Satellite Data as a Business

A Strategic Exploration of
Satellite Intelligence Opportunities
for Financial Services

A SIX White Paper

Foreword

Satellite technology is rapidly becoming a critical component of the global data and sustainability transition. Advances in Earth observation technologies and analytics now enable real-time, objective insights into economic activity across the planet, supporting more informed decision-making in an increasingly complex world.

Satellite data is being applied across sectors such as agriculture, energy, transportation, retail, finance, and climate risk management. Use cases range from crop monitoring and yield forecasting to supply-chain tracking, physical risk assessment, and the estimation of economic activity. These applications position satellite analytics as an important input for risk management, forecasting, and capital allocation.

As satellite data markets mature, efficient integration into enterprise and financial systems, along with clear standards and governance, will be essential to ensure transparency, scalability, and trust.

SIX partnered with the University of Gallen to examine the current state of satellite data adoption, highlight practical use cases, and explore tools and strategies to support its responsible integration into modern market infrastructure. We hope you find it both insightful and engaging.

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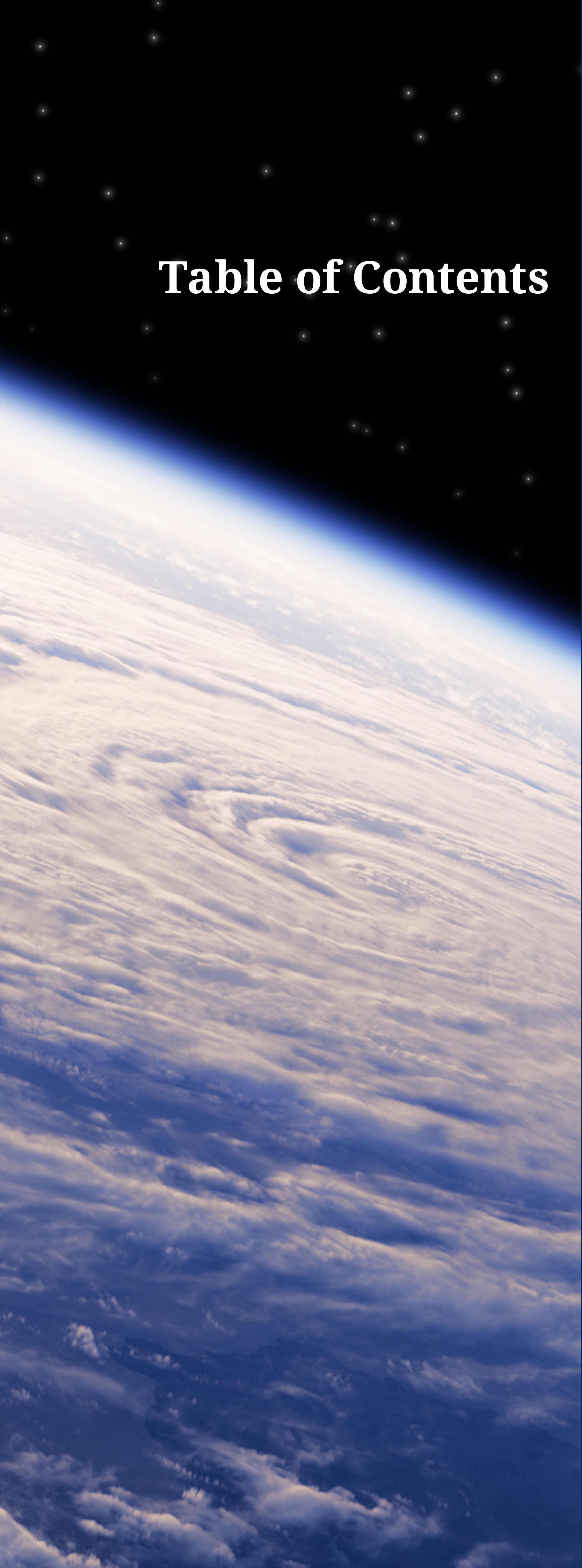

Executive Summary

Satellite technology is reshaping how financial institutions observe physical assets, locations, and risks. While geospatial intelligence is established in insurance, logistics, and agriculture, its systematic integration into financial market processes remains limited. This whitepaper, developed by the University of St. Gallen in collaboration with SIX, identifies where strategic value lies for institutional stakeholders.

The global space economy is now valued at USD 415 bn and is projected to exceed USD 1 tn by 2030–2040, driven by declining launch costs and expanding commercial demand. The market for satellites launched into Low Earth Orbit is forecast to grow from USD 15 bn today to USD 108 bn by 2035.

The global space economy is now worth USD 415 bn and is projected to exceed USD 1 tn by 2030–2040

Through research, interviews, and evaluation of multiple use cases, five high-potential business models emerge for financial market infrastructure providers.

1. Property Intelligence
Swiss mortgage valuation models rely on historical data and often miss real-time property and neighborhood changes. Satellite imagery and geospatial analytics can/will enhance existing models and improve valuation accuracy.

2. Construction Monitoring
Construction financing still relies on slow, manual site visits and reporting. Construction Monitoring using satellite-derived progress indicators, enables scalable portfolio oversight and evidence-based tranche release decisions.

3. Agri Risk Index (ARI)
Climate change is increasing agricultural losses and financial risk, while agricultural risk markets remain fragmented and opaque. ARI combines satellite data with market models to create standardized risk Benchmarks and enables USD 113 bn global protection gap.

