SUMMARY REPORT FROM 'SATELLITE EARTH OBSERVATION DATA' WORKSHOP: A NEW FRONTIER IN RESILIENT INFRASTRUCTURE FINANCING

MARCH 27TH 2025

Geovation, London

www.Space4Climate.com @Space4Climate space4climate.bsky.social Space4Climate

EXECUTIVE SUMMARY

On March 27th, 2025, professionals from the financial services industry (FSI) and the geospatial sector met to workshop the use case for satellite data in FSI with a focus on risk and opportunity identification related to the financing of Resilient Infrastructure.

- Donna Lyndsay (Ordnance Survey) presented the findings of a previous series of workshops focussed on use cases in infrastructure and real estate: *Identification of the necessary preconditions to enable the value of EO data to be derived, such as standardisation, education, verified Asset location register, and legal identifier linking*
- Nikhil Chouguley (Reframe Capital) presented his use cases and perceived limitations of Satellite data in FSI. *Climate Risk & Hydro-Asset Valuation, Supply Chain Risk & Deforestation Monitoring, Regulatory Reporting & Emissions Monitoring. The need to be able to create a narrative, manage & communicate uncertainties in the data, help internal rather than external risk management.*

Roundtable discussions and solution design discussions concluded that EO data can:

1. Enhance 'Active management portfolios';
2. Help manage 'stranded asset' liabilities in portfolios;
3. Enable proactive marketing within the FSI rules of marketing engagement.
4. Leverage the Carbon and Biodiversity credits market as a new source of capital for Resilient Infrastructure financing.
5. Be integral to a digital planning hub that would enable collaboration across the planning and financing cycle.

The technical blockers session: concluded that high quality authoritative data, must be embedded in existing FSI risk models and user interfaces and easily adopted via procurement.

Participants included FSI user representatives from the regulator, private equity, commercial and investment bank alongside Satellite EO providers

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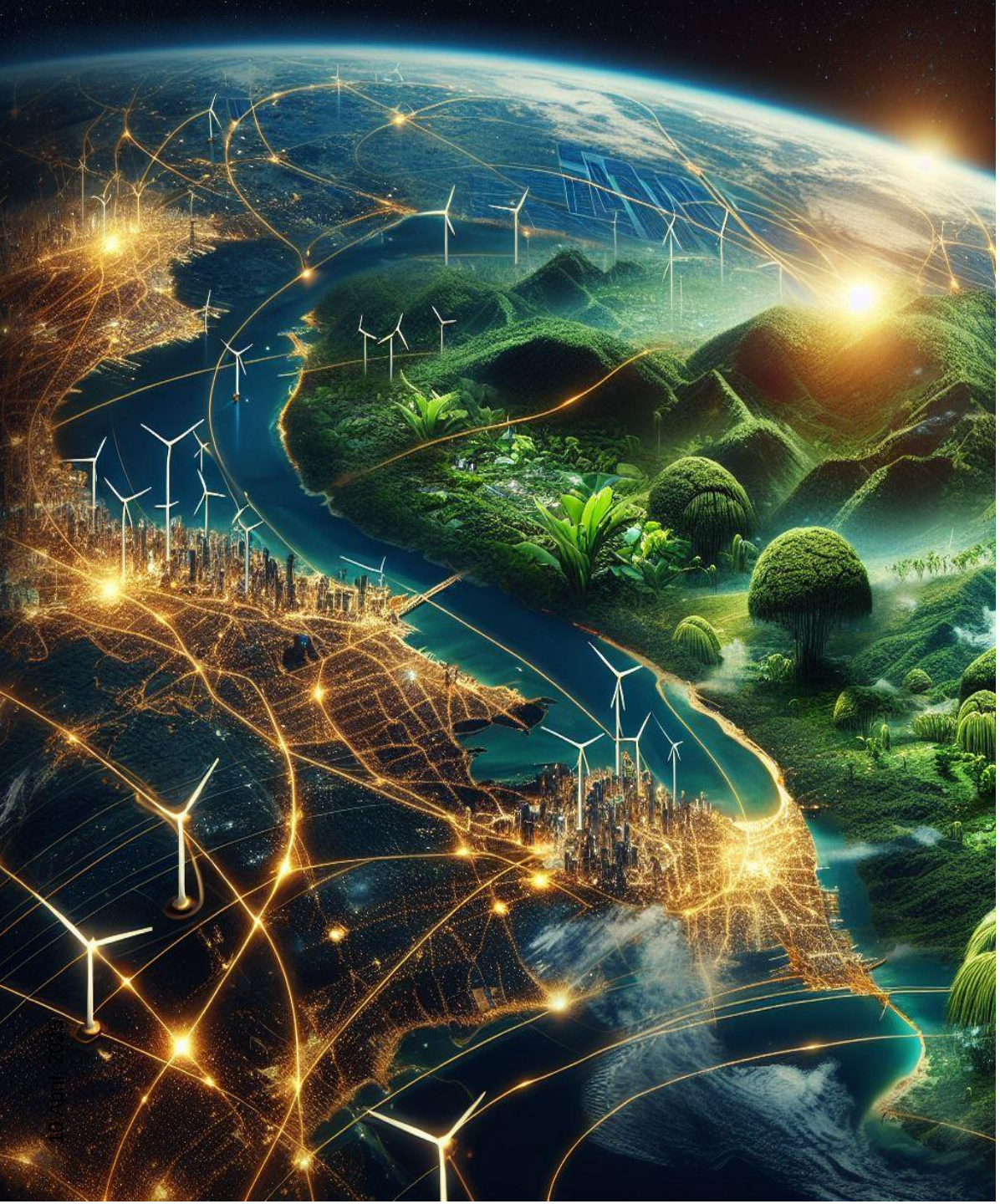

OVERVIEW

Resilient Infrastructure sits at the heart of the nexus of the SDG's, the triple challenges of climate change, pollution and biodiversity loss, and government fiscal policy.

Today $2.9 trillion a year flows into infrastructure. Annual infrastructure investments of well over $1 trillion are needed globally until 2040 to achieve the SDG's with more than 70% to Emerging Markets and Developing Economies (EMDEs)

Resilience of new and existing infrastructure is vital to secure growth, jobs, prosperity

Much of the 2.9 trillion is not properly factoring in physical climate risks.

World Bank concludes that disruption to infrastructure costs at least $390 billion a year across emerging and developing economies; yet the extra cost of resilience is only 3% of overall investment vs an overall net benefit of $4.2 trillion.

Source: University of Oxford; UNEP; Green Fiscal Policy Network; giz

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Earth Observation Data: Can it unlock benefit and value for the Financial Sector?

UKSA - SBRI Feasibility Study

Geospatial unlocking EO (Earth Observation) for use in Financial Services to support improved outcomes for investors, environment and society

Ordnance Survey
SEE ≻ BETTER PLACE

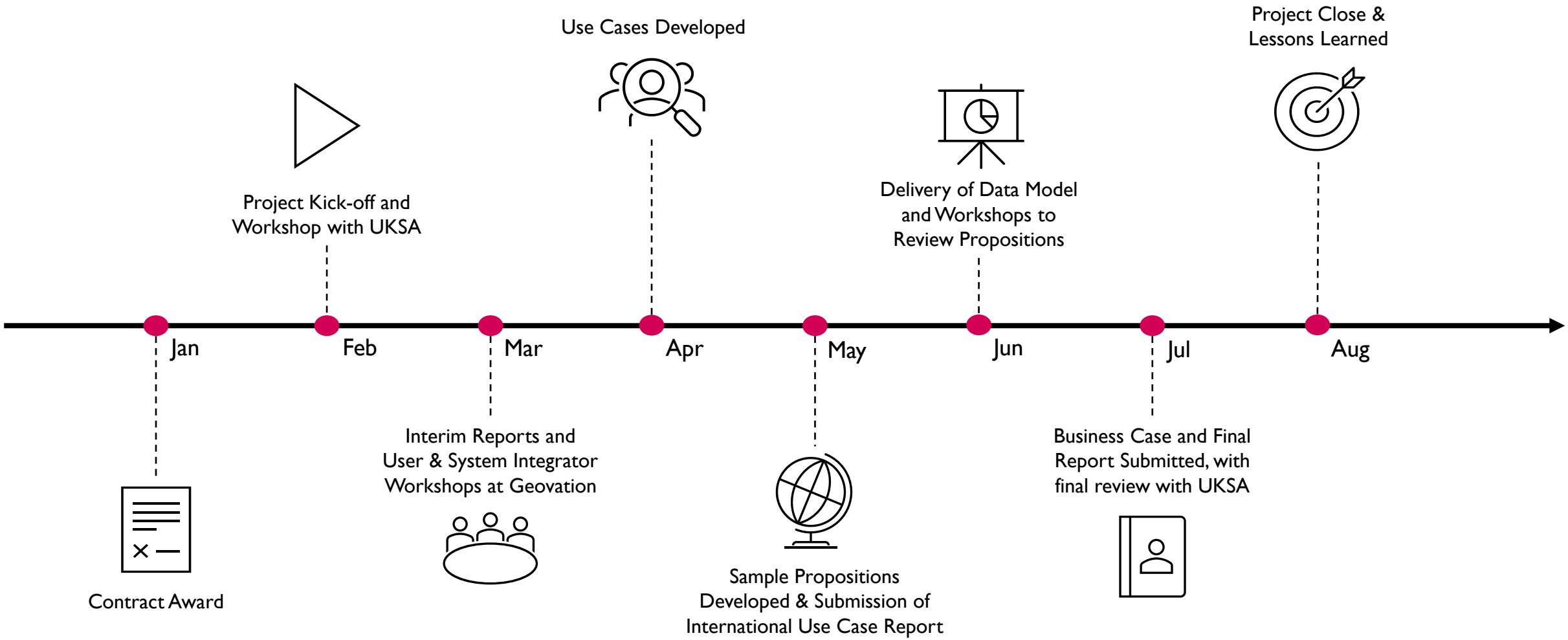
Project Objective

The project aimed to understand how to unlock the value of the combination of Geospatial, Earth Observation and PNT capabilities for the Financial Services sector, delivering under a UK Space Agency SBRI (Small Business Research Initiative) funded Programme.

