



The United Nations / Romania International Conference on Space Solutions for Sustainable Agriculture and Precision Farming

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Satellite Imagery Based Analysis - Delivering outcomes that matter

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BUILDING A WORLD OF DIFFERENCE®
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 **BLACK & VEATCH**



Core Values

- Shared Ownership
- Integrity
- Common Purpose
- Stewardship = Sustainability
- Respect
- Accountability
- Entrepreneurship

VISION
WE ARE RECOGNIZED AS A GLOBAL LEADER
in safety, innovative client solutions, career development and profitable growth

VALUES
WE BUILD STRONG RELATIONSHIPS
with each other, our clients and our business partners
based on seven fundamental

MISSION
BUILDING A WORLD OF DIFFERENCE

INTEGRITY SHARED OWNERSHIP
COMMON PURPOSE STEWARDSHIP
RESPECT ACCOUNTABILITY
ENTREPRENEURSHIP

Black & Veatch is *Building a World of Difference*®



About Black & Veatch

MARKETS

POWER



WATER



TELECOMMUNICATIONS



OIL & GAS



GOVERNMENTS



SMART CITIES



TRANSPORTATION



MINING



DATA CENTERS



SERVICES

Asset Management

Data Analytics

Smart Integrated Infrastructure - SII

Sustainability Solutions

- Controlled Environment Agriculture
- Renewable Energy Solutions

Engineering Procurement Construction

Consulting / Operations

Physical & Cybersecurity

Program & Construction Management

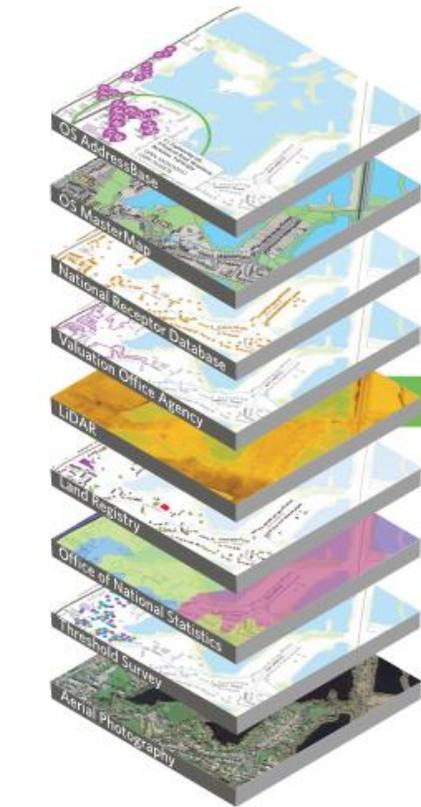
Black & Veatch solves complex challenges for critical human infrastructure

ASSET 360 using Numeric Analytics



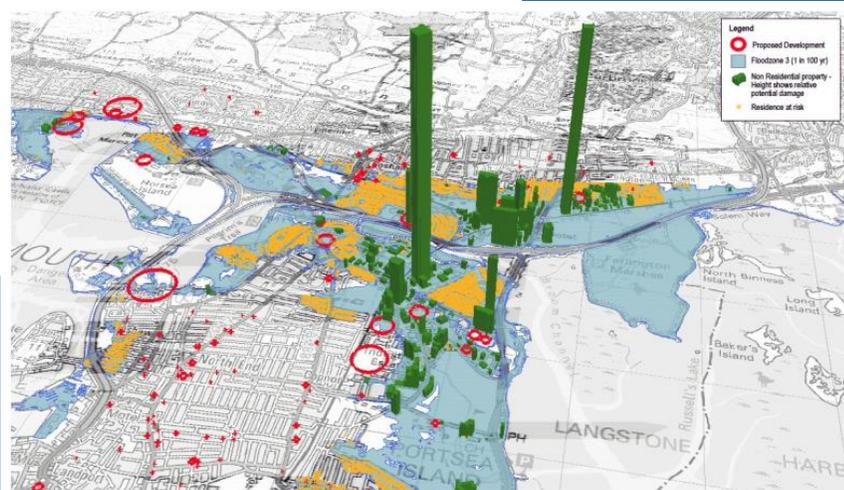
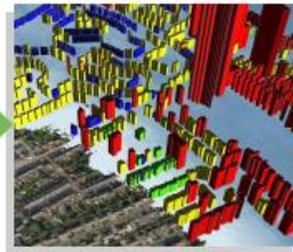
Flood Damage Economics Model (FDEM) Image based Analytics