4. Retail Sales Prediction
Retail activity is a key economic driver, yet financial markets lack timely and reliable real-time consumption indicators. Official retail sales data is delayed, backward-looking, and often revised, limiting forward-looking decision-making. Retail Sales Prediction uses satellite earth observation data to measure physical retail activity e.g. Occupancy and site utilization and generates predictive consumption signals ahead of official retail sales data. The solution provides standardized, high-frequency insights for investors, banks, and policymakers.

5. Earth Observation Intelligence Hub (EOI Hub)
ESG and risk assessments increasingly depend on data that is often inconsistent, self-reported, and slow to update. Satellite earth observation provides objective, real-world evidence of environmental and operational activity. The EOI Hub transforms satellite and geospatial data into standardized financial-grade ESG and risk intelligence, addressing regulatory pressure and greenwashing concerns.

Financial data providers should adopt an integrator model rather than building proprietary analytics. By licensing best-in-class satellite capabilities and focusing on financial-grade validation, standardization, and secure distribution, providers can transform satellite intelligence from niche inputs into standardized data signals in financial market infrastructure. This approach enhances efficiency, predictive accuracy, operational resilience, and transparency, helping to mitigate systemic risk and enabling financial infrastructure providers to leverage satellite-derived insights at scale.

Satellite-derived insights enable financial market infrastructure providers to strengthen operational resilience, increase transparency, and mitigate systemic risk

List of Abbreviations

API	Application Programming Interface
AI	Artificial Intelligence
Bn	Billion
CSRD	Corporate Sustainability Reporting Directive
EO	Earth Observation
EOI	Earth Observation Intelligence Hub
EU	European Union
ESA	European Space Agency
ESG	Environmental, Social and Governance
f. e.	For example
IoT	Internet of Things
ISIN	International Securities Identification Number
KPI	Key Performance Indicator
LEO	Low Earth Orbit
NDVI	Normalized Difference Vegetation Index
Tn	Trillion

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Introduction

Financial markets operate on information asymmetry. The institutions that detect economic shifts first, objectively verify claims, and accurately quantify risks gain a decisive competitive advantage. Despite unprecedented data availability, critical blind spots persist. Property condition deteriorates between valuation cycles. Construction projects stall without triggering alerts. Agricultural assets face climate pressures invisible to credit models. Retail consumption shift weeks before official statistics captures it. ESG commitments remain unverified, and physical climate risks go unquantified.

These gaps exist because the infrastructure to observe them systematically has been missing. Satellite earth observation changes this equation. Optical and radar sensors now deliver sub-meter resolution imagery with revisit cycles measured in days, not months. Machine learning converts this imagery into structured intelligence at scale. Cloud infrastructure makes processing economically viable. What was once prohibitively expensive and technically complex has become operationally feasible.

The convergence is timely. Regulatory frameworks increasingly demand verifiable sustainability metrics. Climate-related financial risks require forward-looking, location-specific data. Market volatility rewards institutions that can move ahead of lagging official statistics. Yet satellite intelligence remains fragmented across specialized vendors, with differing methodologies and update cycles, and with outputs that resist integration into regulated financial workflows.

Satellite intelligence is fragmented and still largely untapped in financial workflows

This whitepaper addresses a specific strategic question: How can financial data and market infrastructure providers monetize satellite data? Rather than cataloging technical possibilities, it identifies where satellite intelligence creates genuine strategic value and how trusted intermediaries can transform fragmented earth observation capabilities into bank-grade financial infrastructure that creates real value for both the client and the data provider.

The whitepaper is structured to support decision-making at multiple levels. Following an overview of satellite technology fundamentals and the evolving space economy, the methodology section details the research process and validation approach. The core Use Cases section presents five deployment-ready models: Property Intelligence Layer, Construction Monitoring, Agri Risk Index, Retail Sales Prediction, and Earth Observation Intelligence Hub. Each case follows a consistent analytical structure, examining market need and solution design. The concluding discussion compares cases across key dimensions and distills strategic recommendations, positioning financial infrastructure providers as integrators rather than technology builders – a model that leverages existing capabilities while minimizing execution risk.

Overview of Satellite Technology

Satellite observations start as physical measurements. Earth observation satellites record electromagnetic energy from the planet below and convert it into digital signals that are tied to a location, a viewing geometry, and a time. Because the same ground situation can produce different measurements depending on sensor type, atmosphere, and acquisition geometry, satellite data becomes decision-relevant only after it is translated into indicators that are comparable across regions and time, and that include documented quality control (6).

At acquisition level, two sensor families dominate. On one hand, there are optical sensors, which are passive instruments that measure reflected sunlight in visible and infrared bands. They behave like calibrated cameras with multiple spectral channels and, therefore, support data collection on surface properties such as vegetation condition, water, bare soil, and human-made structures (6). On the other hand, there is the Synthetic Aperture Radar (SAR), which is an active system that emits microwave pulses and measures the backscattered signal. This makes SAR observations largely independent of daylight and less sensitive to cloud cover than optical imagery (6). Because SAR backscatter responds to geometry, surface roughness, and dielectric properties such as moisture, it provides complementary information that is especially valuable for flooding, moisture-related proxies, infrastructure change, and maritime activity (6). Optical data contributes spectral and texture information, while SAR contributes structural and moisture sensitive signals. Combining both can improve downstream mapping and change detection results.

