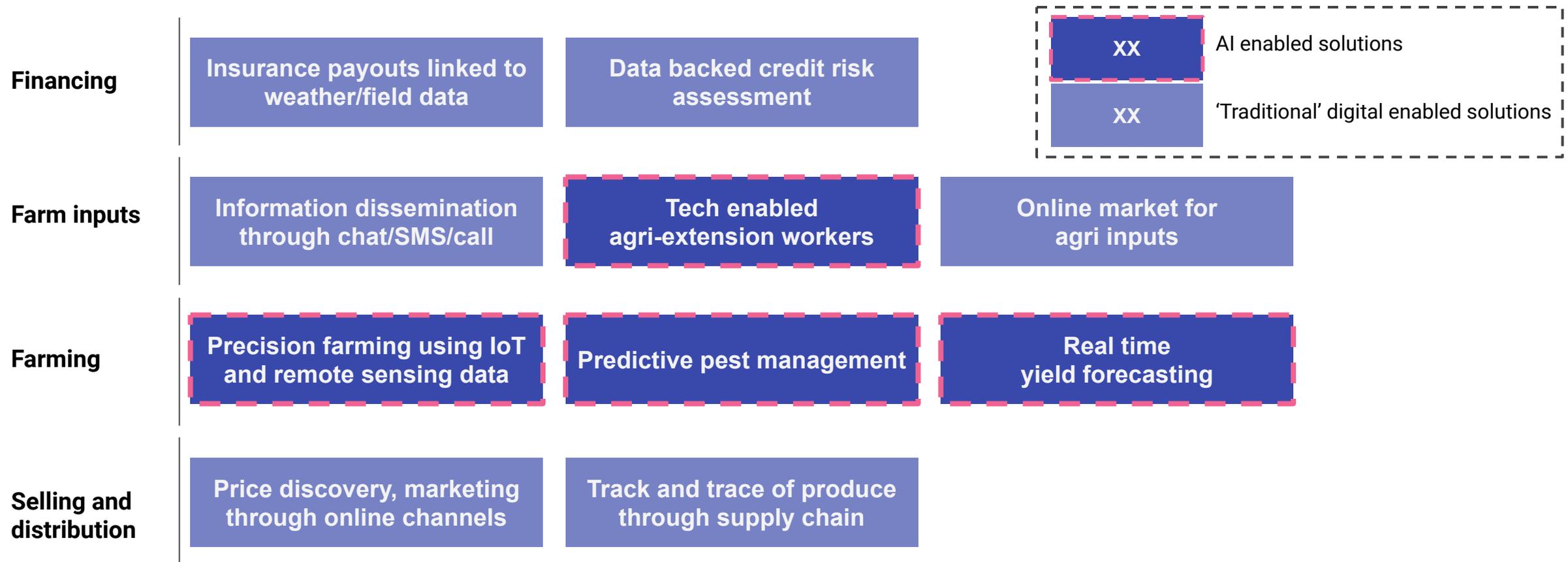
Challenges in agriculture

Digital technologies and AI have the potential to significantly impact a number of challenges to Indian agriculture today; though major change cannot be driven by technology alone