FDEM is an Information Management and Analytics (IMA) based tool developed by Black & Veatch.



Combining multiple sources to generate a full assessment

FDEM

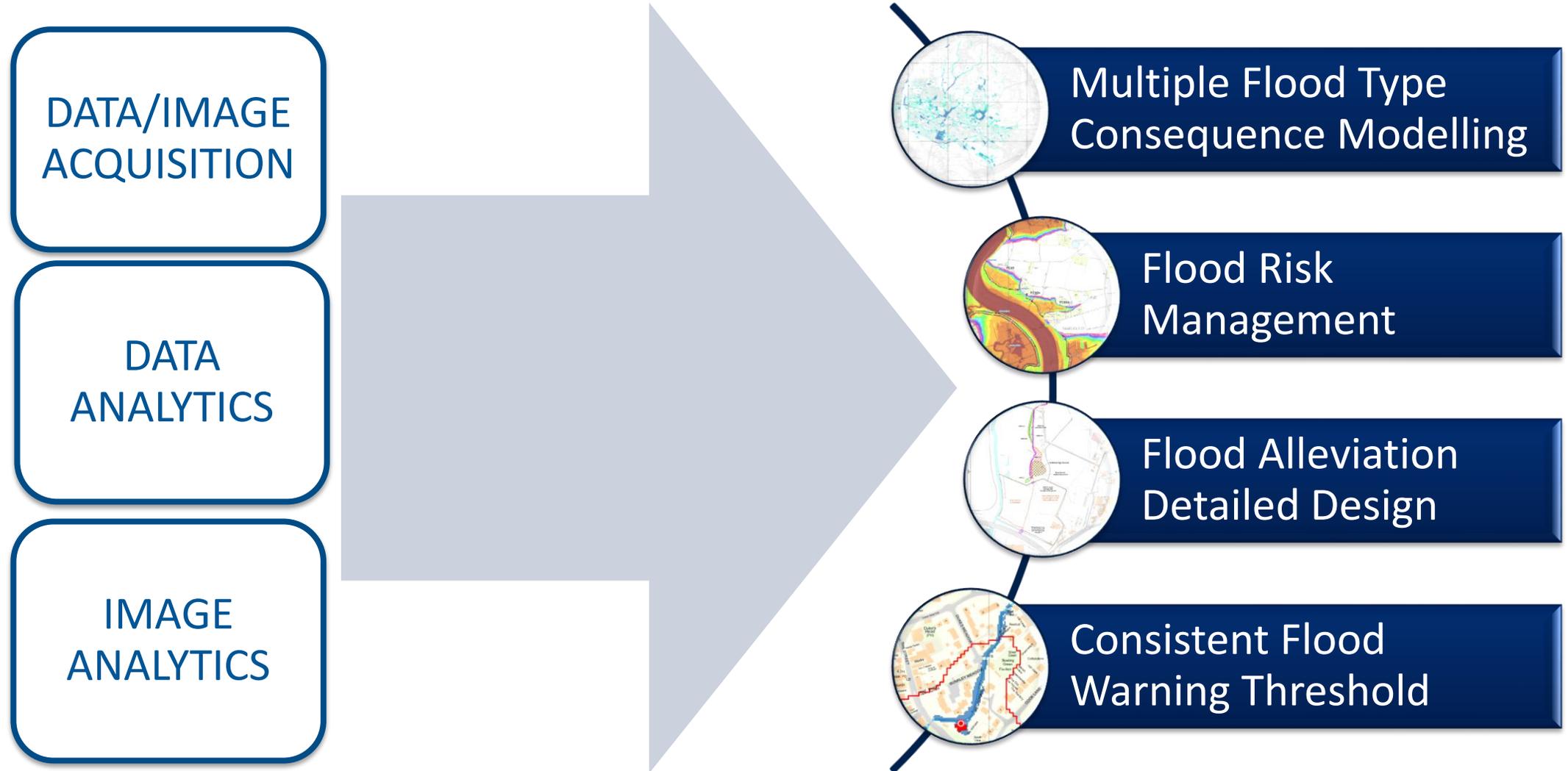


Bringing flood damages to life in demonstrating elements such as damage value or contribution requirements at property level

BENEFITS

- A better picture of flood risk management ✓
- A need to identify potential contributors ✓
- Prioritising projects – targeted spend ✓
- Better communication – visualisation ✓
- Implement Payment for Outcomes ✓
- Collaboration between Environment Agency, local authorities and utilities ✓

Integrated Application in Effective Disaster Management



Single application, multiple outcomes! 6

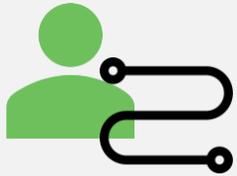


Why Data Analytics?



WITHOUT MONITORING & DIAGNOSTICS

REACTIVE



Time intensive review of asset performance



Lack of insight into asset performance & asset risk



Leads to significant loss in revenue (ex: water loss), asset down-time and brand reputation damage

WITH MONITORING & DIAGNOSTICS

PROACTIVE



Automated system monitoring



Quick and easy identification of under performance of assets



M&D service center see an anomaly within Alerts



Issue documented and fixed before significant loss in revenue, down-time and any reputation damage

Data Analytics provide actionable information!



Drought Assessment & Drought Plans



Challenge

To assess the impact of 2011-12 drought in UK and plan for any event in the near future.



Solution

Assessed the impact of 2011-12 drought and developed drought plan covering period of 2015-2040 in the UK. Also, developed Water Resources Management plan.



Result

- Worked in coordination with Environmental Agency
- Identified the drought triggers
- Drought management actions – such as mobilisation of a drought management team; communication strategy; review leakage levels; water use restrictions (varying severity)
- Identified levels of service and frequency of implementation

Multipurpose resources scheme in Vietnam



Water Resource Planning



Location: Vietnam



Challenge

Frequent droughts in the region threatened hydroelectric production and power cuts were ordered.



Solution

Multipurpose resources scheme doubling the available water resources of the Saigon River Basin and supplying new irrigation areas.



Result

- In 2008, water shortages in Hanoi led to the release of 2.2 billion cubic meters of water (equivalent to 430 million kWh of electricity) from three hydroelectric dams, again for agricultural use.
- The master plan aimed to approach water resource planning in a sustainable fashion for the people of Vietnam. It made an important impact to the lives of the 9 million people, improving the water supply and salinity control in the region

Drought impacts various allied industries

Crop Damage Assessment using Satellite Imagery

→ Challenge

Developing accurate analysis to assess damage to crop land using satellite imagery with less manual effort