Discovery activities and a series of workshops investigated the core challenges that the finance sector face; to develop use cases, sample products, and a series of reports including a business case and data model.

With the overall ambition to deliver on ROI for the UK space ecosystem and downstream services, driving societal impact and environmental protection through the appropriate use and access to EO derived data.

Delivery Timeline

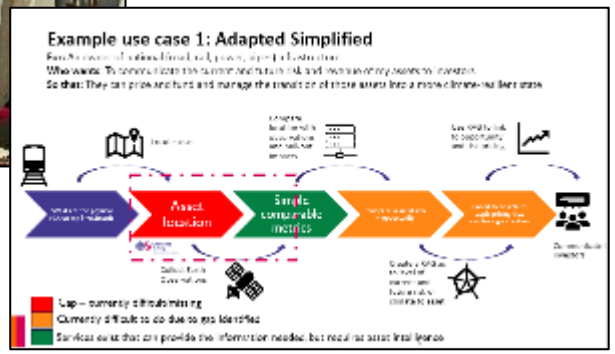


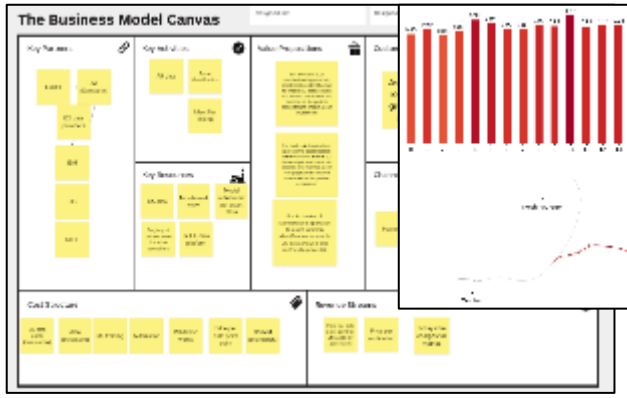
Key Outcomes Achieved

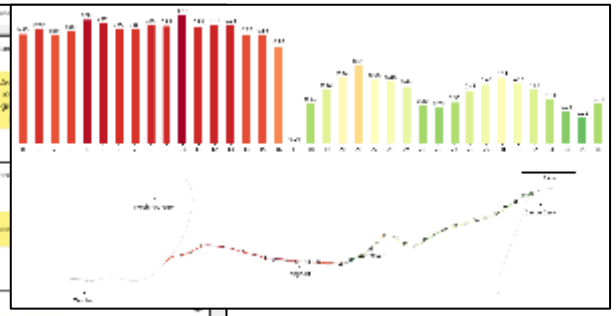
- Understanding the specific pain points and identifying use cases of the Financial Services sector
- Understanding barriers to adoption of Earth Observation data
- Successful engagement with the sector, with genuine interest, collaboration and overall buy-in
- Ability to test our resulting hypotheses by creating sample data and customer stories directly with end users
- Clarity for the role an entity such as OS should take in supporting the uptake of EO data
- Identification of the necessary preconditions to enable the value of EO data to be derived

Project Outputs

- 5 workshops delivered including 3 in-person engagements at Geovation Hub with Finance Sector stakeholders
- Finance sector pain points and barriers to adoption of EO identified
- 6x User Stories scoped, with 2 developed into user journeys (infrastructure and property)
- International use case report
- 2x POC propositions developed including accompanying data models
- Business Case delivered (using Value Proposition and Business Model Canvases)
- EO Ecosystem and metric analysis with market sizing
- Final report with summary findings and recommendations

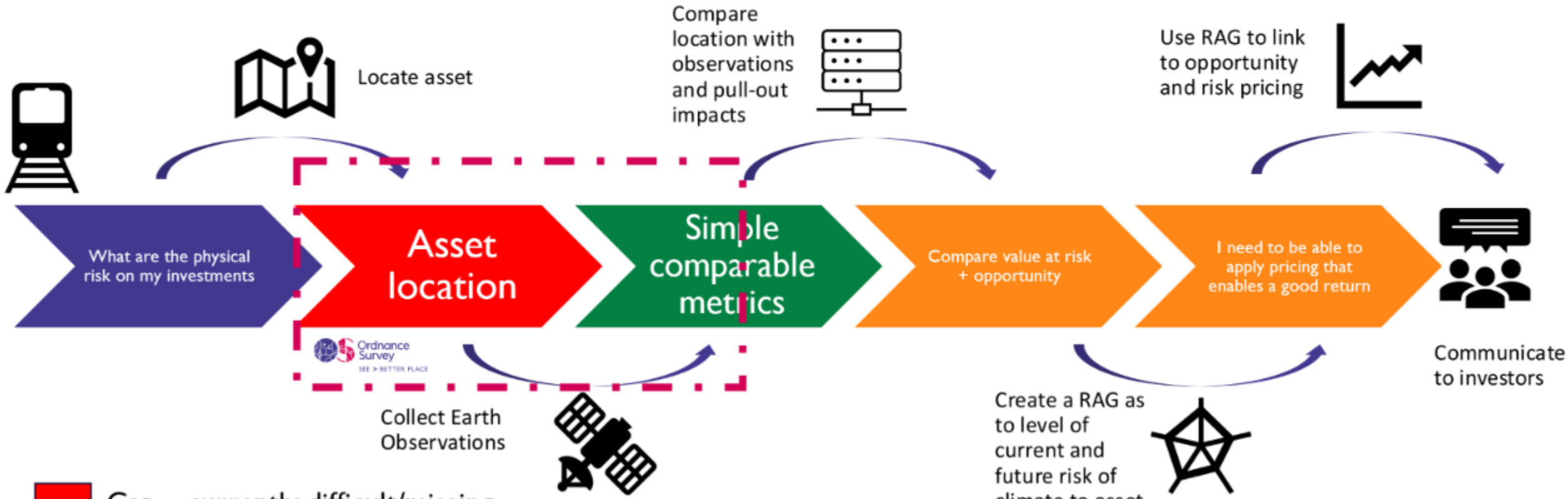






Example use case 1: Adapted Simplified

For: An owner of national (road, rail, power, pipes) infrastructure
Who wants: To communicate the current and future risk and revenue of my assets to investors
So that: They can price and fund and manage the transition of those assets into a more climate-resilient state



Gap – currently difficult/missing

Currently difficult to do due to gap identified

Services exist that can provide the information needed, but requires asset intelligence

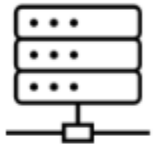
Example use case 2: Adapted Simplified

For: An investor in property

Who wants: To understand climate-related effects associated with different sites and properties

So that: They can make informed investments and balance risk with reward, particularly green loans and social bonds

Locate asset + EPC+ property data



Compare location data with observations and pull-out impacts

Use RAG to link to opportunity for loans and disinvestment

Maximise portfolio investment

Locate

Simple comparable metrics

Assess risk and investment

Apply pricing

Loan made with conditions

Have conditions been achieved

Ordnance Survey

Collect Earth Observations

Create a RAG as to level of risk of Asset not being able to get to EPC C or above. Identify properties that can benefit from green loans to get to EPC C

