

INSURANCE CONFERENCE 2022

**STRENGTHENING RESILIENCE IN A CHANGING
ECONOMIC LANDSCAPE – THE CASE OF INSURANCE**

Topic: Climate Risk Insurance – case study of cocoa Indonesia

Speaker: Fay Fay Choo from Mars Inc.

HSM Widodo from General Insurance Association
Indonesia (AAUI)



Mars

- The business case – why protect smallholder farmers?
- The approach: developing soil moisture index SMI crop insurance

AAUI

- From approval to pilot
- The financial business case for insurers

**The world we
want tomorrow
starts with how we
do business today**

MARS

While we may all remember 2020-22 for Covid-19, our lasting impact and damage to our climate is increasingly evident around the world



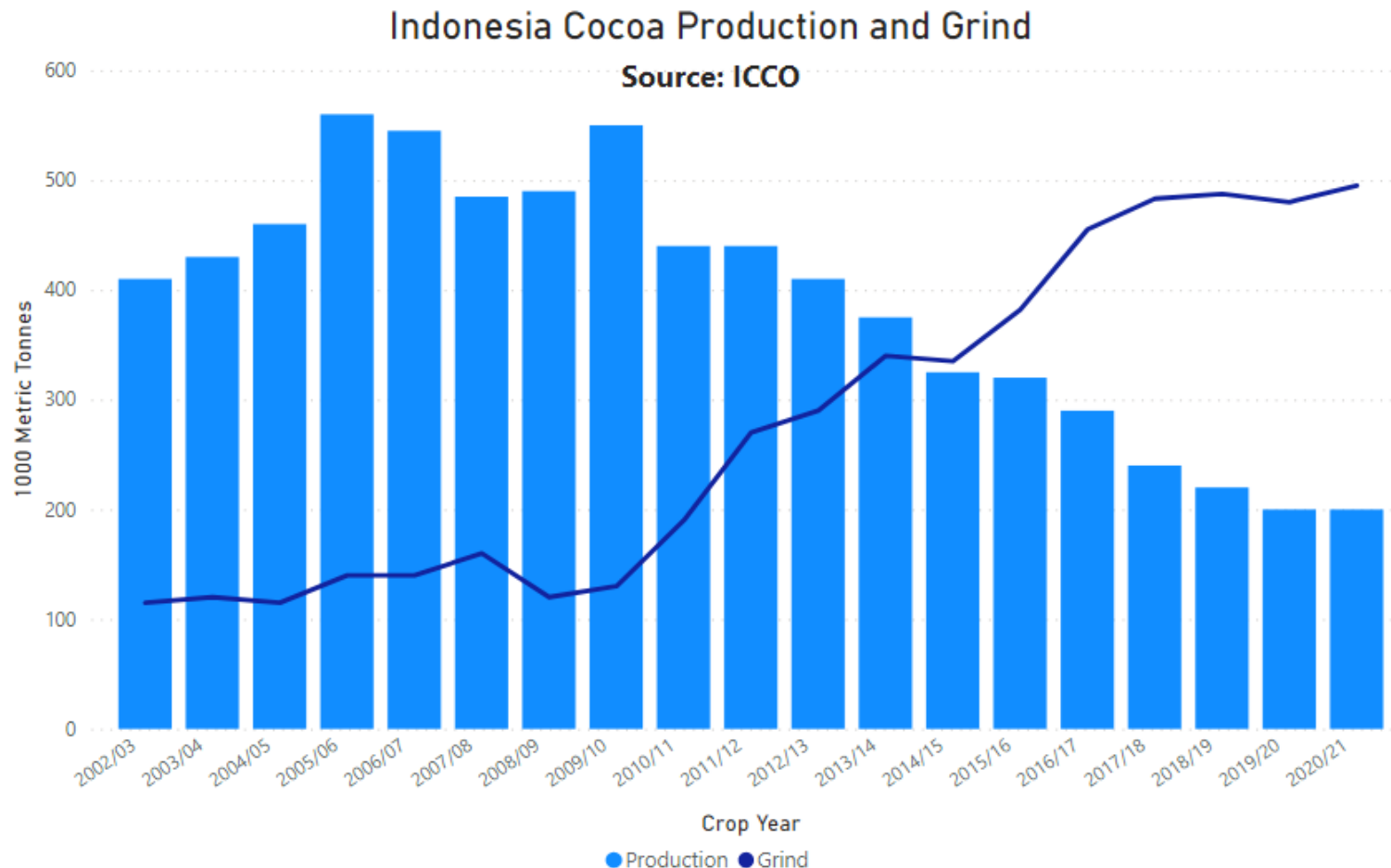


**Help small-scale farmers adapt
to climate change or face