☆ Solution

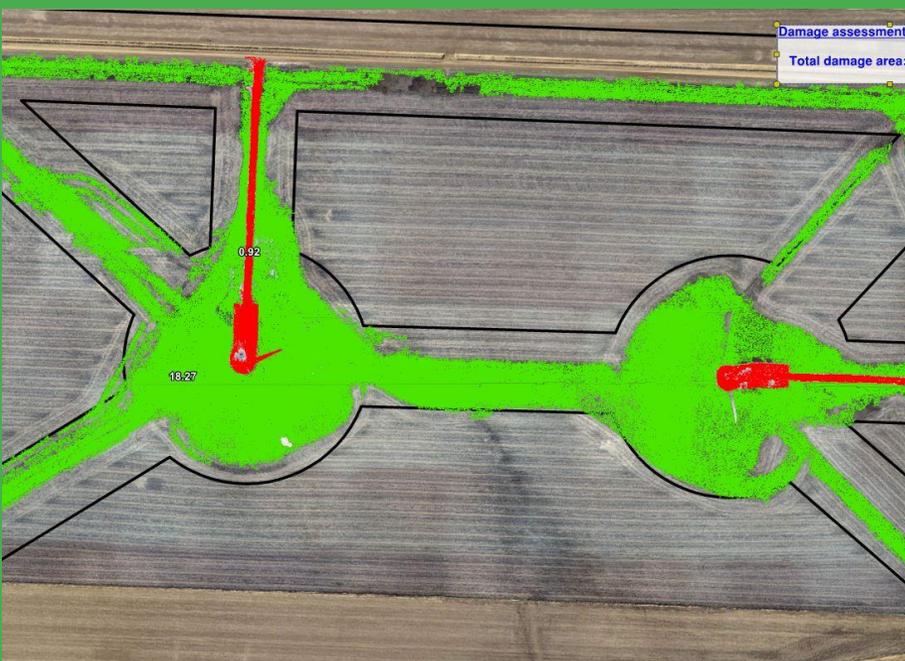
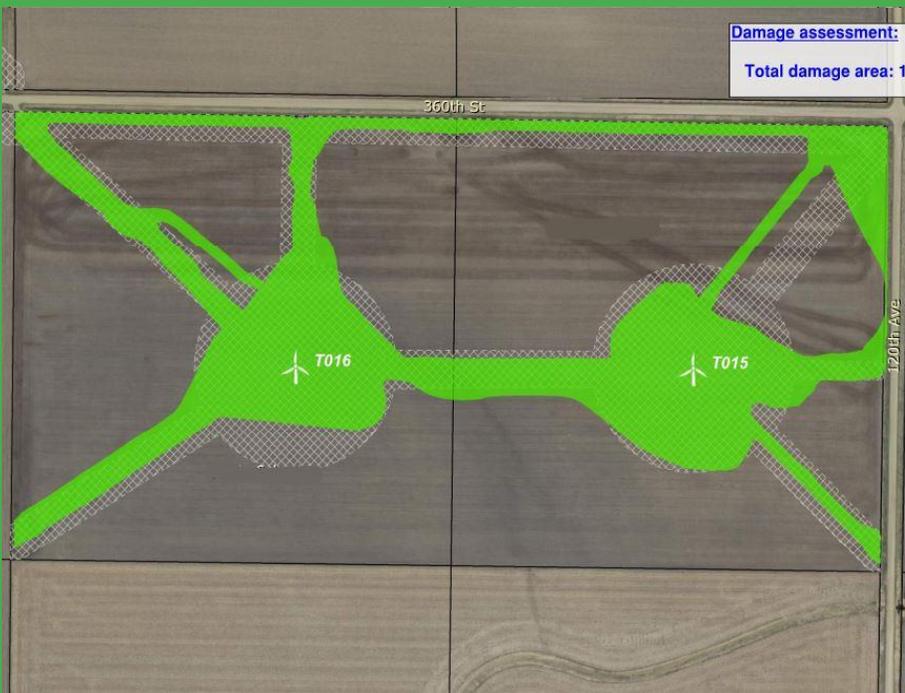
Developed a GIS application and classification algorithm which will identify the difference in the landscape in the aerial satellite imagery