The translation from raw measurements to indicators typically follows four technical stages that ensure comparability and interpretability. First, preprocessing aligns data across time and sensors through radiometric calibration, geometric correction, and georeferencing, so that later analysis compares like for like. For optical data, atmospheric effects and illumination geometry must be accounted for to avoid confusing haze or sun angle with real change. For SAR, speckle and viewing geometry require careful treatment because incidence angle and layover can alter the observed signal, and calibration is required to make backscatter comparable across different satellite passes. Second, feature extraction converts the corrected data into quantifiable metrics, such as vegetation indices, water extent, or texture and coherence-based change signals. Third, classification or segmentation maps these features to meaningful surface elements such as water, vegetation, buildings, or bare soil. Fourth, aggregation translates the classified outputs into indicators that match real decision contexts, including exposure metrics, anomaly scores versus a baseline, or location-specific event flags. For example, multi-temporal SAR is frequently used for rapid flood and damage mapping because it supports consistent monitoring even under clouds and at night.

Orbital design shapes what is feasible because it determines revisit time, coverage, latency, and achievable resolution. Low Earth Orbit is typically used for Earth observation because proximity enables higher spatial resolution and systematic global coverage through polar and sun synchronous patterns (6). Geostationary orbit enables continuous viewing of the same region and, therefore, is central for weather monitoring and rapid updates, where refresh frequency is more valuable than finer detail (6). These orbital tradeoffs matter directly for indicator design, because they set the practical limits for how frequently a location can be observed and how quickly a new observation can be translated into information.

Finally, indicator quality is constrained by sensor characteristics that define what can be detected and with what level of confidence. Spatial resolution determines the smallest observable feature. Sub-meter imagery supports building-level analysis, while medium resolutions, around 10 to 30 m, are often better suited for land coverage, agriculture, and flood extent at scale (28). Spectral resolution affects the physical properties that can be separated, which is why vegetation monitoring often relies on indices such as Normalized Difference Vegetation Index (NDVI) and requires careful interpretation of limitations such as atmospheric influence and saturation effects. Revisit time and latency govern timeliness, especially for fast-changing events, which is why constellations with short revisits are central for operational monitoring. Taken together, the technical functioning of satellite data is best understood as an end-to-end chain in which sensor physics, orbit choices, preprocessing, and modelling decisions jointly determine whether outputs are robust enough to be used as comparable, quality-controlled indicators.

Space Economy

Facts and Figures

When translating satellite technology into market numbers, it's essential to look at the bigger picture: the global space industry. The global space economy has already reached a significant scale, with a current market value of approximately USD 415 bn. Today, the majority of this value is generated by satellite services and ground equipment, which together account for more than half of the overall market. These segments form the operational backbone of the space economy, enabling connectivity, navigation, Earth observation, and data-driven services across multiple industries (14).

Within this broader ecosystem, as shown in **Figure 1**, the Low Earth Orbit (LEO) satellite industry represents a fast-growing yet still relatively small segment. As of today, the LEO market is valued at around USD 15 bn, with close to 10,000 satellites currently in orbit.

While modest in size compared to the total space economy, LEO satellites are emerging as a key catalyst for structural change.

Looking ahead, the global space economy is expected to expand to approximately USD 1 tn between 2030 and 2040, driven by large-scale satellite constellations, declining launch costs, and rapidly increasing commercial demand. The LEO segment alone is forecast to grow to USD 108 bn by 2035, with the number of satellites potentially rising to 70,000 by 2030 (8).

From 10,000 today to 70,000 by 2030 satellite numbers are set to explode in the Low Earth Orbit

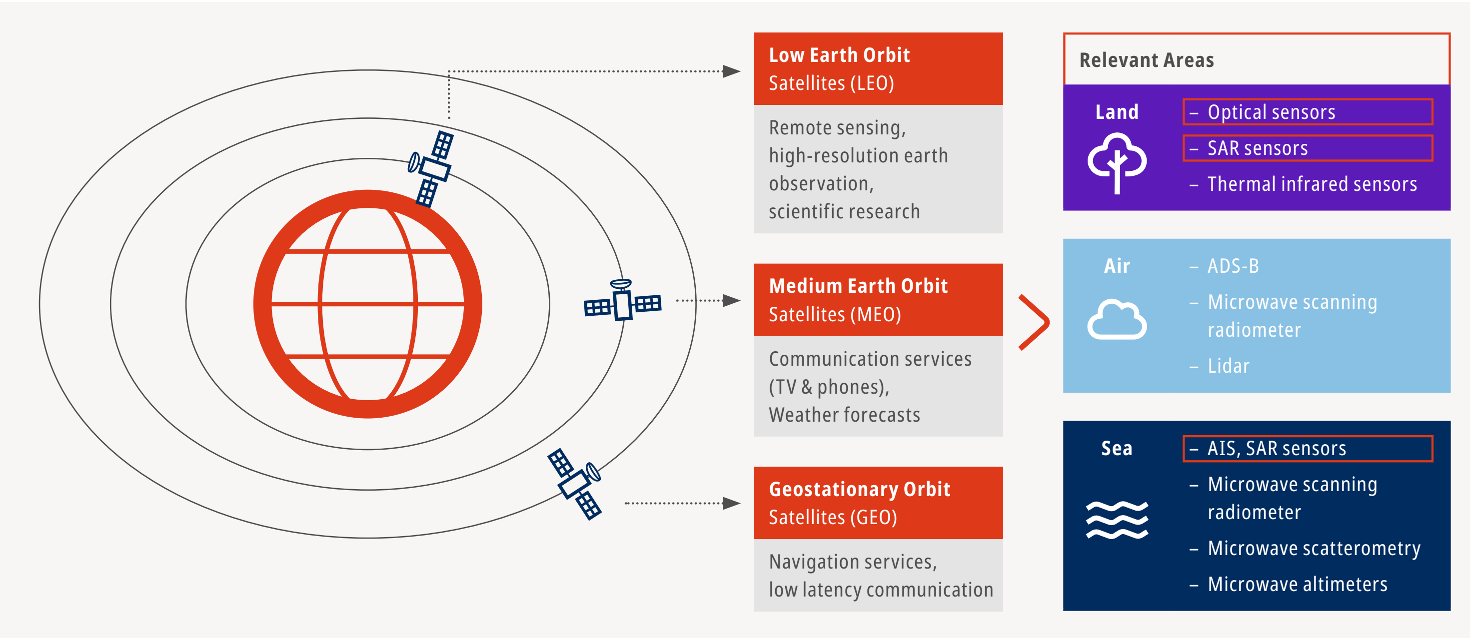

Figure 1: Types of Satellite Orbits (3;17).

