Sustainable food production is not farmer's responsibility alone; entire ecosystem needs to act in harmony. There are many problems and for most of which, solutions also available locally. Big data will impact smart farming and involves whole supply chain (Wolfert et al., 2017). We believe that bigger impacts can be made by connecting problems and solutions using big data within supply chains involving the entire ecosystem of agriculture. **Our idea is to mine several big data sources to generate appropriate alerts and opportunities based on an influencing event.** It is not to detect any event in particular but assess its impact and disseminate relevant, targeted, tailor-made, and timely alerts & opportunities along with agro-advisory on a social network platform. Alerts are the choices to take decisions on an event's potential impact. Opportunities, on the other hand are the choices for other ecosystem players, for their own gratification, but indirectly acting on the same event.

We will use many data sources, some of which are not previously tapped and some of them are available as part of Kalgudi (a business network platform for agriculture ecosystem):

DATA SOURCES	
Events	Any event that affects agriculture ecosystem. These include rainfall, pest attack, disease, soil condition, market activity, policy change, climate condition, social, forums and some actions within the ecosystem.
Event Models	Every event has its own characteristics. These include event information, favorable conditions, spread, impact, management procedures, etc.
Actual Conditions	Conditions like wind direction, weather parameters, crop season, crop calendars, current market prices, etc.
Impact models	Impact (knowledge) models of various roles in the ecosystem and effects of events & resultant conditions on them.
Ecosystem	Everyone including farmers, inputs suppliers, output traders, warehouses, transporters, service providers, academia, extension implementers, govts, etc.

Problem we are trying to solve has many facets and diverse data sources. Our problem includes identifying an event, extracting models, predicting spread, analyzing impact on the ecosystem, generating appropriate information snippets and effective dissemination. We will use novel techniques like structured data extraction to various data mining techniques like classification, clustering and regression.

APPROACH	
Consider an Event for processing.	Events are happening all the time around us. For example, pests are being detected, discussed, and reported using various techniques. We take events from these sources, manual in the current scope. *Ex: Yellow rust identified at a location, large scale import opportunity in marketplace, etc.*

Once an event is considered, deduce event characteristics from event models.	Most of these models are available, may be not in a directly consumable form. We will use structured data extraction and classification techniques to prepare the model. From these models, we deduce spread characteristics, impact, other resulting conditions, etc. *Ex: Yellow rust spreads through wind, rainfall increases humidity.*
Consider actual and predicted conditions to get to potential impacted areas & roles in the ecosystem.	Conditions like wind direction, weather parameters, crop season, crop calendars, current market prices, etc., are analyzed along with event characteristics using regression techniques. We predict the areas, crops, and roles potentially impacted, price fluctuations, etc. *Ex: Specific areas & crops of impact.*
In the impacted areas; crops, roles, etc., are analyzed to get to precise impact of an event on them and generate alerts & opportunities.	Ecosystem has roles, produce they deal with, stage, services they provide, etc., which helps in generating tailor made alerts and opportunities. Most of this data is not structured, most of it needs to be deduced based on their given information, social & marketplace activity, etc. *Ex: Prediction of pest attack on wheat farmers, opportunity to input dealers.*
Disseminate information	Format alerts and opportunities for smart phones, SMS, web and push the information on the platform. Mobile notifications, alerts and other techniques will help make sure to get the attention and activity around them.

Huge impact can be achieved by enabling the ecosystem make informed decisions based on an event. Relevant, targeted, tailor-made, and timely alerts & opportunities results from robust data mining (Witten et al., 2016). Every role in the ecosystem gets alerts to act on problems and opportunities to cash on. Generating alerts and opportunities for the same event helps in transparency and more importantly quicker resolution, because of **complementary gratification**. Our idea do not expect farmers to be on smartphones and expect any activity from them. Alerts will be pushed through SMS to farmers and opportunities for other ecosystem players through mobile applications & web. Farmers can reap bigger benefits, if they use smartphones, because of rich content and social activity.

We propose to use Kalgudi.com for business roles, impact models and for actual farmers & small businesses. Kalgudi is free to use network platform for agriculture ecosystem across the world. Kalgudi scales to millions of users and allows follow-up activities like comments, questions/answers, measurement of reach & information consumption of the snippets pushed. **This loop back enhances the value generated by the big data analytics greatly.** As part of this pilot, we will pick one end to end case; from an event to an alert, selected based on kalgudi's farmers and businesses network available.

Budget: We estimate a budget of $100K, shared equally between ICRISAT & Kalgudi. ICRISAT will leverage the ongoing projects, existing data sources and partner consortium in India/Africa to onboard primary stakeholders in addition to project management. Kalgudi team will be the technical support for big data analytics, new data sources, and customizing platform for this project.

Post pilot, we will continue generate or use existing data sources for pests, diseases, weather, soil, market, etc. We will continue to prepare and analyze data related to farmers, crops, and businesses in the ecosystem. A fusion of these data sources coupled with AI & robust data mining is a workable and scalable model to have positive impact on agronomic decision making.