📄 Result

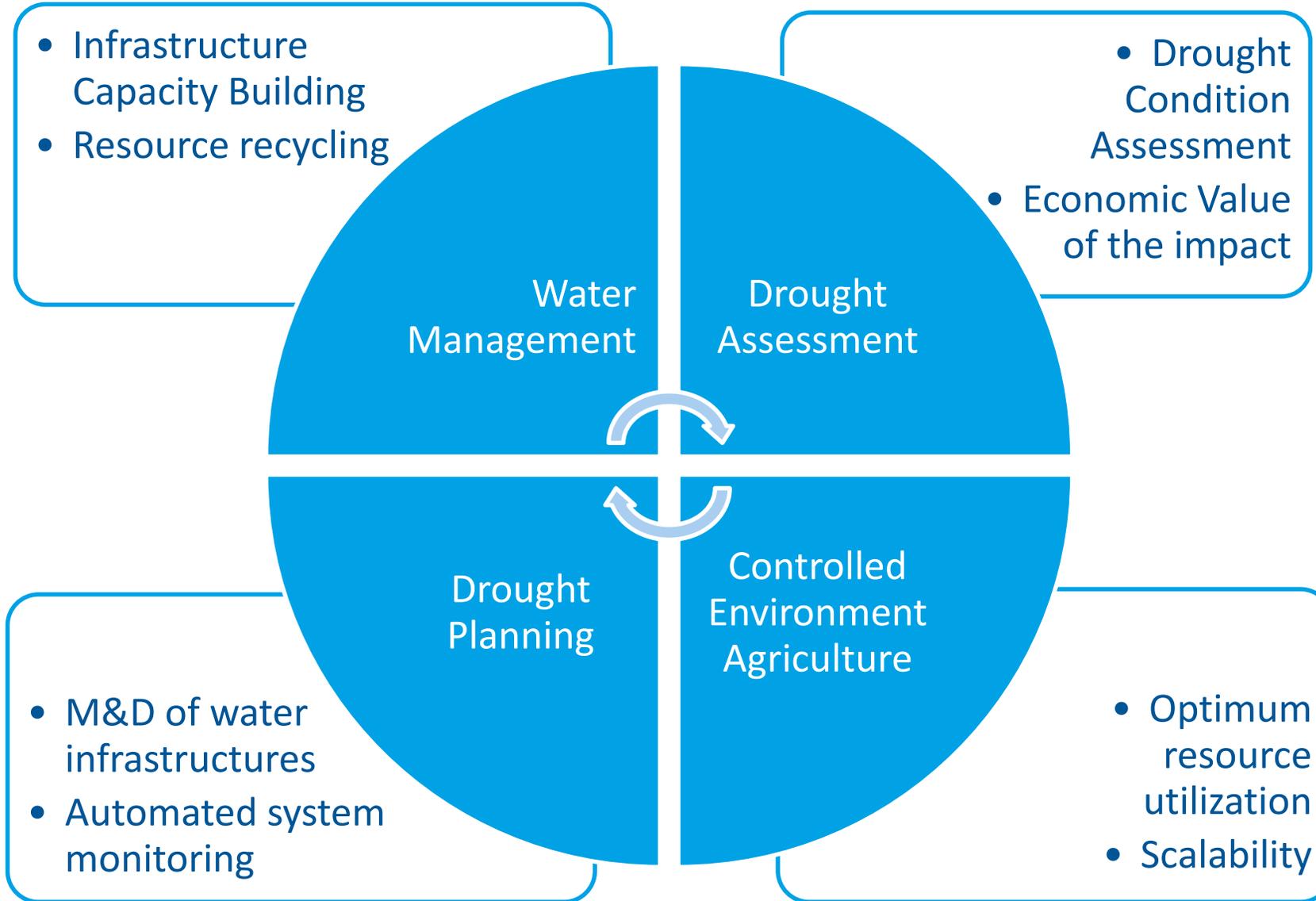
Classification of objects in the satellite image like Cultivated/Roads/Wetlands/Damaged