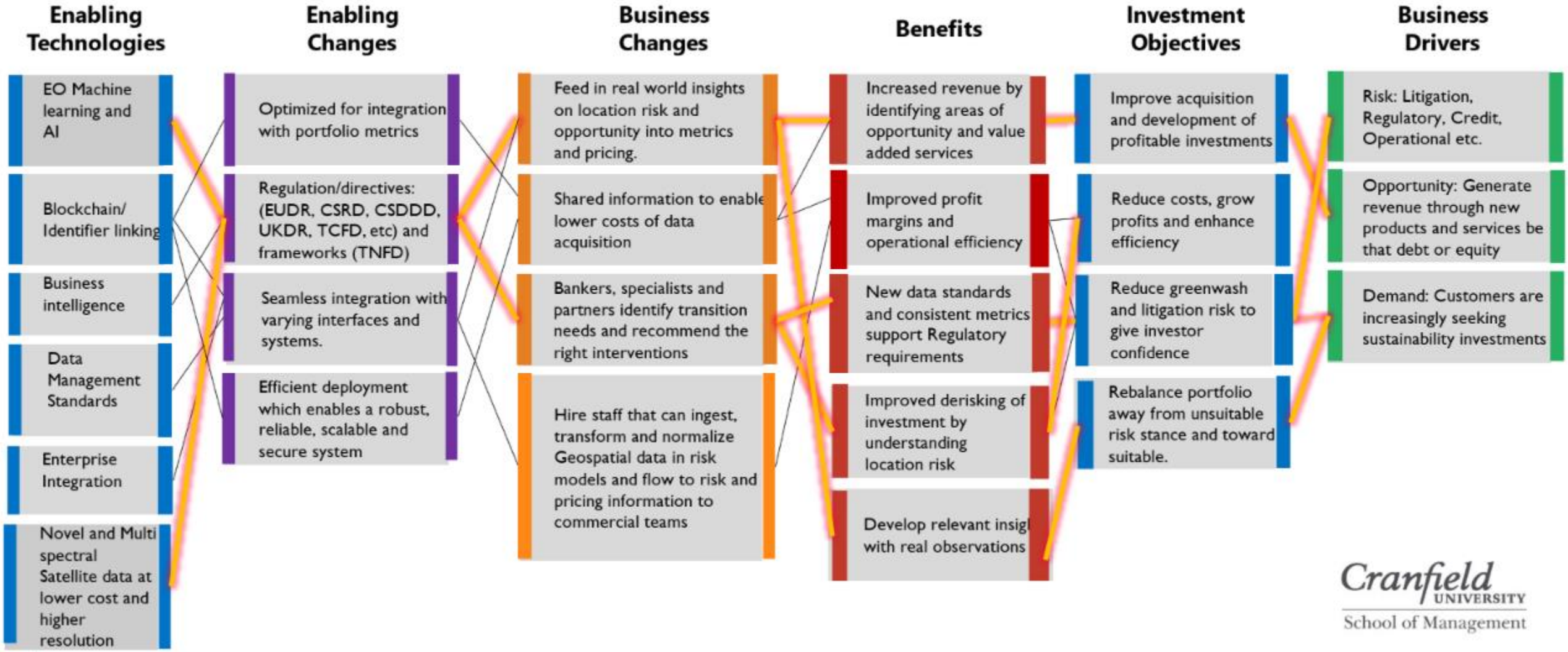
Conditions monitored, transitions observed

Gap – currently difficult/missing

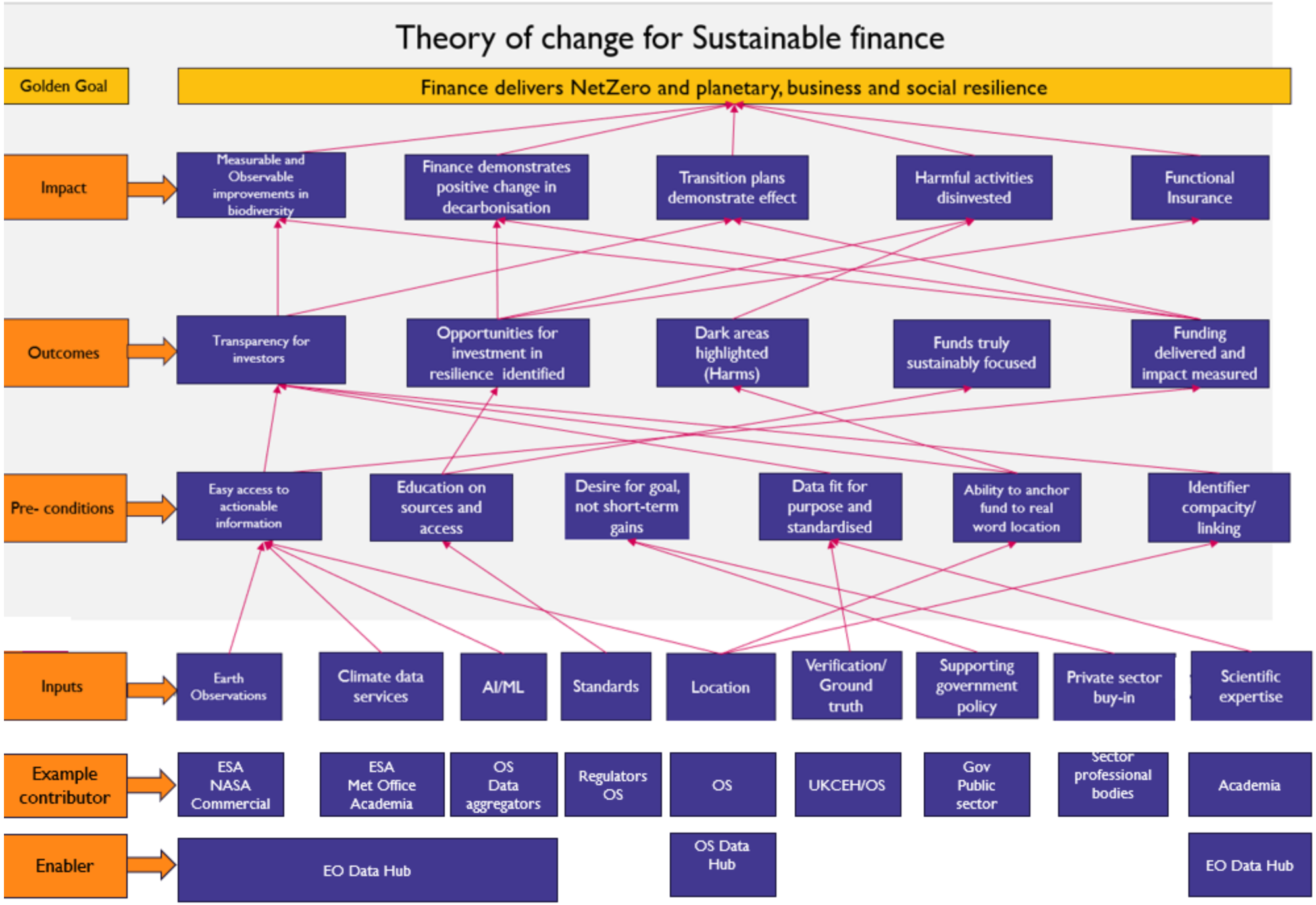
Currently difficult to do due to gap identified

Services exist that can provide the information needed, but requires asset intelligence

Investing in Space derived Geospatial Data for the financial services industry
Benefits Dependency Network



Cranfield UNIVERSITY
School of Management


Theory of change for Sustainable finance
Golden Goal
Finance delivers NetZero and planetary, business and social resilience
Impact
Measurable and Observable improvements in biodiversity
Finance demonstrates positive change in decarbonisation
Transition plans demonstrate effect
Harmful activities disinvested
Functional Insurance
Outcomes
Transparency for investors
Opportunities for investment in resilience identified
Dark areas highlighted (Harms)
Funds truly sustainably focused
Funding delivered and impact measured
Pre- conditions
Easy access to actionable information
Education on sources and access
Desire for goal, not short-term gains
Data fit for purpose and standardised
Ability to anchor fund to real word location
Identifier compacity/ linking
Inputs
Earth Observations
Climate data services
AI/ML
Standards
Location
Verification/ Ground truth
Supporting government policy
Private sector buy-in
Scientific expertise
Example contributor
ESA NASA Commercial
ESA Met Office Academia
OS Data aggregators
Regulators OS
OS
UKCEH/OS
Gov Public sector
Sector professional bodies
Academia
Enabler
EO Data Hub
OS Data Hub
EO Data Hub

Key Sector Learnings

- Scale of opportunity is huge and extends beyond the UK
- As a result of this research, we believe there is a real opportunity for the UK to lead in the use of EO insights for financial reporting which would be transformational for the EO ecosystem
- Unlocking the value of EO for FS is the genuine issue articulated by the entire sector of lack of knowledge of asset location
- Identification of the necessary preconditions to enable the value of EO data to be derived, such as standardisation, education, verified Asset location register, identifier linking

Prerequisites for Uptake

- Access to authoritative data
- Standardisation
- Data fit for purpose and standardised pipelines for comparability
- Education and use cases
- Verified asset location register
- Identifier linking
- Government as anchor customer

Nikhil Chouguley

Former C-Suite Executive at Citi Bank & Deutsche Bank

SUSTOPIA
SUSTAINABILITY DATA ANALYTICS & REPORTING

Primary Use Cases:

Climate Risk & Hydro-Asset Valuation

Satellite data enhances climate risk assessment by tracking water flow and volume through models like Copernicus, enabling accurate cash flow models for hydro-assets.

Supply Chain Risk & Deforestation Monitoring

In supply chain risk management, AI-driven satellite imagery and shipping data detect deforestation near key ports, such as in the Amazon, helping assess risks in soft commodity supply chains.

Regulatory Reporting & Emissions Monitoring

For regulatory reporting, satellites track methane and CO_2 emissions from oil, gas, and waste sites, exposing underreported figures and ensuring compliance with ESG standards.