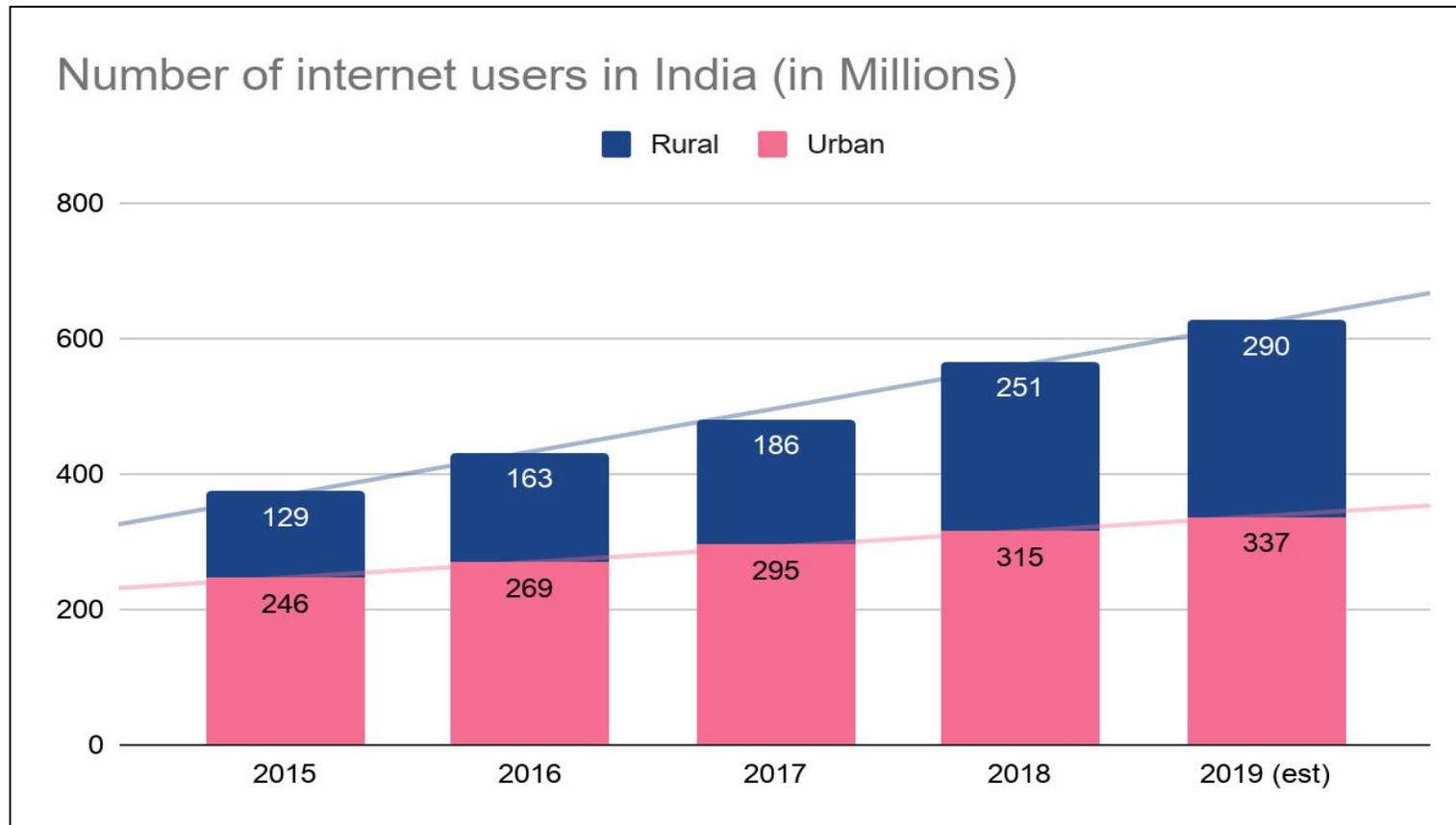
Major areas of digital technology application

The growth of 'agritech' solutions and startups is indicative of the growing demand for solutions for specific applications



Improving access to enable technology adoption

As penetration of mobile and internet connectivity amongst farmers increases the adoption of technology enabled solutions will only grow; important to develop solutions to take advantage



Rural internet base growth is leading overall growth, driven by low data cost and increasing smartphone penetration

Though current usage is primary 'social media', projected to expand to other services as consumer maturity increases

Specific national level initiatives and potential

Some specific areas of AI adoption are already being considered and deployed at a national level as well;

Mobile based Recommender Systems and Expert Systems:

Enabler of the shift of location based advisory services to the personalized and context specific advisory

AI based automatic grading and sorting for vegetables and fruits:

Creating an international agri-commodity standard aiding reliable trading across country boundaries

AI auto-translation among various languages, text to speech/speech to text in Indian languages:

Improve access to required knowledge generated by the National Agricultural Research and Education System (NARES).

Government as an enabler to scale deployment

Agritech AI startups would benefit greatly from government support in providing support for access to AI specific needs; data and compute infrastructure