Damage Assessment using Satellite Image = 19.19 acres

Conventional Damage Assessment = 19.57 acres



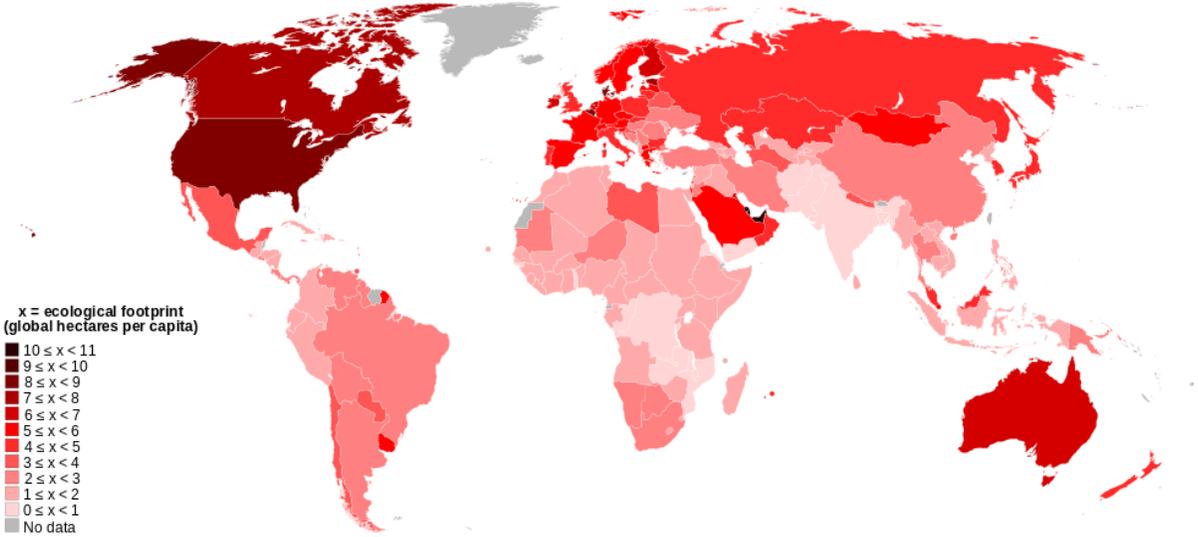
Focus Areas for Data Analytics in Agriculture



Ecological Footprint v/s Human Development Index

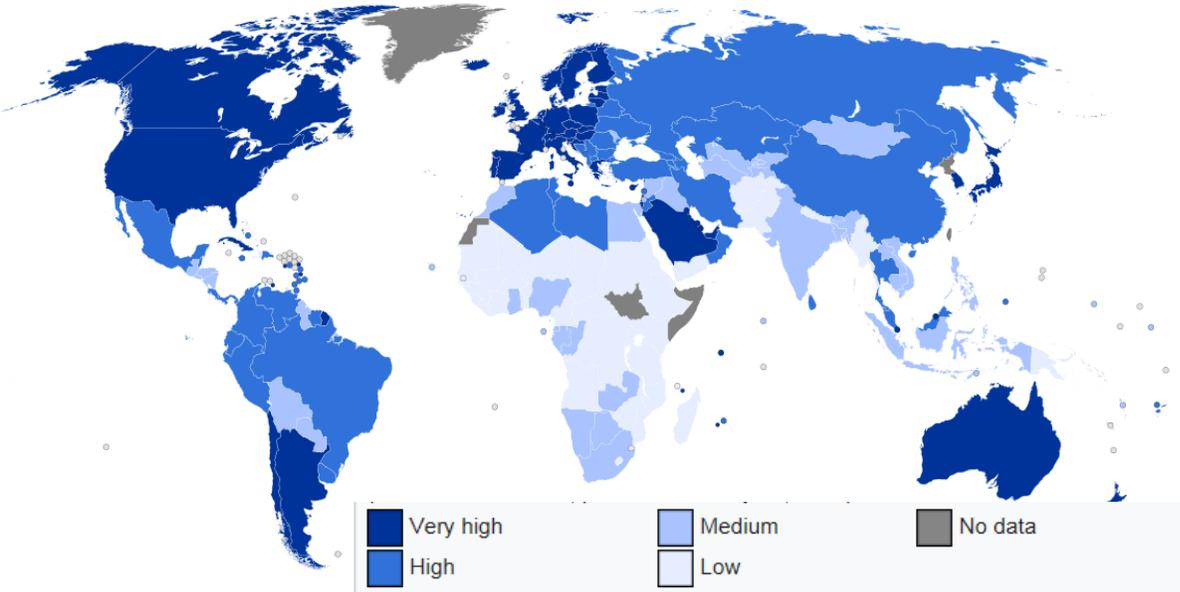
▼ Ecological Footprint

World map of countries shaded according to their ecological footprint in 2007 (published on 13 October 2010 by the Global Footprint Network).