Other Use Cases: Real-Estate & Carbon Credits

- Talking about the power of capital: Need to find green capital to fund green projects
- Where is the commercial value in capital?
- Need data, technology (AI) and convert into a financial dataset
- Primary use cases in the use of EO in financial investments
    - Climate risk and hydro-asset valuation: Using turbines to generate hydropower that has low environment impact
        - Uses EO data to identify where the optimum location is
        - Combining satellite data and EU climate change data to look at water flow and risk, adding value of assets to identify investment potential
    - Supply chain and deforestation monitoring
        - Supply chain risk management, how to prove that forest products have higher value than others from “virgin forests”
        - Understanding source, supply chain impact, and unit of soft commodities end up in markets (before and after pictures and has there been any deforestation in the areas)
    - Regulatory Reporting and Emissions Monitoring
        - Quantifying future emissions, including flaring
        - Using satellites and airborne missions to monitor refineries, but challenge is the amount of flaring given the time of measurement
- Bottomline is knowing how climate is affecting where investments are happening, and how sustainable transitions are happening for long-term investments

Workshop problem statement and process

Problem Statement

Governments are trying to finance many projects that aid growth and are resilient to physical climate risk but lack the funding to make them viable. The finance world is looking for high value, material projects to finance but sees a lack of volume and quality.

Both sectors are looking at the question of "impact of and dependency on Climate and Nature", and so balancing risk and opportunities to the public and private balance sheet while addressing "planetary solvency"

- It's hard to quantify impacts across value chains and attract patient long-term capital from asset owners and project funders when decision ready data is not abundant, risk price is not clear, and project market volume is low. Earth observation data can play a key role in unlocking this impasse.

Problem to be solved

- What role can satellite data play in shortening the lengthy process to identify projects and inform asset owners, investors, public sector and citizens with decision ready data.
- How can satellite data better enable stakeholders to identify their dependency on and responsibility to Climate and Nature and see value in investing in its preservation and restoration.

Scope of this workshop *(round tables and whiteboarding sessions)*

- Scope of workshop will seek to clarify the people; process and technology systems required that can address these disconnects and identify:
  - The Earth observation data and technology solutions required by the FSI industry to enable:
    - Opportunity identification (subject of roundtable a)
    - Risk evaluation (subject of roundtable b)
    - Overcome barriers to technology adoption (subject of roundtable c)

WORKSHOP

ROUND TABLE A : OPPORTUNITY

How can we leverage satellite data to identify and invest in resilient infrastructure that not only withstands the physical risks of climate change and nature loss but also adapts and thrives in the face of these challenges? As financial professionals deploying capital, how can we consider Internal Rate of Return (IRR) and Return on Equity (ROE) metrics in our investment decisions, and determine how satellite data can help enable these metrics?

ROUND TABLE B: RISK

How can we leverage satellite data to identify and manage the risk of investing in resilient infrastructure that withstands the physical risks of climate change and nature loss? As financial professionals how can we use Satellite data to Enhanced Data Accuracy and Coverage, Improve Risk Identification, Cost-Effective Monitoring, Independent Validation, Integration with Financial Metrics.

ROUND TABLE C: TECHNICAL ADOPTION

What are the limitations and barriers to adoption of satellite data into the FSI industry. Consider Data Format and Resolution, Preprocessing Complexities, Quality and Transparency, Integration with Financial Metrics, Modelling challenges, Accessibility and Comparability, Internal skills and budget.

OUTPUTS FROM ROUNDTABLE SESSIONS

Methodology: We reviewed the outputs from the ‘Opportunity’ and the ‘Risk’ roundtables and classified them as either ‘Pains’ to be solved for or ‘Gains’ to be realized.

Opportunity

"How can we leverage satellite data to identify and invest in resilient infrastructure that not only withstands the physical risks of climate change and nature loss but also adapts and thrives in the face of these challenges? As financial professionals deploying capital, how can we consider Internal Rate of Return (IRR) and Return on Equity (ROE) metrics in our investment decisions, and determine how satellite data can help enable these metrics? Let's brainstorm innovative solutions and strategies to turn this vision into reality."

PAINS

Data Source
History of data, needs to be back tested (does it go back far enough?)

Credibility of data-sets needs to be demonstrated

Data sources and history need to be on par with financial data

Need data from key data authority in sectors like mining, energy etc.

Data use cases
Data needs to suit the functional use case and user perspective

Data needs to help address data overload, simple as possible & in familiar tools

Retail Banks are interested in Agriculture, flood, heat stress, drought.

PE interested in circular economy of water resources and effluent monitoring tied to polluters. Also water storage in Natural solutions.

Commercial challenges
Can't find land fast enough for infrastructure projects, Natural solutions

GAINS

Use Cases:
Protecting Reputational Risk

Visualising investments to help deliver reports and insights

Deliver transparent reporting on investments, monitoring river flows, tracking solutions & increasing value of infra

Municipal/Green/Sust' Bonds due diligence. EO tracing Asset backed Bond and monitoring KPI's

Investment Banks looking to manage corporate lending, trust in BNG, Regen', scalable land parcels +

Retail Banks, mortgage lending. Tracing flood, fire risk, energy profile ++

Collaboration & Co-Creation:
Coalition building public and private finance for large infra'.

Tracking and communicating to stakeholders for large infra'.

KPI tracking before, during and after for investor relations

Valuing Nature Assets:
Identifying shared value of assets and investments in Nature

Baselining & footprinting

BNG: identify opportunities, scalable and efficient

Demonstrating Biomass gain over time and species monitoring

Mitigation opportunities: e.g. understanding EPC ratings of real estate for retrofit links to energy and social bonds

Changes in Energy and Transport systems (Local councils) Preserving assets and investments, care of long term loans and returns

Risk "How can we leverage satellite data to identify and manage the risk of investing in resilient infrastructure that withstands the physical risks of climate change and nature loss? As financial professionals how can we use Satellite data to Enhance Data Accuracy and Coverage, Improve Risk Identification, Cost-Effective Monitoring, Independent Validation, Integration with Financial Metrics: Let's brainstorm innovative solutions and strategies to turn this vision into reality."

PAINS

Third Party Marketing rules Limit targeted marketing for proactive solutions discerned from data patterns

Politics and narratives Reframe the narrative to FOMO of missed opportunity during the re-pricing of assets due to Climate and Nature loss issues

Need future data as a lot is historic to create scenarios and narrative, benchmarks

Disclosure reporting such as ESG and align EO to RCP's and SSP's

Need for consistency and managing uncertainty: Not much consistency across data sources, want reliable, consistent and comparable.

Want to know what 'good looks like' when applying uncertainty principle, A Brief Introduction to Uncertainty in Business | Tim Kastelle Longer time scale, uncertainty is more acceptable.

Common language: Banking legal speaks the same language in the main and the EO world does not translate their language across.

Banks are not the primary customer segment for EO data: Primary is Gov and local authority, then corporates & other then Banks.

Need for long term data sets: Sovereign wealth, Food security, soil moisture content, farm locality vs water availability etc. only works off long term data to monitor risk. Need temporal analysis to act on long term challenges. Back testing needed against other sources.

Not a top priority: Bank exec' don't make climate and nature factors a key decision as focus on cashflow over short term ownership vs long term stewardship.

GAINS

Layering data to spot risk and opp' e.g. Mortgage portfolio, identify potential for natural flood barriers (low carbon), or spot urban heat island risk + other top 3 metrics for mitigation and adaptation.

Tracking over time to ensure uplift measures are implemented and value is accreting

Assist in CBA of various mitigation & adaptation measure at outset of due diligence.

Assist in seeing patterns & trends in asset risk and value e.g. infra like Nuclear sited by costs. Erosion from sea rise and run off maybe untenable over time.

Debt financing e.g. Bonds and SLL's. EO assists low cost KPI tracking

Assists with issuing Nature bonds, refinancing sovereign debt, more precise EO reoslution allows different tranches to be issued, lower cost due dil' but needs authoritative data.

Blue Bonds: Can assist with ocean acidification identification, fishing monitoring, seagrass and mangrove restoration realizing carbon credits +

Turning bad news into good! Identify issues and resolutions for impacted customers & help them insure and mortgage properties. Or change farming practices etc due to drought/flood soil erosion cycle. Great customer service as become trusted advisor and can upsell services as well as protect asset book.

Technical Adoption

What are the limitations and barriers to adoption of satellite data into the FSI industry. Consider Data Format and Resolution, Pre-processing Complexities, Quality and Transparency, Integration with Financial Metrics, Modelling challenges, Accessibility and Comparability, Internal skills and budget, : Let's brainstorm innovative solutions and strategies to turn this vision into reality."

PAINS

Data Integration
Novel Satellite and EO data would need to be ingested, normalised and integrated with existing data practices and systems, taking into consideration security and usability

Data Usability
Data overload is an issue with users, and it would need to be presented in a format and via tools such as Bloomberg/MSCI/Excel that users are familiar with

Operations and procurement
Risk and governance is high in Banks and all data would need to jump through a lot of hurdles and then procurement would want to standardise and rationalise suppliers

Understanding different users and use cases
One size does not fit all. Banks: Retails, Commercial, Investment and then Pensions, PE all have different needs.

Costs and Open Source:
Costs is also an issue and although Open source is used this creates IP challenges.