Trends and Drivers

This rapid expansion underscores the growing economic relevance of satellite-based data and infrastructure, positioning the satellite economy as a core global technology market in the coming decade.

The rapid acceleration of the satellite economy is driven by a set of reinforcing technological trends that are fundamentally reshaping the industry's scope and value creation potential. Six key developments stand out:

1. **In-orbit services** are emerging as a new economic layer in space. Capabilities such as refueling, repairing, repositioning, and space traffic management extend satellite lifetimes and reduce replacement costs, while simultaneously creating new service-based revenue models.
2. **Satellite Internet of Things (IoT) and edge computing** are transforming how data is generated and processed. By enabling remote connectivity and onboard data analysis, satellites can reduce latency, optimize bandwidth usage, and support time-critical applications in areas such as logistics, environmental monitoring, and industrial operations. Looking ahead, advances in quantum computing could further enhance this ecosystem by, for example, enabling significantly faster optimization of global logistics networks or improving climate and risk simulations based on satellite-derived datasets.
3. **Cybersecurity** has become a strategic priority. As satellites increasingly underpin critical infrastructure, from communications to financial services, the need for secure, resilient, and trusted space-based systems is rising sharply.
4. **Expansion of Low Earth Orbit networks** enables global broadband connectivity and the integration of satellite systems into terrestrial 5G and future 6G architectures, significantly expanding addressable markets.
5. **Green satellites** are gaining importance as sustainability considerations move to the forefront. Lightweight designs, modular architectures, reusability, and debris-mitigation concepts are increasingly prioritized by agencies and commercial operators alike.
6. **Cost efficiency,** driven by technological progress and reusable launch systems, continues to lower barriers to entry and accelerate constellation deployment.

Together, these trends are expanding the boundaries of the satellite market and unlocking entirely new business cases, many of which are only beginning to materialize today (12; 18).

Challenges

Despite strong growth momentum, the satellite market faces a set of structural challenges that must be addressed to ensure sustainable long-term development.

- The first challenge is **technical complexity.** The integration of emerging technologies such as artificial intelligence (AI), IoT, and edge computing significantly increases system complexity and shortens innovation cycles. Satellite operators are required to continuously upgrade capabilities while maintaining high levels of reliability in mission-critical environments.
- Second, **environmental considerations** are becoming increasingly pressing. The rapid proliferation of satellites intensifies concerns around space debris, orbital congestion, and the environmental footprint of satellite manufacturing and launch activities. As highlighted by PwC (12), sustainability is evolving from a peripheral concern into a core strategic requirement for both public and private actors.
- Third, **security vulnerabilities** represent a major risk. Satellites have become critical infrastructure underpinning communications, navigation, and financial systems. Their growing strategic importance increases exposure to cyber threats, jamming, spoofing, and hostile interference, requiring advanced cybersecurity and resilience measures.
- Fourth, **spectrum congestion and signal security** are emerging as bottlenecks. The rapid expansion of large constellations raises the risk of frequency interference, spectrum scarcity, and collision hazards, particularly in Low Earth Orbit.
- Fifth, **regulatory and legal uncertainty** adds complexity to market planning. National approaches to licensing, spectrum allocation, geofencing, and interference mitigation remain fragmented, creating compliance risks and limiting cross-border scalability.
- Finally, **financial pressure** has intensified. Private investment has become more selective, favoring players with proven commercial traction, clear revenue models, and disciplined capital deployment.

Taken together, these challenges underscore that, while the satellite sector is well positioned for growth, unlocking its full potential will require coordinated technological innovation, regulatory alignment, and sustained investment discipline (12) (21).

Ecosystem Mapping

The ecosystem of the "satellite data for financial services" market primarily consists of satellite data providers, financial information firms already leveraging satellite data, and potential customers that could benefit from satellite data product offerings. Insurers, corporates, asset managers, corporate lenders, and hedge funds can all profit from products utilizing satellite data. The most common use cases for this data in the financial sector, as well as the core areas where current product providers operate, are as follows:

- **Retail analytics** leverages satellite imagery, parking-lot car counts, anonymized traffic data, and smartphone geolocation to predict quarterly sales and consumer spending trends ahead of official earnings releases, with platforms such as Orbital Insight providing retail traffic and activity indices.
- In energy and commodities, measurements like floating-roof shadows on oil storage tanks, thermal signals from power plants, and tanker-movement tracking generate early insights into global oil, gas, and **commodity supply-and-demand dynamics.** This is supported by solutions from Orbital Insight, Kayrros, and Ursa Space Systems.
- Maritime and shipping intelligence combines AIS ship-location data with satellite imagery of ports and container yards to assess **global trade flows and identify supply-chain bottlenecks** ahead of customs data, with providers such as Spire, BlackSky, and Planet Labs enabling these insights.
- In agriculture, multispectral satellite imagery is used to compute vegetation indices like NDVI to forecast **crop yields for commodities** such as corn and soybeans, drawing on data and analytics from TellusLabs and Descartes Labs.
- Finally, **ESG and climate-risk analysis** overlays corporate asset locations with geospatial hazard data such as flood zones, wildfire exposure, and drought frequency, to quantify physical climate risks. Asset-intelligence solutions are offered by MSCI and GeoSpatial Asset Intelligence, enhancing ESG assessments where disclosures are incomplete.