Requirements of AI Solutions

Data for training of AI Algorithms

Compute infrastructure required for storage, training, and inference

Domain specific expertise to design solutions

Government support outline in National Strategy

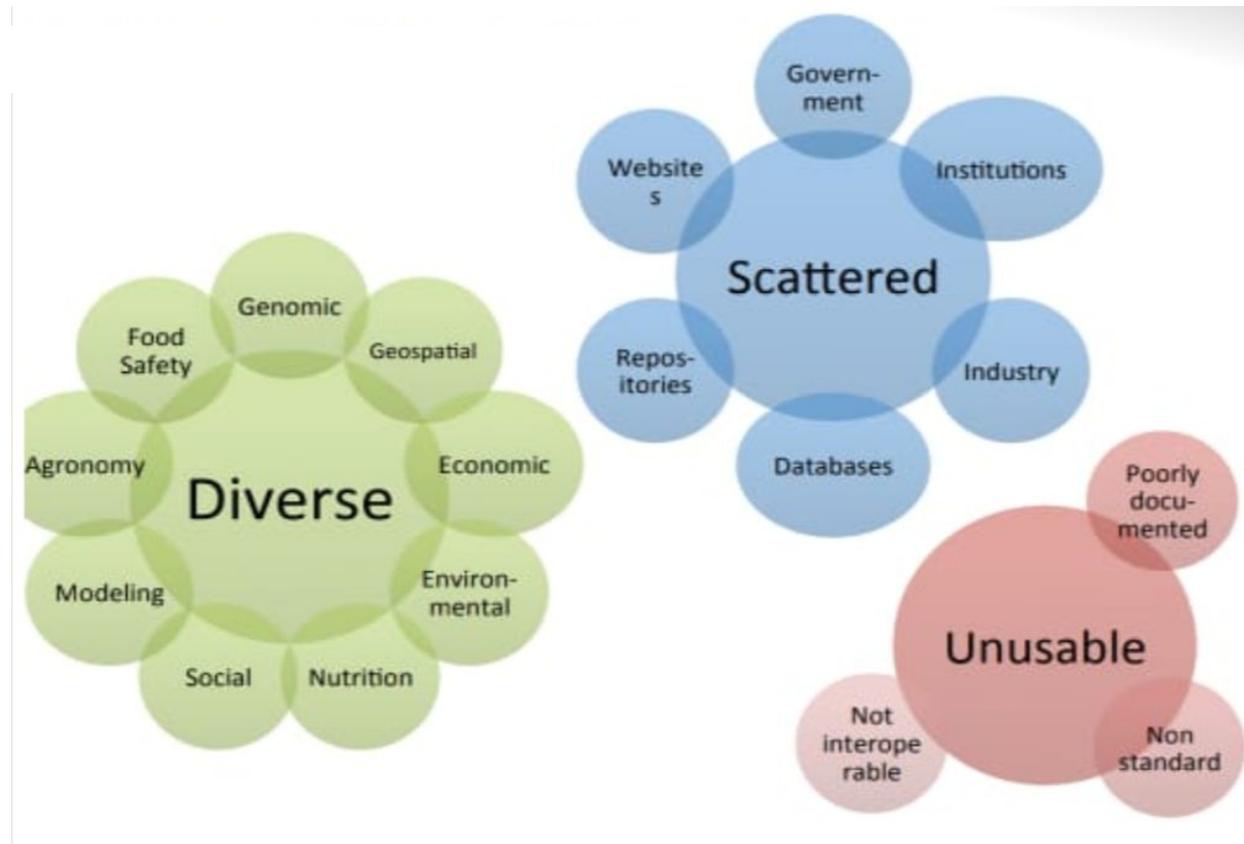
Creation of domain specific annotated data sets (image database of pest infested crops); data standards farm generated data; improved access for existing data through data marketplaces

AIRAWAT cloud compute platform to enable AI solution developers to train algorithms affectively, host large 'common good' data sets

Application focussed research institutes (ICTAIs) to promote inter-sectoral linkages; Moonshot programs to guide innovation to government priorities