increased hunger and migration,
warns IFAD President**

Rome, 22 January 2021

©IFAD/Susan Beccio

Indonesia cocoa production



Factors **positively** affecting trend

- Sustainability interventions working in localized areas
- Decline slowing: less acreage, better farmers left and replanting

Factors **negatively** affecting trend

- Government support to annual crops / food security
- Disease pressure with too wet climate

Cocoa Farming Family: what's changed in last 3 years

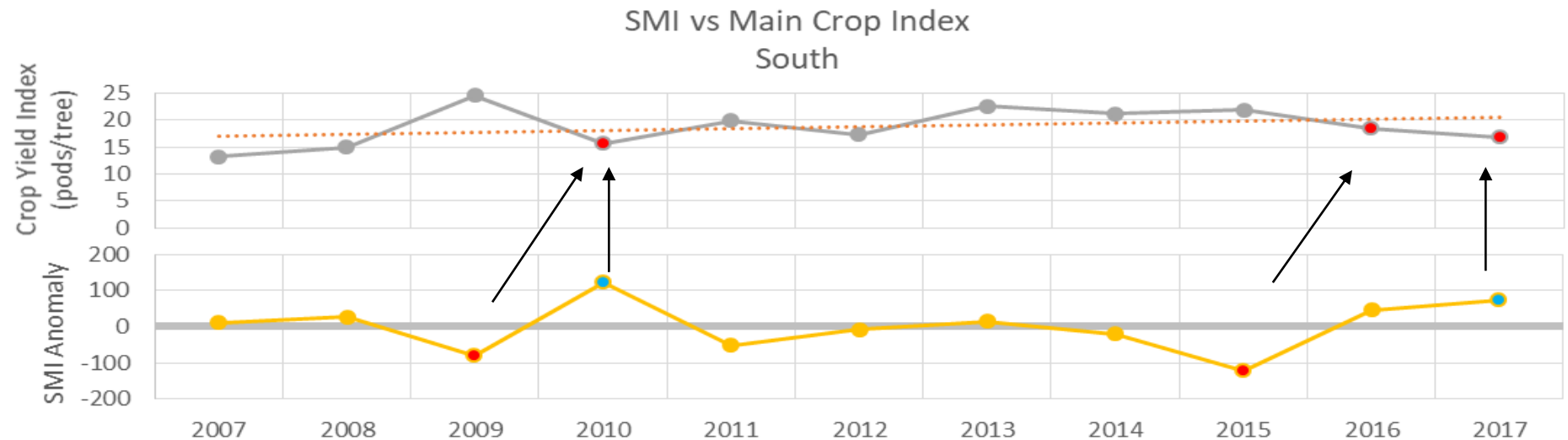
- RESILIENCE - stronger community cohesion, high social capital
- Costs of inputs have doubled, farm economics is worse
- Climate unpredictable: Pest & disease pressures
- Needs access to inputs, financing and support
- Children lost 2 years of education