These examples illustrate that satellite data has moved well beyond a niche input. It supports agricultural yield estimates, disaster damage assessments, and environmental monitoring projects, and is now a core source of economic intelligence, capable of delivering earlier, more objective, and more granular insights than traditional data sources. It positions the satellite economy as a critical enabler of data-driven decision-making across industries in the decade ahead.

Satellites are no longer just about space or telecom, they are becoming a core piece of infrastructure informing decision-making across the economy.

Methodology

This project followed a structured, multistage research approach to explore how satellite and Earth Observation (EO) technologies could be applied within financial market infrastructure contexts. The objective was to move from broad opportunity exploration to a focused set of well-developed use cases grounded in market relevance, feasibility, and strategic value. The research was conducted by a team at the University of St. Gallen. The process resulted in the identification and evaluation of more than 25+ use cases. The four steps are explained in depth below and visualized in **Figure 2.**

Stage 1: Market and Technology Exploration

The project began with exploratory desk research to build a shared understanding of satellite technologies, data capabilities, and relevant market trends. Sources included academic literature, industry and consulting reports, governmental publications, and NGO research. This phase also included value chain and ecosystem analysis across multiple financial market functions. Based on these insights, sub-teams ideated broadly and divergently to generate a longlist of potential use cases.

Stage 2: Validation and Shortlisting

In the second stage, the identified use cases were evaluated through expert interviews and structured scoring. Each use case was assessed against a uniform criteria covering strategic alignment, market need and value, feasibility and risk, time to value, and data availability. The evaluation was reinforced by insights from experts across diverse fields, including sustainability, banking, and technology, enabling systematic prioritization and the selection of eight high-potential use cases.

Stage 3: Synthesis and Refinement

The midpoint of the project marked a dedicated synthesis and refinement phase, during which insights were consolidated and cross-case themes were aligned. Overlapping concepts were merged, individual use cases were sharpened, and selected cases were restructured to enhance strategic clarity and coherence. This iterative refinement resulted in the five final use cases identified, characterized by strong strategic alignment and clear business relevance.

Stage 4: Deep Dives and Final Development

In the final stage, the five selected use cases were developed in depth. For each case, the team established a clear storyline, defined the target users and problems addressed, assessed technological and regulatory considerations, and outlined value creation logic and potential business models. The outcome is a set of deployment-ready use cases supported by structured analysis and practical considerations presented in the next section.

This staged approach ensured analytical rigor while allowing for creative exploration and iterative refinement, resulting in a balanced and transparent research outcome suitable for thought leadership purposes.

Figure 2: Four-Stage Process. Source: Authors

Use Cases

This section presents the final set of use cases developed through the structured research and evaluation process described earlier. Following extensive exploration, prioritization, and refinement, five use cases were selected as the most promising applications of satellite and Earth Observation data within financial market infrastructure contexts.

Each use case is presented using a consistent structure. For every case, the analysis outlines the underlying customer or market problem, the proposed solution enabled by satellite data, and the value created for relevant stakeholders. The focus is on clarity, relevance, and feasibility, with each case highlighting the most critical strategic, technical, and market considerations.

Five use cases have been selected, which could become five business solutions:

1. **Property Intelligence Layer**
2. **Construction Monitoring**
3. **Agri Risk Index**
4. **Retail Sales Prediction**
5. **Earth Observation Intelligence Hub**

Together, these use cases illustrate a range of potential applications, from asset-level monitoring and risk assessment to market intelligence and data services. They reflect different degrees of maturity and implementation complexity, while collectively demonstrating how satellite-based insights could be translated into scalable, value-generating offerings for financial markets.

The following pages provide a concise deep dive into each use case.

1. Property Intelligence Layer
Case Background & Scope

Residential real estate valuation is a cornerstone of the Swiss banking system and underpins mortgage lending, risk management, and capital allocation. Over the past two decades, this function has become highly standardized, with hedonic valuation models from providers such as *Informations- und Ausbildungszentrum für Immobilien (IAZI)* forming the accepted industry backbone across banks, insurers, and pension funds. These models are deeply embedded in underwriting and portfolio processes and are widely regarded as robust and accepted by the regulator.

At the same time, the operating environment is evolving. Real estate markets are becoming more heterogeneous, while climate, environmental, and location-specific risks are gaining financial relevance and supervisory attention (20). Traditional valuation models remain largely transaction-driven and updated periodically, offering limited visibility into changes in property condition between valuation cycles. Banking practitioners stated that key attributes such as building condition or renovation status are often estimated rather than directly observed.

Although banks are aware of these limitations, they rarely attempt to address them internally. Integrating complex data and analytics capabilities is increasingly handled by specialized infrastructure and data providers rather than being built in-house by financial institutions.

Advances in satellite imagery, geospatial analytics, and AI now make it technically feasible to close this gap. High-resolution imagery can provide objective signals on physical asset characteristics and neighborhood development at scale, without on-site inspections. However, in Swiss mortgage lending, such data has not yet been operationalized in a way that is standardized, regulator-compatible, and integrated into existing valuation frameworks.