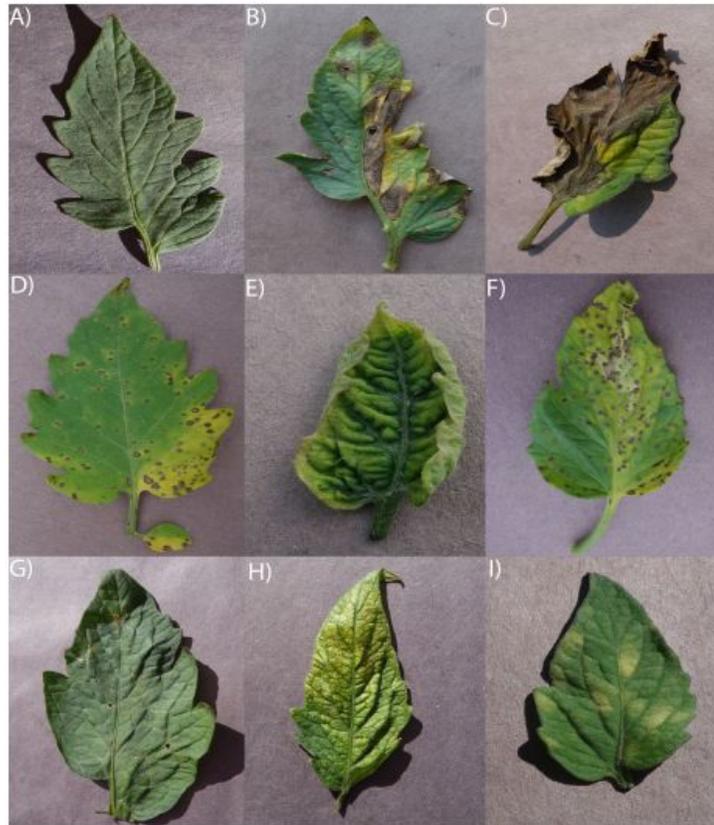
Data: What are the challenges being faced?

Lack of open agriculture data standards has much of agri data stored in silos; which in turn is a key barrier to nurturing an agritech startup ecosystem in India



Data: Creation of annotated datasets

Facilitation of creation of India specific large annotated datasets for diagnosis, sorting, or knowledge dissemination



Examples of different phenotypes of tomato plants with affected by varieties of pest

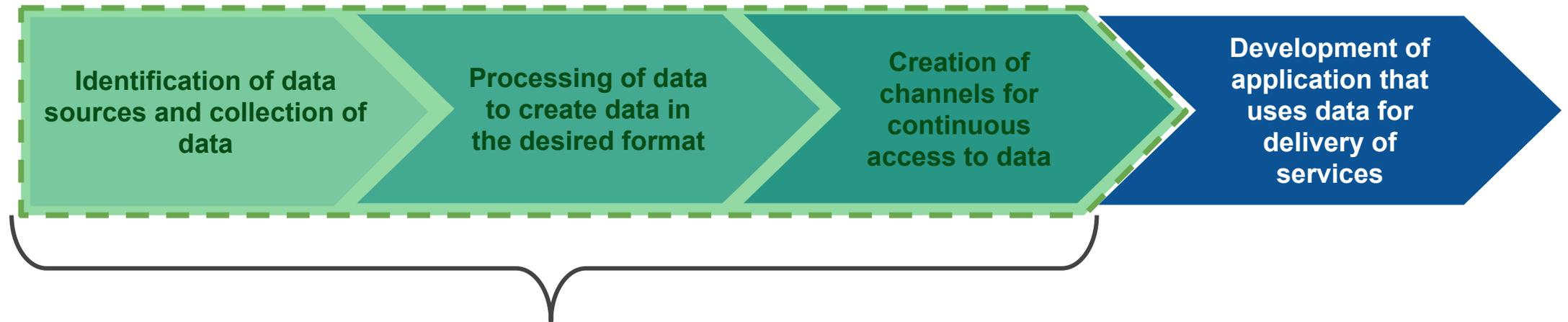
Source:
An open access repository of images on plant health to enable the development of mobile disease diagnostics, Hughes and Salathe' (2018)

Form	Stem	Lemma
Gujarati		
શાપો (beat)	શાપ	શાપ્ત્વ
શાપો (set up)	શાપ	શાપ
Telugu		
పంచను (robe)	పంచ	పంచ
పంచను (I don't share)	పంచ	పంచు
అమాయక (Innocent)	అమాయక	అమాయక
అమాయక (Innocence)	అమాయక	అమాయకం
Nepali		
अकर्मी (act)	अकर्म	अकर्म
अकर्मी (deffective)	अकर्मी	अकर्मी
काम्ले (plant)	काम्ले	काम्ले
काम्ले (adapts)	काम्	काम्

Annotated corpora of text and speech for agriculture specific requirements to enable localized knowledge dissemination

