What is your idea?

Inspire Challenges are about solving big problems using next-generation ideas. We're looking for novel high-risk big data and ICT ideas that have the potential to lead to new scientific discoveries, or enhance the efficacy of development efforts. We want to see innovative ideas with promising potential for social impact that use open data to solve development problems faster, cheaper and with greater efficiency.

Use this section to briefly describe your idea.

- Indicate in one or two sentences **in bold** the essence of the idea.

"Athavan" is an online dashboard that will simulate climate and soil data and suggest the most suitable agroforestry system (trees and crop combination) to small scale farmers at a village-level, that once implemented will increase household nutritional and food security while improving ecosystem resilience.

- Why is the idea an unconventional or creative approach to the problem outlined in the topic?

Northern Sri Lanka, a predominantly agrarian region, has emerged from 30 years of civil war that has resulted in large areas being deforested, soil erosion, soil and water pollution, and overall degraded land.

In addition, the province is under protracted drought conditions, the worst in 40 years that has led to severe loss in crop productivity further plunging small-scale farmers into food insecurity. There is a need for greater access to diversified food through harnessing existing climate, soil and water data. Athavan will compute real time data to provide local forecasts of climate and length of dry spells with information of sowing dates, harvesting time and agroforestry recommendations to increase nutritional security.

Athavan will input farmers indigenous knowledge, scientific research, climate and soil data so anyone can get personalized recommendations of agroforestry models that once implemented will then immediately improve the microclimate and make it more drought resilient.

Describe the hypothesis for the proposal and why it is expected to succeed.

After utilizing the information provided by Athavan we will implement agroforestry models in farming communities that will then, 1) increase nutrient and food security, 2) increase crop yields, 3) replenish soil nutrient availability, and 4) increase water availability in the region. Our application will generate a model suited to the two monsoon cycles Northern Sri Lanka, indicating the best tree and food crops to plant for each season. Agroforestry models will act as a buffer against continued soil erosion and increase soil fertility

How will you pilot it?

Beyond simply great ideas, we're looking for great impact as well. We want ideas that can be put into practice in a short timeframe - to start making a real difference for real people today.

Use this section to briefly describe how the idea will be put into practice.

- Describe the implementation plan, including any new technologies or tools that will be developed.

We will collect data from open access resources and use existing soil data (previously collected by Hamsha Pathmanathan and Chandrashri Pal in Northern Sri Lanka), and analyse it to obtain an accurate depiction of soil quality (soil organic carbon, soil moisture content, soil texture, and soil water retention) within the farming regions of Northern Sri Lanka

The team would select 5 unique villages within Northern Sri Lanka for implementation. Climate (downloaded from NOAA), soil, and management data from open sources and universities would be collected and converted into the required format for the agroforestry model. Athavan will model rainfall seasonal pattern, trend of monsoon, temperature trends, water use efficiency (current and future), nutrient use efficiency (current and future), to generate an agroforestry model most suited to climatic zone to the small-scale farmer.

- Explain how the work will be performed within the budget (USD$100,000) and time (12 months) allowed?

Please see Appendix A

- What essential data will be generated during this pilot?

This project would generate the following data: location specific crop productivity (before and after interventions and after interventions), climate pattern, soil status, WUE & NUE (before and after interventions). This will be published in dashboard so that it may be used for everyday decision-making in farming practices. The project would also recommend various agroforestry model (living fence, bund or boundary planting) specific to an area given the current climatic conditions and also generate ideal crop varieties best suited for tree-crop interaction during each growing season.

- If the pilot is successful, what are the next steps?

The first objective of Athavan will be to ensure household level food and nutritional security on a village scale in the most sustainable and cost effective manner. Food and nutritional security on a household and community level is achieved when the small holder farmers have access and the means to produce culturally appropriate foods safely [1]. Athavan will recommend agricultural intensification methods by utilizing agroforestry models in drought conditions that once implemented will create its own microclimate and reduce vulnerability. Next steps include partnering with farming communities on marginal lands with different soil profiles to test Athavan's predictive abilities on agricultural productivity and ultimately strengthening landscape integrity and resilience towards climate related disasters.

Reference:

[1] Food and Agriculture Organization. 2010. "Household food security & community nutrition." [Online]. Available: http://www.fao.org/ag/agn/nutrition/household_en.stm. [Accessed: 08-Sep-2017].

Appendix A

Budget and Timeline

Budget Items	Description	Cost per month (USD)
Airfare and Visa (one time expense)		
Air fare (Two way)	Airfare from YYZ - CMB -YYZ and MAA-CMB-MAA	$2,631.00
	Total Costs	$2,631.00
Daily Transportation		
Taxi/auto and public transportation	50 USD/month/person	$150
	Total Costs	$150
Daily Living		
Groceries		$450
	Total Costs	$450
Housing expenses		
Rent/lease	50 000 rs /month	$450
Downpayment (one time)	152000 rs	$995
	Total Costs	$1,445
Communications:		
Internet	$30 usd (fiber option 50 gb per month and 50 gb btw 12 p.m-8 a.m)	$30
Air time	$25 usd*4	$100
	Total Costs	$130
Monthly Allowance		
Chandrashri Pal	$700 usd based off of LankaCorp montly stipend	$700
Hamsha Pathmanathan	$700	$700
Ponraj Arumugam	$700	$700
	Total costs:	$2,100

	First month total	$6,906.00
	Person expense - start up cost /month	$3,280
	Annual budge	**$42,986**

Budget Items for Field implementation	**Description**	**Costs per year (USD)**
Seedlings	Crop seeds, such as rice, tomator, capsicum, tomatoe, pulses and trees, such as neem, mango, gliciridia, tulip tree	$15,000
Fertilizers (paddy fields)	Nitrogen, phosperous, and potassium	$5,000
Renting/leasing land	40000 rs/month	$3,200
Land preparation (I50 farm fields)	6000 rs * 4 labourers *15 days * 2	$4,400
Field assistants (2)	30000 rs /month	$2,400
Developing "Athavan"		$22,000
Soil Analysis	University of Vavuniya, much purchase own chemicals	$3,000
Weather sensors		$2,000
	Annual budget	**$57,000**

Time Line (2018-2019)	**Activity**
January to March	Collecting, analsying, and synthesizing open source data to be inputted into Athavan Setting up household weather sensors
March to April	Developing and running Athavan protocol
April to June	Implementing Athavan recommended agroforestry models in 150 farming households for the first monsoon cycle
June to August	Resampling field site
August to October	Analyzing collected data to determine project success in increasing crop yields and food securit. Tweaking Athavan decrease model errors
October to December	Implementing Athavan recommended agroforestry models in 150 farming households for the second monsoon cycle
December to January	Sampling field site to determine crop yeilds and impact on food security. Determining scalability of the project