The approach: Developing Soil Moisture Index (SMI) Insurance

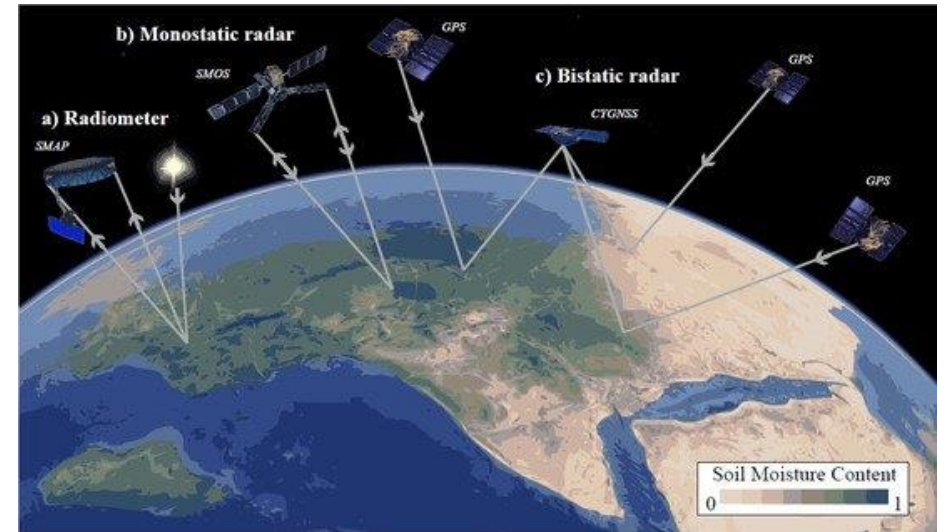
- Open sourced, transparent (independently verifiable)
- Consistent, reliable
- Low admin cost, payout triggered by SMI, easy to scale
- Understood by farmers, good proxy for crop yield

Strong correlation between Soil Moisture and Mars Crop Index



Satellite Remote Sensing: Soil Moisture Index (SMI)

- Soil moisture is open-sourced data collected by EU / NA Spatial Agency (Copernicus/NOAA), globally and captured on daily basis at 12 by 12 km resolution (grids). Data collection started in 2007, providing a reasonable sample for insurance product design and pricing (co-related to farm yield)
- Satellite sends microwave remote sensing to the earth ground surface and measures the volume of moisture within one cubic meter of soil, expressed as percent, i.e. 42 means 42% of that cubic meter contains moisture. It can capture this info at various depths (for this we used 60cm depth as it corresponds to root zone)
- Complex data retrieval was simplified by AAUI into local Indonesian Data Repository in <http://soilmoisture.aaui-services.id:8080/contractCustodian>




soilmoisture.aaui-services.id:8080/contractCustodian/ 90%

AAUI Weather Index Insurance Smart-Contract Platform

[Weather Index](#) | [Open Smart-Contract](#) | [Executed Smart-Contract](#) | [Contractual Sub-Indexes](#) | [Agriculture-Weather Research](#) | [About ATBI](#)