The Property Intelligence Layer addresses this gap by positioning an infrastructure provider as an integrator. Rather than replacing IAZI's established models, the solution enriches them with independent geospatial intelligence delivered through a trusted financial market infrastructure provider. This approach aligns with broader trends in financial market infrastructure, where institutions increasingly rely on centralized providers to integrate complex data services, rather than operating it themselves.

Market Need and Limitations

Swiss banks rely heavily on IAZI, Hedonic Statistical Models (HSM), and Wüest Partner (WP) valuations to determine market value and lending limits (22). These models are mature, regulator-approved, and deeply embedded in mortgage processes. Interviews with banking and data science experts confirmed that these providers' key strength lies in their long market history, transaction-based hedonic models, and standardization across the industry.

However, several structural limitations remain:
- **Static data & update cycles:** Valuation models are typically refreshed periodically, sometimes leaving gaps without new signals on changes at the property or neighborhood level. Outputs are also primarily delivered as reports or periodic updates, not as continuously evolving intelligence layers.
- **Imputed property condition:** Where information on building condition or renovations is missing, models rely on imputations based on construction year and statistical averages rather than objective observation.
- **Limited treatment of climate and environmental risks:** While such risks are expected to be integrated over time, they are currently only partially reflected, often through coarse location proxies.
- **High dependence on transaction volumes:** In illiquid or volatile markets, model accuracy can suffer due to a lack of recent transactions.

Banks recognize these gaps but may not always be positioned to address them independently. Given the cost and complexity of building these capabilities, financial institutions increasingly rely on specialized data and infrastructure providers, a role that hedonic valuation providers like IAZI already play in Swiss mortgage markets.

The opportunity is therefore not to build a new valuation model, but to augment an industry standard with additional, objective signals that improve valuation robustness and transparency. Satellite data and AI are

A clear gap persists between trusted valuation models and more dynamic, observable property intelligence.

well suited to address exactly those areas where current models are weakest: physical condition, neighborhood dynamics, and environmental exposure. Infrastructure providers are uniquely positioned to operationalize this augmentation at scale due to their general proximity to banks, their experience in running regulator-grade data platforms, and their ability to act as a neutral integrator between specialized data providers (13; 15)

The opportunity is augmentation, not disruption, strengthening trusted valuation models with objective signals.

Solution Design

The Property Intelligence Layer is designed as a complementary intelligence overlay on top of existing valuation models, not as a replacement (See **Figure 3**). At its core, the solution builds on IAZI's hedonic valuation models through a licensing partnership and enriches them with additional, externally observable signals that improve transparency, timeliness, and contextual understanding for banks.

The architectural approach is deliberately structured to preserve simplicity: IAZI functions as the valuation core, complemented by an infrastructure provider that integrates and distributes supplementary data layers, which banks may find more efficient to access externally.

First, valuation and property reference data from IAZI, GWR, and other authoritative Swiss sources form the baseline. Second, satellite and aerial imagery, combined with selected geospatial datasets, provide objective and repeatable observations of the physical asset and its surroundings, such as visible changes to rooftops, land use, solar installations, vegetation, or nearby infrastructure. Third, the infrastructure provider integrates selected transaction-related and market activity indicators where legally and contractually permissible, adding a market-context dimension that individual banks cannot easily assemble at scale. AI and analytics are applied in a targeted and conservative manner. Rather than generating new market values, AI models are used to detect changes, anomalies, and signals relative to the last known valuation state. Examples include identifying visible construction activity, major physical alterations, or neighborhood developments that may warrant closer review. These signals are translated into standardized indicators that can be consumed by banks as flags, indices, or confidence adjustments, fully auditable and explainable.

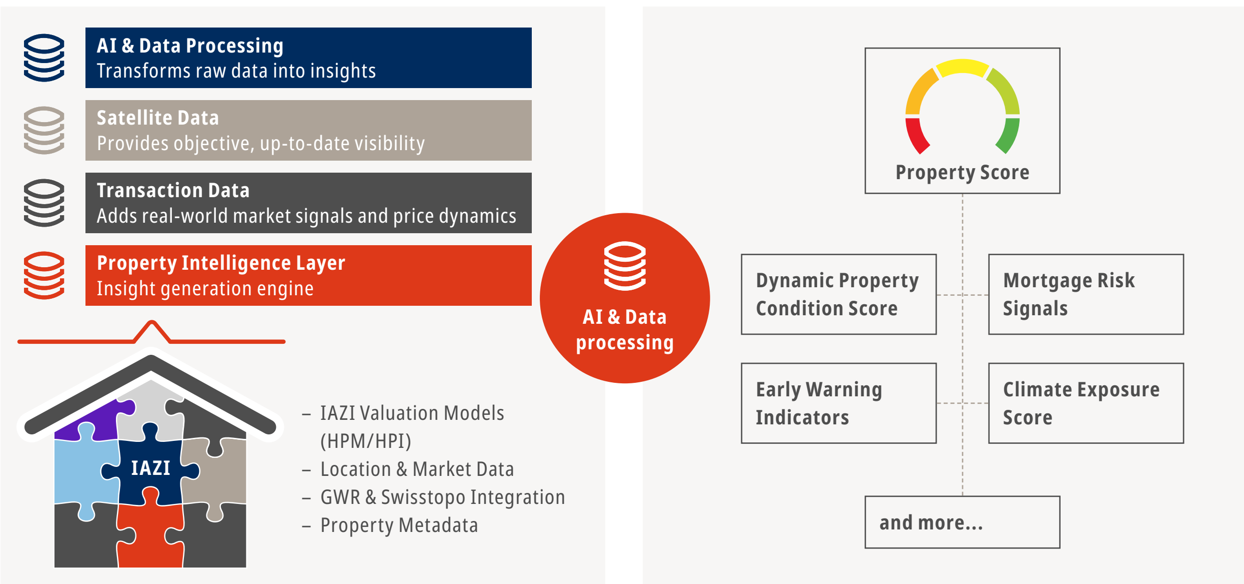

Figure 3: Synthesizing Satellite and Market Layers into Objective Scores. Source: Authors