▲ Human Development Index

World map indicating the categories of Human Development Index by country in 2013 (published on July 24, 2014 by the UN Human Development Report Office)



The Human Development Paradigm!

Farms Of the Future

“Managed for Usable, Workable, Sustainable Growth of Rural and Urban Areas;
High Human Development Index and Ecological Footprint less than 1.7 global hectares per person”



Pressing need to achieve **sustainability!**



Paradigm shift

- Planet (Globalization)
- People (Tech-savvy)
- Prosperity (Economy)
- Planet (Environmental)
- People (Social Well-being)
- Prosperity (Health & Happiness)

BUILDING A WORLD OF DIFFERENCE

10 May 2019

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Questions???



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Learn more at [bv.com](https://www.bv.com).

Disaster Management

- Drought Plans
- Damage/Economic Loss

Water Resource Management

- Water Management
- Monitoring & Diagnostics
- Capacity Building

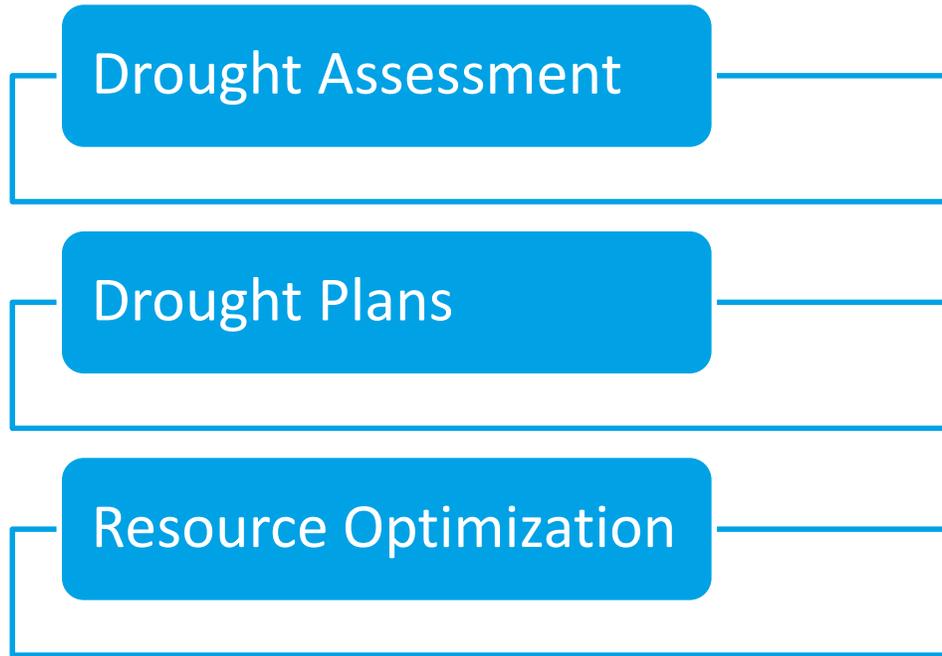
Power Generation Planning

- Drought Assessments and subsequent planning
- Water & Power equipment monitoring

Controlled Environment Agriculture

- Optimized facility infrastructure for Air & Nutrition Management
- Programmatic Approach to scale up from Pilot to Full scale facility