Risk models and due diligence process: Are established and any changes to inputs that affect material risk are very hard to introduce. Culture and technical issue.

GAINS

Data Integration
Large data providers such as MSCI, LSEG, Moody's maybe a route to market as they are already supplying aggregated data services.

Operations and procurement
Marketplaces from data, SaaS and Platform providers like Microsoft or Finastra among many have established marketplaces that reduce time to sale as they are established.

Understanding different users and use cases:
An EO data exchange with pre-commercial data layer matching to commercial and end users analytics could present a common hub for the sourcing of EO data, while respecting different commercial models and end users needs. E.g. OS Climate

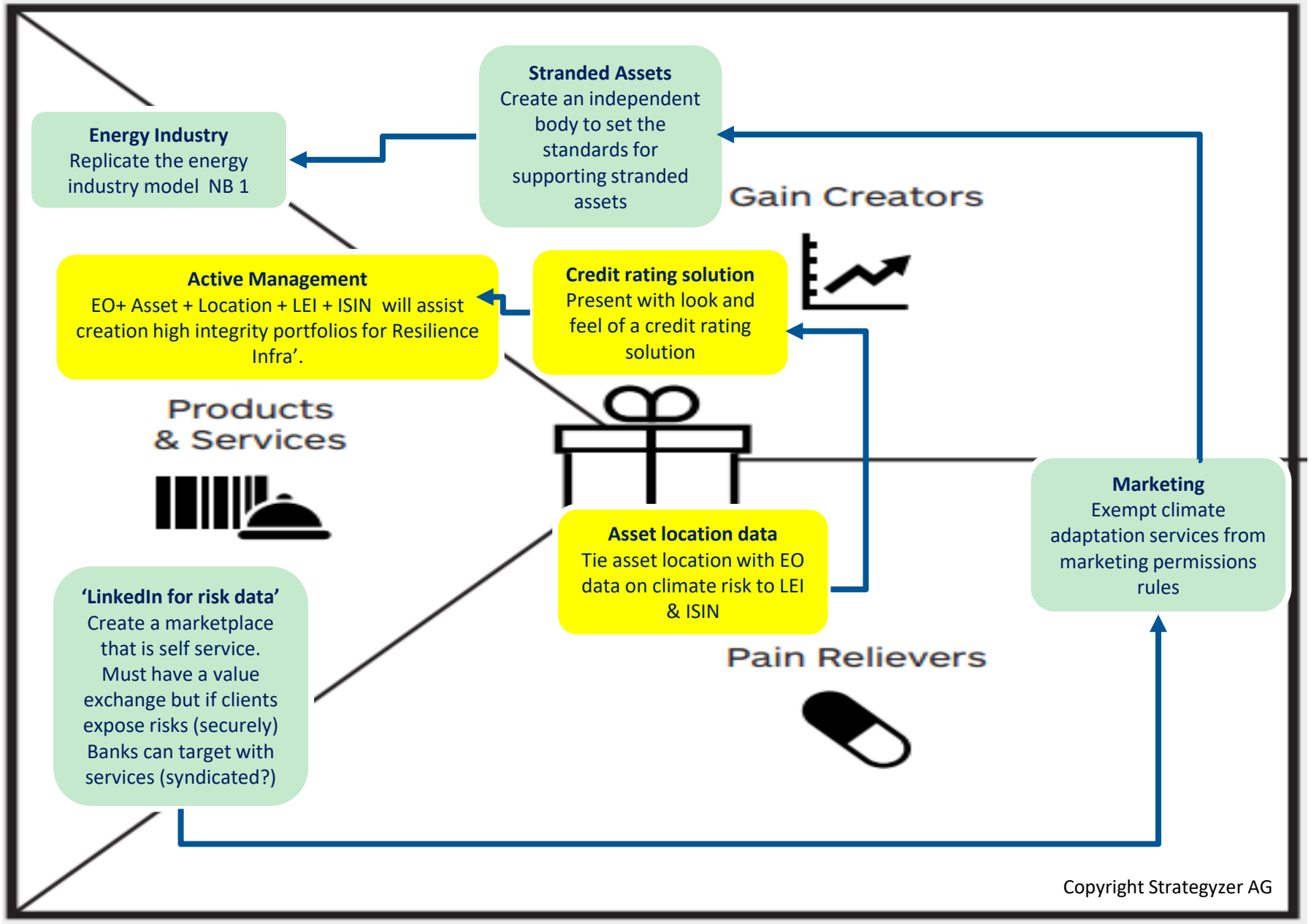
Risk models and due diligence process: Talking to CRO's and understanding approaches to integrate new data such as Gaussian Copula Model | PyFin Academy

RESULTS WHITEBOARD SOLUTIONING SESSIONS

Methodology: We reviewed the ‘Pains & Gains’ from the ‘Opportunity’ and the ‘Risk’ roundtables and consolidated them into key themes.

We then discussed these ‘Pains & Gains’ to try and find solutions that would ideally address both.

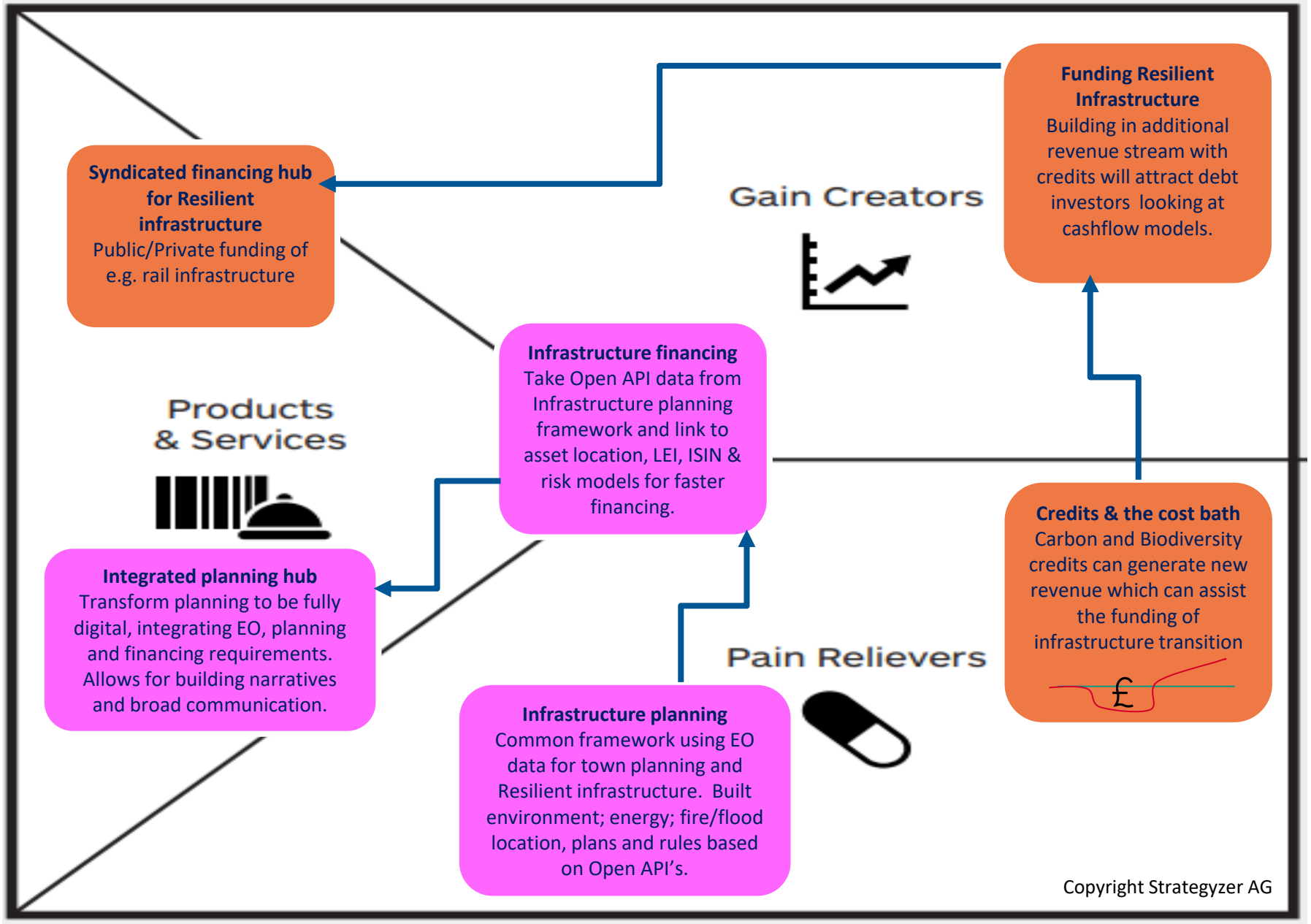
This resulted in four solution ideas that are highlighted on the next two slides.
1: Overcome marketing permissions pain to create a proactive service to address stranded assets.
2: Overcome asset location pain to create a credit rating solution to enable an active management portfolio.
3: Overcome cost pain by enabling ‘Nature credits’ and deliver a syndicated financing solution
4: Overcome limited use of ‘EO’ data by integrating into ‘FSI’ systems via API’s and into a digital planning hub for greater efficiency and effectiveness of the planning process.