From the user perspective, the output is delivered through a dashboard and Application Programming Interface (API)-based service operated by the infrastructure provider. Relationship managers, risk teams, and portfolio managers can access a consolidated property view that combines IAZI valuations with dynamic intelligence layers, without changing their existing valuation methodology. The update frequency is configurable, typically quarterly by default, with the option for more frequent updates in selected use cases such as portfolio reviews, refinancing waves, or ESG reporting cycles.

By design, the solution minimizes operational disruption. Banks do not need to build geospatial infrastructure, manage satellite data providers, or develop in-house analytics capabilities. The infrastructure provider assumes this integration role, leveraging its trusted position, data governance capabilities, and proximity to the Swiss banking ecosystem. The result is a scalable, regulator-compatible extension of today's valuation practice that addresses known blind spots while preserving the industry standard which banks already rely on.

2. Construction Monitoring

Case Background & Scope

Construction and infrastructure financing is exposed to execution risk: capital is deployed in stages, while progress, collateral quality, and schedule adherence evolve continuously. Monitoring still relies heavily on periodic site visits and reporting through PDF documents, which is costly, slow, and difficult to scale across dispersed portfolios (1).

Satellite imagery (optical and radar) combined with AI change detection can provide objective, repeatable evidence of site activity and progress over time (5; 27). The data provider's Construction Monitoring service turns those signals into standardized indicators for tranche releases, risk committees, and portfolio monitoring, without replacing engineers or project managers.

The infrastructure provider's role is to operate the integration, governance, and distribution layer: vendor-agnostic sourcing, quality assurance, versioned indicators, and secure delivery via dashboard and APIs.

Market Need and Limitations

Lenders and investors face information asymmetry during construction. Borrowers and contractors observe the site daily, while financing decisions are made using infrequent and heterogeneous updates (19). This slows tranche approvals, reduces early-warning capability, and limits portfolio comparability (1). Empirical work shows that adverse selection and moral hazard manifest differently in collateralized versus non-collateralized loans, underscoring that better information about collateral and borrower behavior materially changes credit outcomes. Episodic monitoring presents long blind spots between observations (5).

Highly manual inspections, document reconciliation, and ad-hoc follow-ups consume substantial resources and drive up operational expenses associated with on-site travel (5; 1). Late detection of delays and stalling often surfaces after material impact has already occurred (1). Additionally, low standardization makes it difficult to normalize and utilize non-uniform datasets gathered from different sources at different times, creating challenges for benchmarking across projects and contractors (5).

A managed, bank-grade monitoring layer can augment existing processes with frequent, independent signals and audit-ready evidence packs (5). The value of construction monitoring is highest for portfolios with many parallel projects and for cross-border asset managers seeking consistent oversight.

Frequent, independent monitoring reduces information asymmetry and improves capital discipline.

Solution Design

The service is an infrastructure provider-operated dashboard and data pipeline that enriches construction-loan portfolios with satellite-derived progress and risk signals. Outputs are delivered as standardized indicators (scores and flags) and evidence packages containing time-stamped imagery and logged indicator history.

The service draws on three primary input streams, (see **Figure 4**). Bank data includes loan amounts, disbursements, covenants, collateral, and arrears history. Project data encompasses budgets, planned milestones and timelines, and contractor and contract metadata where available. Earth observation and contextual data provide optical imagery and can be combined with synthetic aperture radar where relevant, along with land-use, access, and constraint layers.

When it comes to analytics, AI models detect observable site changes and translate them into interpretable features (27). Typical components include segmentation of footprints and earthworks, object detection of machinery and materials, change detection analysis of before-and-after conditions, time-series trend modeling of progress curves, and anomaly detection to identify peer and plan deviations.

The Construction Activity Index provides a standardized activity and progress signal at both project and portfolio levels to the user. Tranche-readiness and deviation flags deliver evidence-based signals versus plan and milestone claims. Early warning alerts flag stalling, abnormal slowdowns or unexpected changes. Benchmarking views enable peer comparisons across regions, asset types, and contractors. Evidence packs combine imagery snapshots with logged indicator history for audit and governance purposes.

A compact indicator set keeps the service explainable and easy to integrate into credit workflows. The Activity Index measures observed construction intensity versus baseline and peer benchmarks, enabling portfolio triage and early detection of stalling. Progress Delta tracks footprint and earthworks changes versus the plan window, supporting milestone claim validation and focused site visits. Inactivity Streak identifies consecutive periods with low or no change, triggering follow-up actions and draw schedule reviews. Deviation Flag highlights unexpected changes such as off-plan expansion, prompting covenant review and compliance checks. Tranche Readiness provides an evidence-based readiness signal with associated confidence metrics to support draw approval committees. Anomaly Score identifies outlier behavior compared to similar projects, escalating findings to risk teams for deeper review.