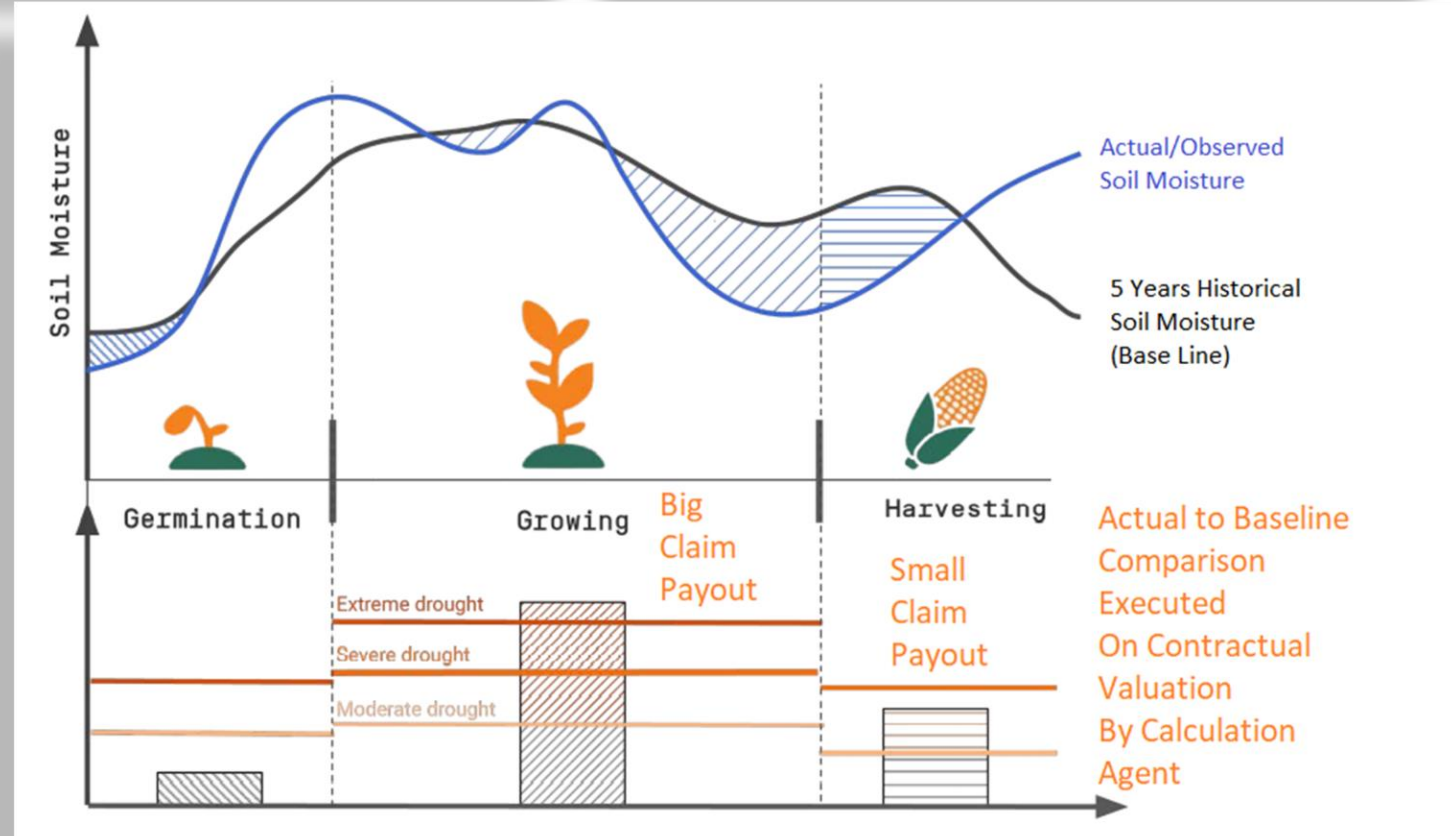
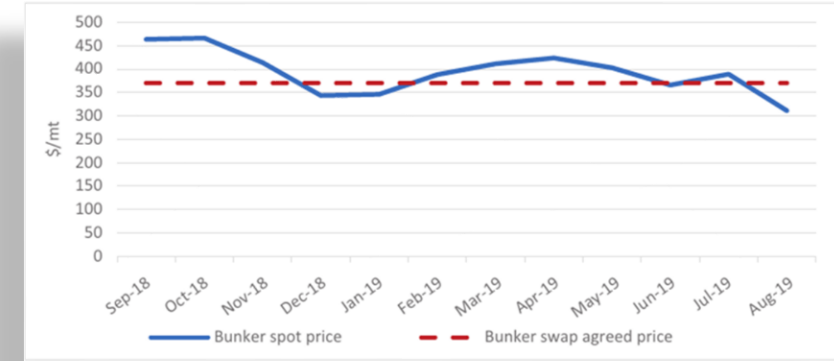
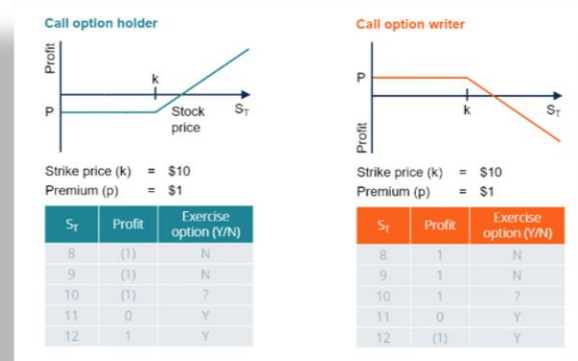
Index Publishing & Weather Index Smart-Contract Custodian