Common goal of various partners



Automated System Monitoring During a Hurricane



Hurricane Katrina recovery activities



Hurricane Mitch re-establishment of power to critical facilities



Challenge

Remote system monitoring before, during and after hurricane



Solution

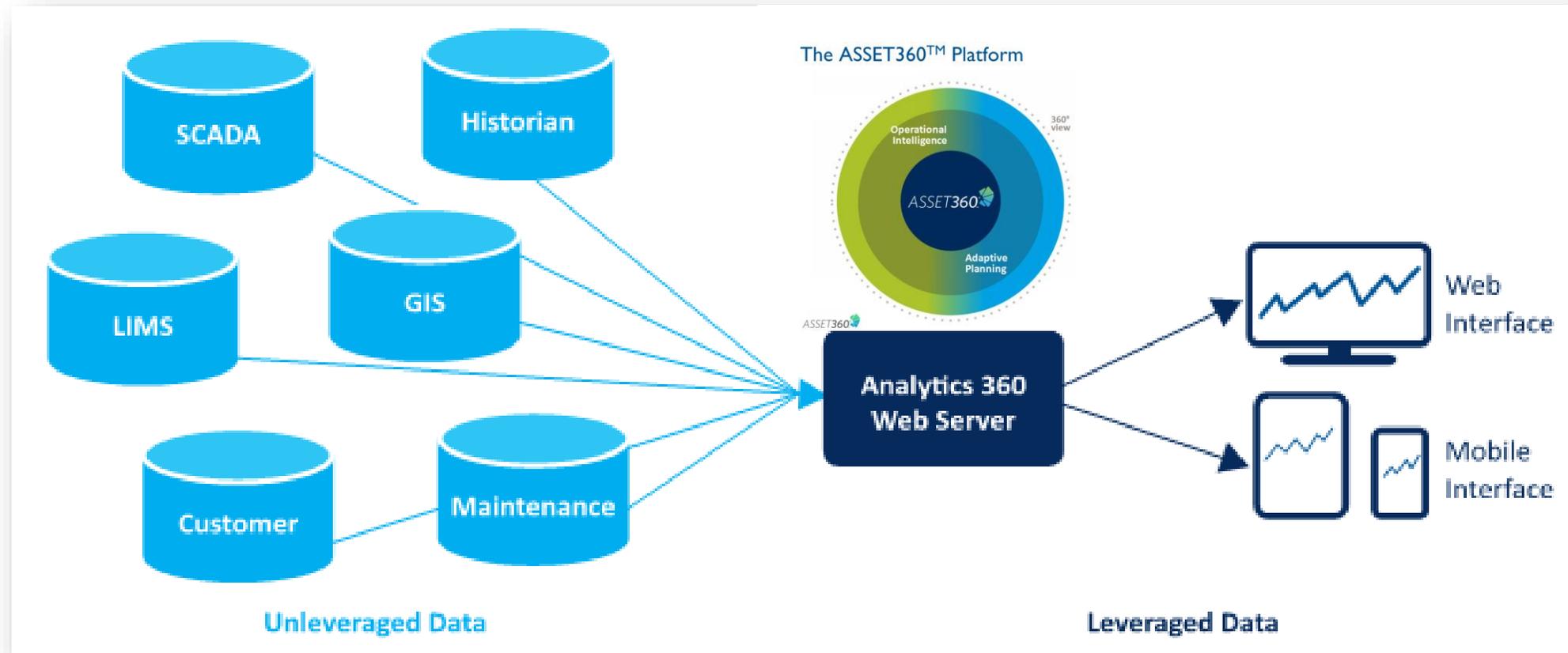
Monitoring & Diagnostics using Asset360 and Technology Watercore with Black & Veatch subject matter experts monitoring and analyzing data



Result

- Monitored water losses during catastrophic event
- Determined whether system went totally out of service (it did not)
- Monitored when leakage detection and all system repairs were complete
- Centralized monitoring and diagnostics. Visualization from any internet connection
- Data logged even when cell system went totally out of service

Schematic representation of data analytics



Applications of Smart Analytics in using Satellite Imagery Analysis
– From Disaster Management to Agriculture Assessment

Multi-purpose applications