SPACE4CLIMATE

NB 1 How utilities should prepare for a new era of stranded assets and regulatory scrutiny

Legend:
Green solution 1
Yellow solution 2



Legend:
Orange solution 3
Pink solution 4

APPENDIX

RESOURCES THAT PROVIDE EVIDENCE OF THE SCALE OF THE ISSUES AND TO ENABLE NEXT STEPS

THE BIG SHORT

A $1 Trillion Time Bomb Is Ticking in the Housing Market

- Millions of US homes are underinsured because their premiums don't reflect the risk of climate-fuelled catastrophes.

The Big Short

- In a webinar with journalists last month, Burt argued that US homeowners' wildfire and flood risks are underinsured by $28.7 billion a year. As a result, more than 17 million homes, representing nearly 19% of total US home value, are at risk of suffering what could total $1.2 trillion in value destruction.

Years ahead of the financial crisis, David Burt saw trouble brewing in subprime mortgages and started betting on a crisis, winning himself a cameo in *The Big Short* by Michael Lewis in addition to lots of money. Now Burt runs DeltaTerra Capital, a research firm he founded to warn investors about the next housing crisis. This one will be caused by climate change. A $1 Trillion Time Bomb Is Ticking in the Housing Market - Bloomberg

PLANETARY SOLVENCY

The Network for Greening the Financial System (NGFS) provides analysis of a range of estimates for the negative GDP impact of climate change under a current policies scenario of 3°C of warming by 2100. These range from 2% GDP (Nordhaus & Boyer) impact to 44% GDP (Bilal & Känzig) impact by 2100.10 Alternative methodologies provide wider ranges still: up to 63%.11

In their latest update, the NGFS propose using a GDP damage estimate based on the Kotz et al paper 'The economic commitment of climate change', which estimates that physical risks from climate change in a current policies scenario might reduce GDP growth roughly 1/3rd by 2100, i.e. GDP is still forecast to grow in this scenario, but to grow less than it would if climate change didn't occur. However, the limitations of this assessment based on the Kotz et al paper show that it excludes many of the most severe risks that are now expected if we do not manage to limit global warming. As well as the assumption that an economic recession is impossible no matter how severe climate shocks become, the approach does not consider the impacts of climate tipping points, climate-driven extreme events, human health impacts, resource or migration-driven conflict, geopolitical tension, nature-driven risks, or sea level rise The authors themselves acknowledge that when these additional factors are considered, real economic impact will likely be greater than estimated in their study.

This is analogous to carrying out a risk assessment of the impact of the Titanic hitting an iceberg but excluding from our model the possibility that the ship could sink, the shortage of lifeboats, and death from drowning or hypothermia. The modelled results would be reassuring but dangerous as they would severely understate the level of risk. That is to say, even though the results show a very material reduction in GDP of 15% by 2050, it may be an underestimate as it does not capture all the risks we expect.

PLANETARY SOLVENCY

In this section we introduce the RESILIENCE principles, designed to support effective and realistic Planetary Solvency risk assessments, as illustrated in the diagram and table below. A fuller explanation of each principle and the rationale behind it follows the table.

Figure 4: The RESILIENCE principles

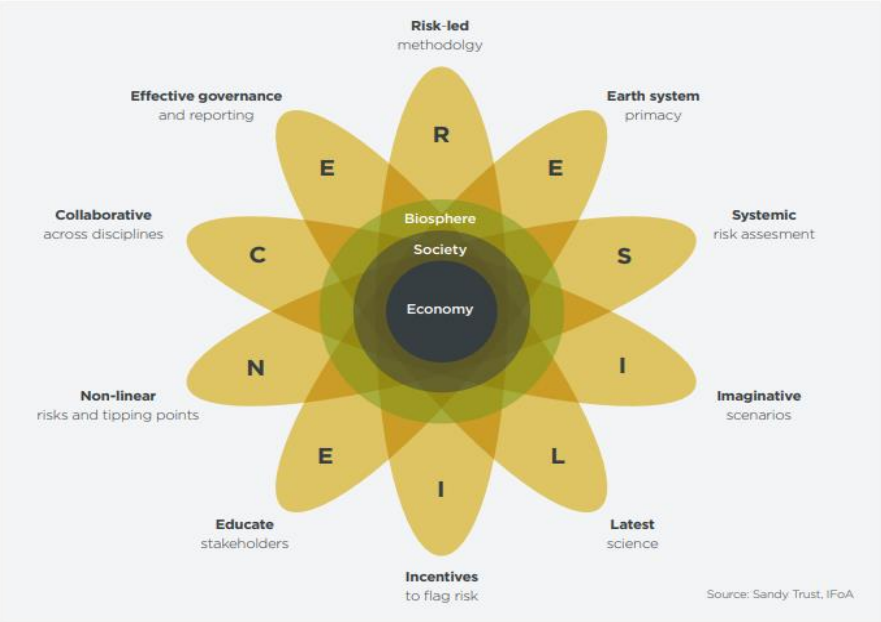
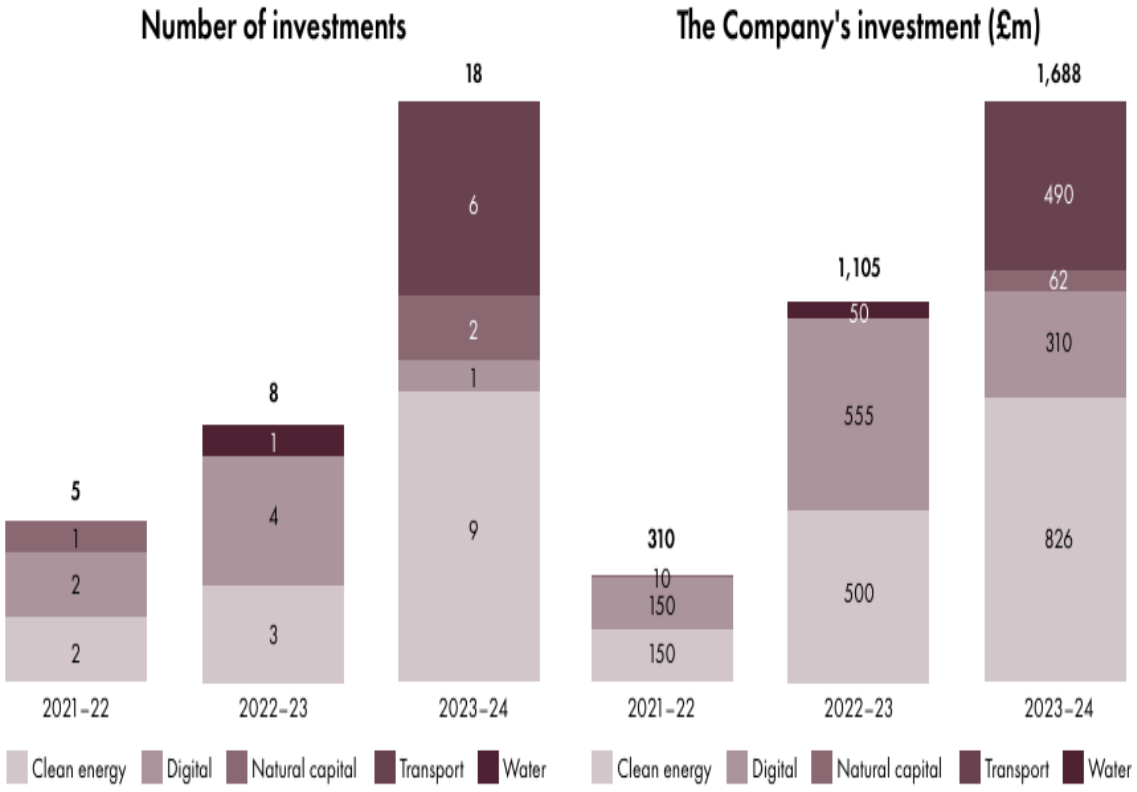


Table 1: Summary of the RESILIENCE principles

Principle	Explanation
Risk-led methodology	Set clear risk limits and track trends using a global dashboard.
Earth system primacy	Prioritise Earth system health over short-term economic metrics.
Systemic risk assessment	Assess interconnections between societal and environmental risks.
Imaginative scenarios	Assess tail risks and combinations of risks.
Latest science	As IPBES and IPCC reports take several years to produce, there is a need to incorporate current science in a more timely fashion.
Incentives to flag risk	Reward risk identification and communication, even if unlikely, to mitigate scientific reticence and consensus.
Educate stakeholders	Invest time in building ecological, climate and systemic risk literacy amongst policymakers.
Non-linear risks and tipping points	Consider exponential risks, the potential for unprecedented threshold events and the impact of tipping points.
Collaborative across disciplines	Work across science, risk, security, private and public sectors to build deeper insights and reduce blind spots.
Effective governance and reporting	Embed into appropriate governance structures, maintain independence and report transparently.

UK WEALTH FUND

The graphic below provides a high-level view of our investment footprint by sector over the past three years.