Soil Moisture Index	Smart Insurance Contract	Index Information	RESTful API
Legacy NOAA Soil Moisture Index	Open Contract by Location	NOAA SMOS	NOAA JSON (Latest data)
Copernicus Top Soil	Insurance Contract Data (Sample)	Copernicus SWI	Copernicus JSON (Latest data)
Copernicus 60cm-Show	Search Insurance Contract		



A 'Climate Pattern Deviation' Insurance

- Similar Contract as the Put/Call Option in stock Exchange or Bunker Swap in Shipping
- With an exchange of a Premium, Insurance company will automatically Pays a 'Tick-Value' Proportionated Claim Amount with regards to the Anomaly, shall the Soil Moisture reached the agreed Trigger point (ie Strike price), within the coverage period .
- Due to the Volume, Level of Sophistication & Independency requirement of Valuation process, an Independent Calculation & Custodian Agent is Required



AAUI smartContract Custodian Platform

[Electronically Secured Contract Custodian Ecosystem with Auditable Smart-Contract Java Execution Engine for Transparent, Automated Future Contract Claim Valuation and Fulfilment]



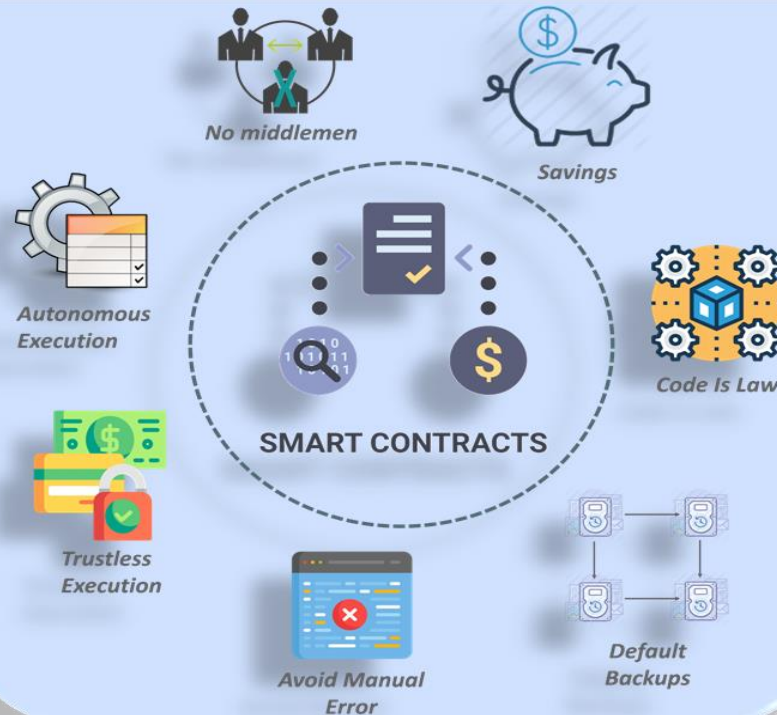
Multiple 128-Bit Hash
Secured-Transparent-
Immutable Future Contract
Public Registrar .

Integrated Contractual Sub-
Index Generation from
Copernicus/NOAA Baseline
Weather Index