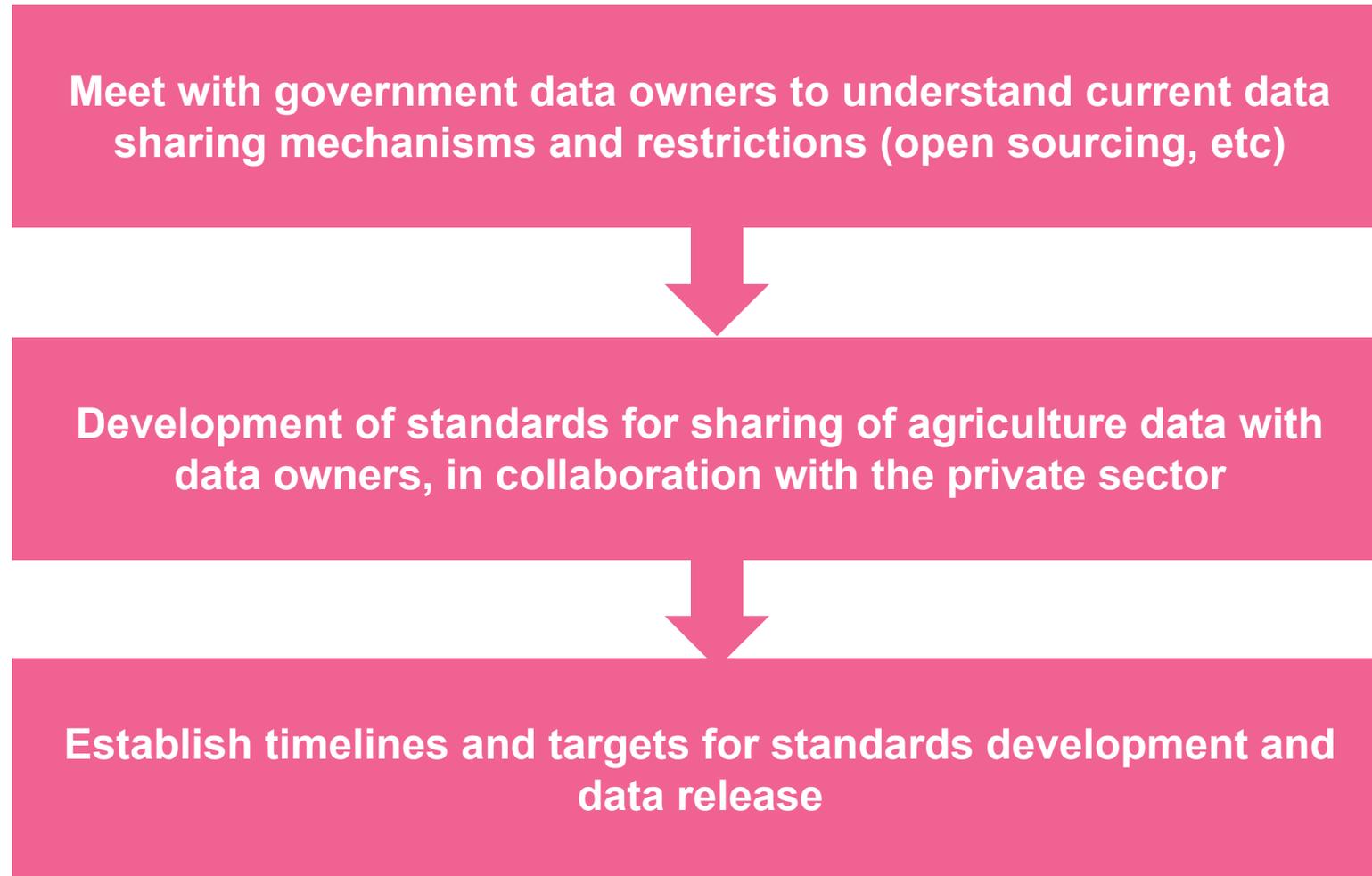
NITI Aayog proposal: Development of 'agrystack'

Creation of common data infrastructure by the Government can reduce duplication of effort by many startups and researchers in the area, and lower barrier of entry to creating agritech products



Proposed Stack would significantly ease process of developing viable solutions for the agriculture sector, and enable increased research and analysis

Next steps for implementation of agristack



Way forward

Implementation of agriculture initiatives under National AI Strategy

Establish a agriculture focussed AI institute (ICTAI)

Creation of annotated datasets for use in agriculture domain (plant pest images, language)

Launch of 'moonshot' projects with focus on identifying pressing agriculture problems

Leverage AIRAWAT cloud compute platform to facilitate innovation

Creation of 'agrystack'

Creation of common agricultural data standards and sharing mechanisms through inter-ministerial consultations

Creation of an 'API' layer for access of data relevant for agricultural sector

Thank you

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