Our investments will help:

Clean energy

- install up to 2GW of solar capacity;
- install up to 2.3GW of energy storage capacity;
- install a further 1.4GW in capacity through one of the world's largest interconnectors;
- generate 8,000 tonnes of Lithium per annum, enough for between 190,000 and 300,000 EV batteries;
- support 15.4GWh of battery production capacity for EVs, equal to 400,000 EV batteries per year;
- the manufacturing of Hydrogen Power Units to replace diesel generators; and
- the development of one of the UK's largest green hydrogen production facilities.

Transport

- the delivery of 2,000 public EV charging points;
- the roll-out of a local authority zero emissions bus route;
- the research and development in hydrogen-powered aviation; and
- upgrades to 54 trains, increasing transport network capacity.

Digital

- up to 18 million homes passed with fibre broadband.*

Water

- build the first reservoir since the 1980s capable of storing 21 million litres of water, serving up to 160,000 customers.

*Our digital investments support different companies' roll-out plans. Changes to those ambitions and some overbuild by different companies are possible.

NATURAL CAPITAL DAY IN THE LIFE OF NATURAL CAPITAL TRADE DATA FROM FIELD TO EXECUTION

SustainableFinance.Live

Observe/Monitor: Satellite and local observational/monitoring data is created and published

Verify: Verification of data is created in the form of Asset location, ID and ownership plus

Baseline/MRV: Capturing asset level data to inform nature strategies, set commitments and action restoration strategies. Ongoing biodiversity MRV

Aggregate: A data mesh for Biodiversity data transforms and loads the data to make it accessible to many

Inform: A marketplace of climate and Nature analytics firms will ingest, transform and interpret the data on a marketplace for many use cases

Risk/Comply: Risk and compliance: Frameworks and Regulations lookup portal to inform compliance, risk, opportunity and pricing. **Report**

Price and Trade: Asset management platform to raise visibility, filter, monitor, trade assets

Final "Go, no-go"?

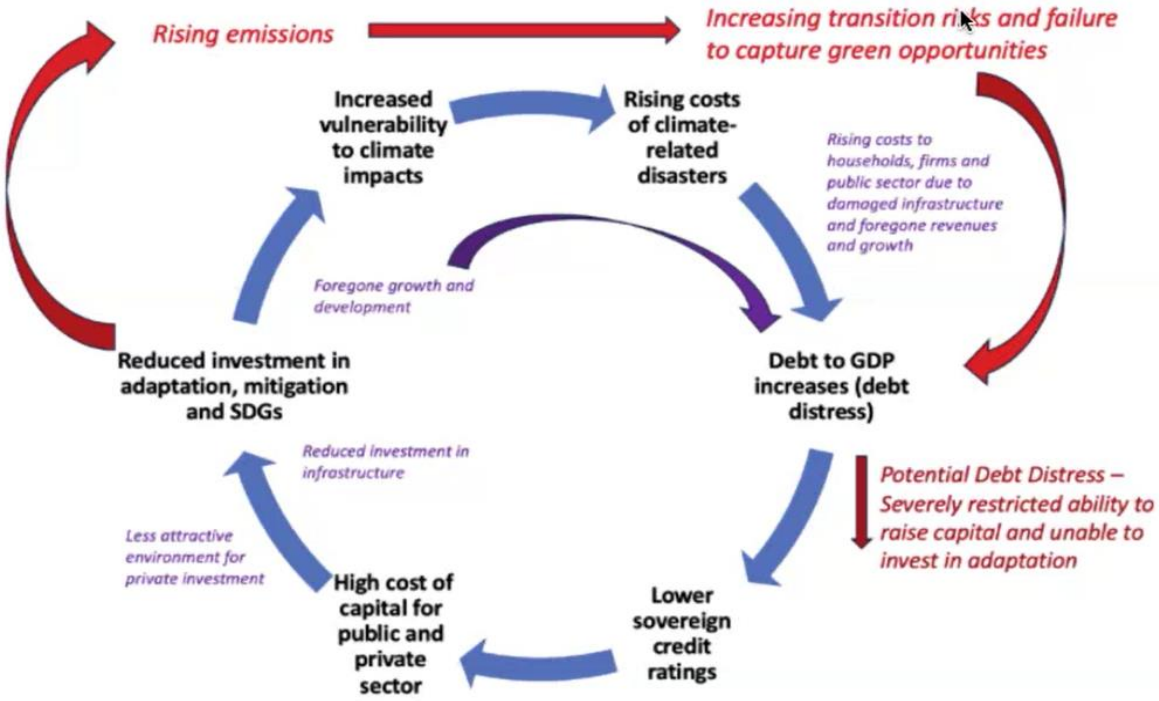
UNEP AND UNIVERSITY OF OXFORD'S ENABLING ADAPTATION: SUSTAINABLE FISCAL POLICIES FOR CLIMATE RESILIENT DEVELOPMENT AND INFRASTRUCTURE.

SPACE 4 CLIMATE

INTEGRATE

- Many EMDEs lack the fiscal space to invest in adaptation, leaving them exposed to climate risks that could lead to a **climate adaptation investment trap**

- To break this trap:
  - Climate and adaptation should be **integrated** into fiscal risk and debt sustainability analyses
  - Investments in **insurance** and **adaptation** can help to offset debt sustainability challenges



(authors' compilation, analogous to Ameli et al., 2021)

WWF A PLAYBOOK FOR NATURE-POSITIVE INFRASTRUCTURE DEVELOPMENT

The reliance on natural processes to reduce the volume and flow rate of stormwater and the pressure on drainage systems is commonly used worldwide. Solutions that rely on natural processes for stormwater management are particularly used in urban areas, where urbanisation and related land use change drive up the increase in impermeable surfaces, which increase the risk of flooding. Often, a combination of several interlinked solutions is deployed, typically as a combination of trenches, ponds and wetlands (permeable pavement / bricks are also used). Other common solutions also include green spaces, parks and trees, where the water is absorbed and retained at the source (like in the case of the 'sponge city' approach in China). Wetlands (constructed or restored) are sometimes used on their own to reduce the risk of flooding, with positive recorded impact on biodiversity through habitat creation or restoration.

2.3.3 DRAINAGE AND STORMWATER

The reliance on natural processes to reduce the volume and flow rate of stormwater and the pressure on drainage systems is commonly used worldwide. Solutions that rely on natural processes for stormwater management are particularly used in urban areas, where urbanisation and related land use change drive up the increase in impermeable surfaces, which increase the risk of flooding.

Often, a combination of several interlinked solutions is deployed, typically as a combination of **trenches, ponds and wetlands** (permeable pavement / bricks are also used). Other common solutions also include **green spaces, parks and trees**, where the water is absorbed and retained at the source (like in the case of the 'sponge city' approach in China). **Wetlands (constructed or restored)** are sometimes used on their own to reduce the risk of flooding, with positive recorded impact on biodiversity through habitat creation or restoration.

In many cases, approaches to reduce the risk of flooding are combined with efforts to maximise the use of space for different social purposes (recreation, amenity, tourism, or even agriculture) and feature some form of watershed management and restoration of local waterbodies (like ponds and lakes).

TABLE 2-10. SUMMARY TABLE – NATURE-POSITIVE APPROACHES TO DRAINAGE AND STORMWATER

OBJECTIVE	SOLUTIONS	KEY-BENEFIT	COMMON CO-BENEFITS	REFERENCE PROJECTS
Improving flood control and reducing runoff	Wetlands (natural and constructed)	Resilience (flood risk reduction)	Biodiversity (habitat creation)	• Building Bangkok's Climate Resilience Through Nature-Based Solutions, Thailand • Development of a Blue-Green City, Australia • Water Management and Flood Prevention – LafargeHolcim, France
	Catchment management	Resilience (flood risk reduction)	Environmental (water quality)	• Sun Valley Watershed Multi-Benefit Project, USA • Adaptation of Nicaragua's Water Supplies to Climate Change, Nicaragua
	Sustainable urban drainage systems (SuDS) and bioretention areas	Resilience (flood risk reduction)	Resilience (temperature regulation Biodiversity (habitat creation)	• Sussex Flow Initiative, UK • Sponge Cities, China • Urban stormwater management in Augustenborg, Malmo, Sweden • Piloting Natural Flood Management Designs at Marlfield Farm, UK

Source: AECOM, 2023

WWF A PLAYBOOK FOR NATURE-POSITIVE INFRASTRUCTURE DEVELOPMENT

A.1 TRANSPORT

I) ACTIONS TO PRESERVE WILDLIFE, FOREST AND COMMUNITIES ALONGSIDE NEW EAST COAST RAIL LINK IN MALAYSIA

SECTOR	TYPOLOGY
TRANSPORT	INLAND ROAD AND RAIL INFRASTRUCTURE

PROJECT	DELIVERY ENTITY	CLIENT	LOCATION
Environmental and Social Safeguards for the East Coast Rail Link (ECRL)	Aurecon and ERE Consulting Group (acquired by Aurecon)	Malaysia Rail Link	Malaysia

SHORT DESCRIPTION

East Coast Rail Link is a 640km railway connecting different parts of the east coast region with the west coast region in Malaysia. It includes 20 stations, including 14 passenger stations, five combined passenger and freight stations and one freight station. The project balanced environmental considerations, economic costs, social impact and engineering constraints and integrated 20 wildlife crossings to strengthen habitat connectivity between different areas where new rail infrastructure was constructed.