Autonomous Transparent
Auditable smartContract
Valuation mechanism



ASOSIASI
ASURANSI
UMUM
INDONESIA



Index Insurance
Smart-Contract



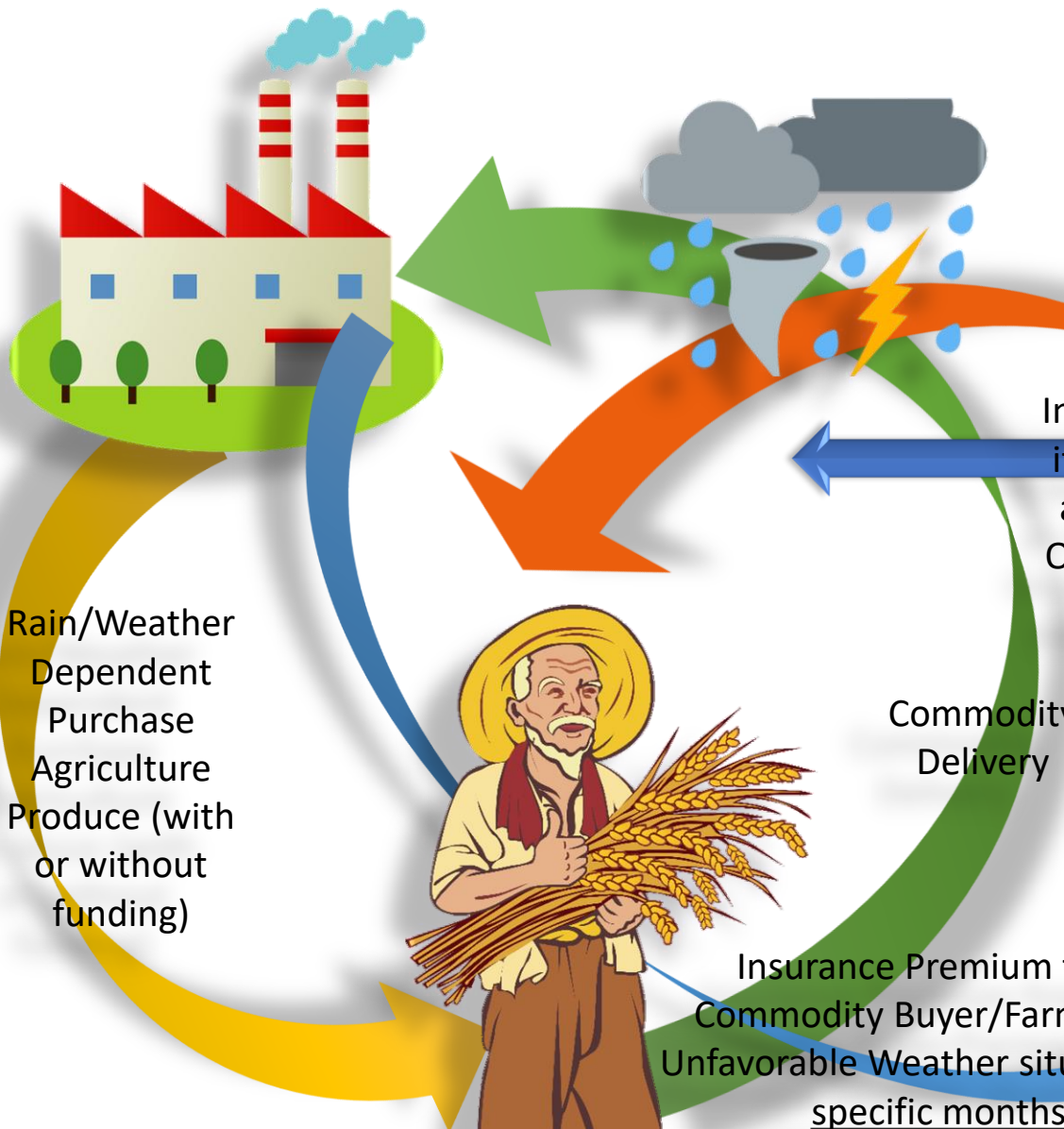
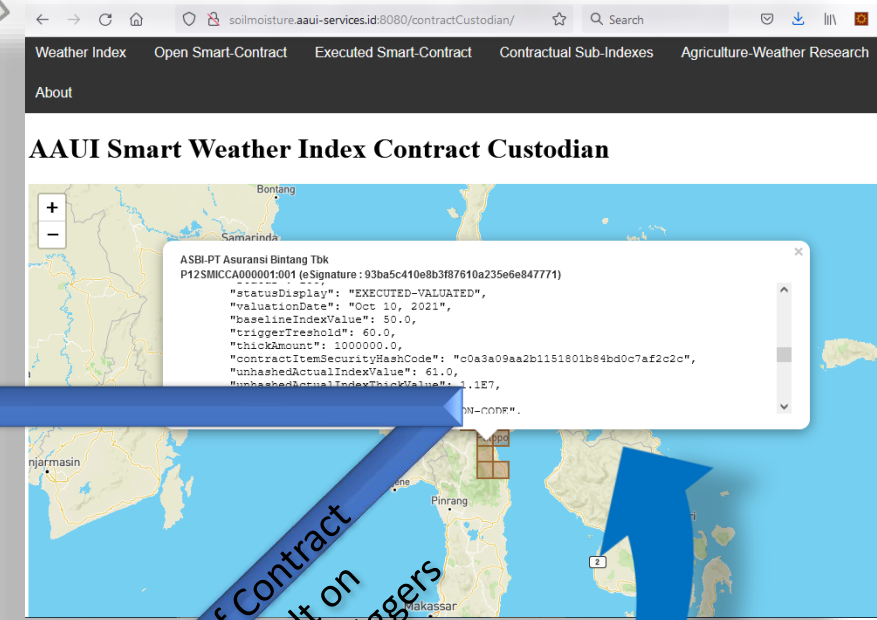
Valuation result &
Claim Notification

Soil Moisture-Index Insurance

The Complete Ecosystem

Daily Data Download from NOAA & Copernicus

<http://soilmoisture.aaui-services.id:8080/contractCustodian>



Insurance Company Pays Claim if Not-Enough/Too much Rain as indicated by Satellite Data On contracts Month. Based on AAUI Valuation Notification

Notification of Contract Valuation Result on Contracts Months (triggers Claim payment)

Insurance Premium from Commodity Buyer/Farmer, for Unfavorable Weather situation for specific months

Weather Index Contract Registration

Rain/Weather Dependent Purchase Agriculture Produce (with or without funding)

Commodity Delivery

The Future

Rain/Soil Moisture Index

Agriculture

- Onion
- Palm Oil
- Tobacco
- Clove
- Vanilla
- Maize

Mining

- Coal Mining
- Fero Nickle

Sea Temperature Index

- Seaweed Farming
- Pearl
- Coral Reef

Sea Level Index

Rob Flooding

Transportation

- Vessel Port Entry
- Vessel Load Factor

soilmoisture.aaui-services.id:8080/contractCustodian/

μTorrent Web TerraScope How to Create an A...

AAUI Weather Index Insurance Smart-Contract Platform

Weather Index Open Smart-Contract Executed Smart-Contract Contractual Sub-Indexes Agriculture-Weather Research About ATBI

About smart-Contract Sea Temp (Coral Prototype)

Agriculture-Weather Index Insurance Funded Research

Maipark-IFC-Mars
Cocoa Farmer Index Insurance Pricing & Model for Sulawesi Selatan, Sulawesi Tengah and Sulawesi Tenggara

AAUI-Maipark Research Grant: Master Research
Universitas Jendral Soedirman
Agung Prabowo SSI,MSi
Pengaruh Perubahan Pola Curah Hujan Pada Produksi Bawang Merah di Kabupaten Brebes

AAUI-Maipark Research Grant: Master Research
Universitas Technology Sepuluh November
Yan Aditya Pramana SPd, MSi
Analisa Pengaruh Cuaca untuk Estimasi Produksi Bawang Merah dengan Hidden Markov Model Sebagai Antisipasi Dampak Perubahan Iklim

Lessons: What worked, what didn't and why

What worked

- Uncommon collaboration in development > approval > pilot
 - Shared vision in service of smallholders
 - Trust between partners
- Pilot and learn before scaling
- Upfront technology ecosystem – works for licensing and rollout

What did not

- Long approval process – innovative product, regulators needed more info to be convinced
- Farmers general low awareness on insurance
- SMI is complex to explain to farmers – need education why premiums, why and when a payout takes place.