PROJECT BENEFITS

KEY BENEFIT(S) OF THE PROJECT

BIODIVERSITY	The project aims to conserve biodiversity and ensure habitat connectivity by creating 20 wildlife crossings. The project design was optimised over a period of three years with inputs from the public and non-governmental organisations and this led to 90% less forest loss compared with the original design, saving almost 2,000 hectares of forest. A wildlife management plan has been put in place to safeguard wildlife during construction.
RESILIENCE	The design of the railway tracks considered climate change and flood avoidance as a major component of the project. The team designed the track based on a one-in-a-hundred-year flood possibility and factored in appropriate solutions.

CO-BENEFIT(S) OF THE PROJECT

CARBON	N/A[a]
ENVIRONMENTAL	The project followed Aurecon's 'Avoid, Tunnel, Mitigate' design philosophy. This means that as much as possible, the project avoided having the railway track cut through sensitive or large portions of forest by realigning the track design. If that was not feasible, the team proposed tunnels to bypass the area subject to local terrain. The last resort has been to mitigate impact by using wildlife crossings to facilitate wildlife movement. The project is also protecting, restoring and promoting sustainable use of forests and water ecosystems.
SOCIAL	This project reduces inequality by bridging the economic gap between the west and east coast of the Malaysian peninsula and by building sustainable communities.
ECONOMIC	The rail link will reduce travel time along the east coast of the Malaysian peninsula from an eight to 10-hour journey by road, to four hours by rail, thereby spurring economic development with improved connectivity.

SOLUTIONS

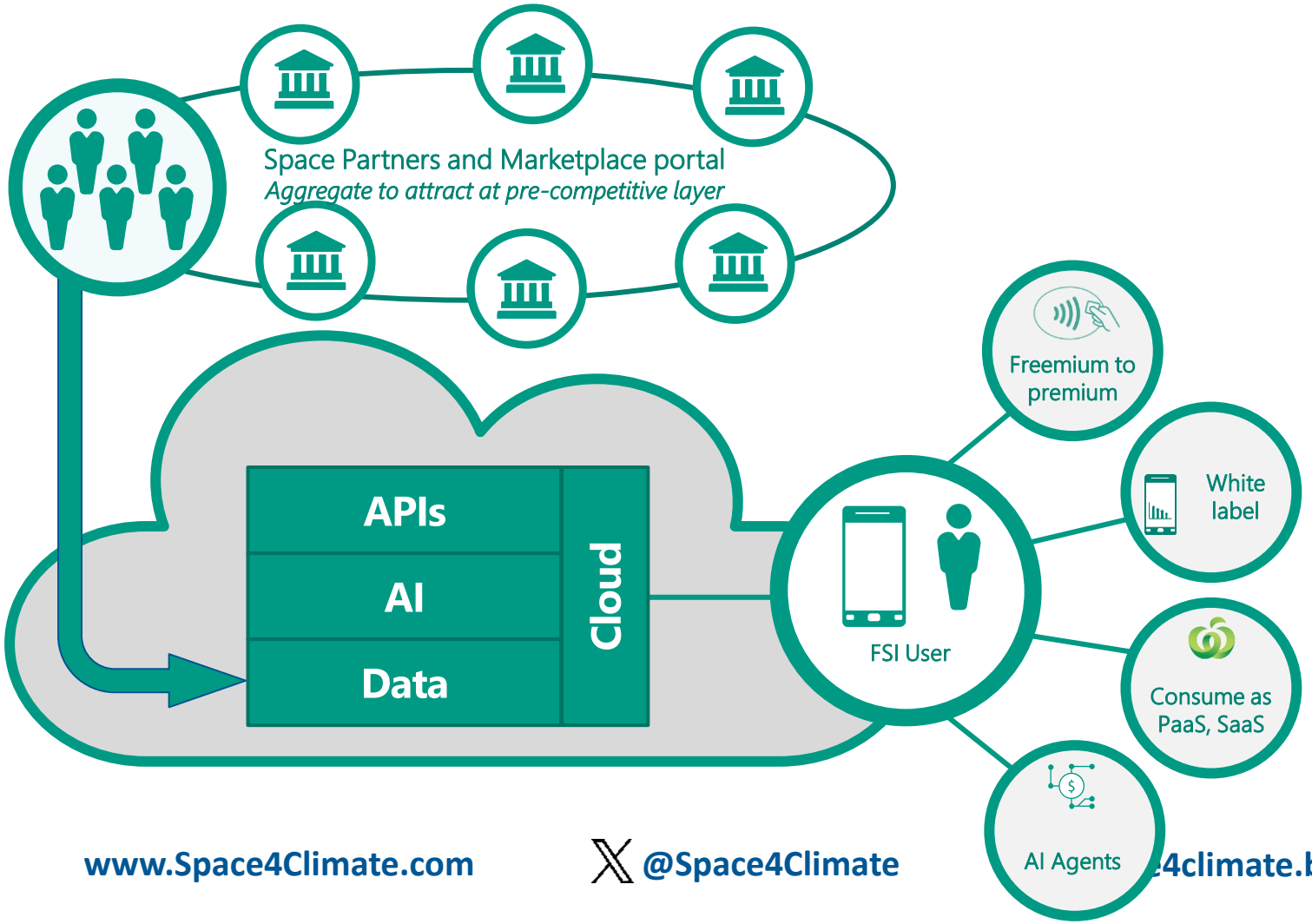
As the scale of the ECRL project generated significant public attention, it was important to address legitimate concerns about its impact on Malaysia's forest ecosystems and rich wildlife. Aurecon and ERE Consulting Group were appointed to undertake the environmental and social impact assessment to optimise railway alignment to conserve important habitats and minimise disruption to local communities. The many engagements with non-governmental organisations led to significant changes in the project alignment and design. The alignment was adjusted many times and the multiple design changes were made to facilitate wildlife crossings as well as to protect key forest habitats. The alignment of the railway was ultimate optimised to achieve 90% less forest loss (compared to the original design of the railway) and the consultant team worked to construct multiple tunnels and wildlife crossings as part of the project.

FINANCIAL SOURCE	SCALE	ECOSYSTEM SERVICES ASSESSMENT	CLIMATE CHANGE RISK ASSESSMENT
Combination of funds from the Malaysian government and China EXIM Bank	Development / Project	No	No

SOURCES OF ADDITIONAL INFORMATION

- https://www.aurecongroup.com/projects/government/east-coast-rail-link-malaysia

A PUBLIC DATA MARKETPLACE: KEY CAPABILITIES REQUIRED.



New Capability	Provides	Enables
Modular Architecture	Push Notifications	Timely Updates
Telemetry	Modelling Cost per Transaction	Value for money
Complete Data View	Predictive Analytics	Extreme Personalisation
Open APIs + Extensible Platform	Marketplace Partnerships	Product Experimentation and Innovation
AI	Future Opportunity Identification	Lead rather follow the market
3rd Party KYC Integration	100% Digital Origination	Friction free access

The capabilities provided by such a platform will overcome inherent obstacles with the current fragmented approach

SCOPE AND DEFINITION OF RESILIENT INFRASTRUCTURE IN THE UK

The UK Chancellor of the Exchequer has emphasized the importance of investing in resilient infrastructure through the National Wealth Fund (NWF) to support the country's growth and protect the economy from the impacts of climate change and nature loss. The NWF, which evolved from the UK Infrastructure Bank, aims to catalyse private investment in critical sectors and technologies that align with the UK's clean energy and growth ambitions[1].

The scope of resilient infrastructure under the NWF includes:

- **Green and Sustainable Projects**: The NWF focuses on projects that contribute to the UK's net-zero targets and environmental sustainability. This includes investments in renewable energy, energy efficiency, and green transportation systems[2].
- **Climate Adaptation and Mitigation**: The fund supports infrastructure that enhances the country's ability to adapt to and mitigate the effects of climate change. This includes flood defences, resilient water supply systems, and infrastructure that can withstand extreme weather events[2].
- **Economic Growth and Innovation**: The NWF aims to unlock private investment in sectors that drive economic growth and innovation. This includes digital infrastructure, such as data centres classified as Critical National Infrastructure, and other technologies that support the UK's industrial strategy[2].
- **Public-Private Partnerships**: The fund promotes collaboration between the public and private sectors to finance and deliver infrastructure projects. This approach aims to leverage private sector expertise and capital to achieve public policy goals[2].

References

[1] UK Infrastructure Bank becomes the National Wealth Fund

[2] New Speaker & Developments - Keynotes: MHCLG, UKIB, NIC, University of Manchester & National Grid - WEET policy conference - 21st Nov. 2024

ABOUT

ResponsibleRisk

ResponsibleRisk was founded by Richard Peers after a long career at Microsoft. Richard seeks to advance the cause of sustainable finance by acting as...

Storyteller: Evangelizing the role of Sustainable Finance in delivering the "triple bottom line" of Profit, People and Planet.

Match Maker: Connecting firms in an ecosystem to deliver results. Many of these are partners I have worked with through my 23 years at Microsoft and have specialism in consulting and technology.

Coach: Advising firms on the role of Sustainable Finance and Technology in their growth plans.