Time-stamped imagery links with provider metadata and resolution information to enable visual verification (5). Indicator values are recorded for each update, including version and confidence metrics. A detailed log

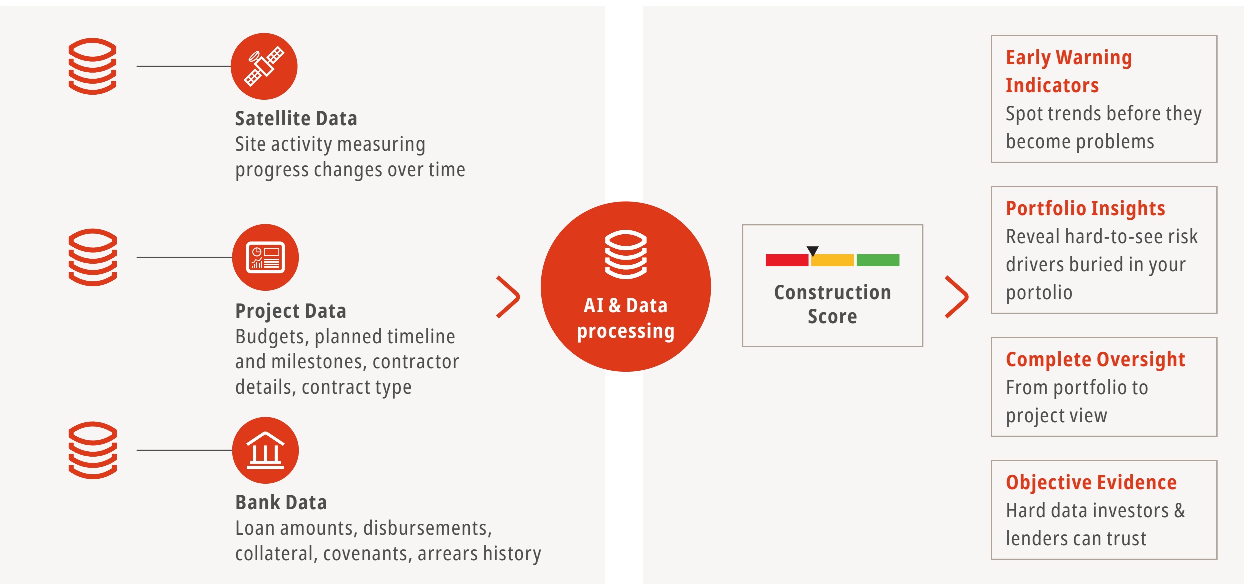

Figure 4: Fragmented data to unified construction risk score. Source: Authors

documents what changed since the last observation and explains why the model flagged specific items. Export formats include PDF summaries for committees as well as machine-readable JSON for system integration.

This solution, as shown in **Figure 4**, is suited to the infrastructure provider, who can offer deep banking integration and secure distribution rails through both dashboard and APIs. Trust and governance are ensured through validation, versioning, vendor quality assurance, and audit-ready documentation. As a neutral orchestrator, the infrastructure provider delivers standardized indicators across multiple earth observation and analytics providers. ■

3. Agri Risk Index

Case Background & Scope

The global agricultural and financial sectors face a systemic financial crisis driven by climate change. As extreme weather events become more frequent and severe, the traditional mechanisms for managing agricultural risk are failing. The global protection gap for crops has widened to an estimated USD 113 bn, leaving the vast majority of production uninsured and financial institutions exposed to massive, unhedged risks. Statistical models increasingly show that rising temperatures are associated with materially higher nonperforming loan ratios in agricultural bank portfolios.

Despite this urgent need for hedging, agricultural risk remains an illiquid and opaque asset class. The current market suffers from a fundamental lack of standardization. Banks, insurers, and asset managers rely on fragmented, proprietary data models that make risk transfer inefficient and costly. There is no single objective benchmark that financial markets can integrate into their systems to price weather volatility accurately.

Climate volatility is increasing, but agricultural risk remains financially unstandardized.

This whitepaper proposes the creation of a standardized Agri Risk Index (ARI), a unified financial benchmark designed to bridge this gap. By synthesizing satellite-based earth observation data with market pricing models, a neutral infrastructure provider can deliver a transparent, high-frequency index that serves as the “golden source” for risk transfer.

Such an index would transform unpredictable weather patterns into a tradable financial instrument. It would enable banks to dynamically price credit risk, allow insurers to automate claims via parametric triggers, and offer asset managers a new, uncorrelated asset class. For the financial market infrastructure provider that establishes this standard, the opportunity is to become the central clearinghouse for a multi-billion dollar market in climate resilience.

Market Need and Limitations

Financial institutions managing agricultural assets today face a critical data gap that exposes them to significant unmodelled risk. While banks hold vast portfolios of agricultural land, often exceeding thousands of square kilometers in collateral, they lack the tools to value these assets dynamically or efficiently. In an era of accelerating climate volatility, the traditional method of static valuation is no longer sufficient. Lenders are effectively operating with several blind spots and holding collateral whose underlying value is shifting rapidly due to environmental factors they cannot track in real-time. This lack of visibility stems from a heavy reliance on historical data and infrequent physical audits, which fail to capture the speed of modern environmental changes.

Credit risk models and asset valuations are typically updated annually or bi-annually based on financial statements or sporadic on-site visits, creating a dangerous latency between physical reality and financial reporting. A bank may hold a mortgage on a portfolio of farmland that has suffered significant yield degradation due to prolonged drought or soil exhaustion. This deterioration remains invisible on the balance sheet until a default event occurs. Furthermore, regulatory pressures (e.g., CSRD) increasingly demand objective proof of climate resilience (10). There is currently no scalable mechanism to monitor the health of thousands of dispersed hectares simultaneously. This means banks attempting to manage 21st century environmental risks with 20th century actuarial tables are structurally mispricing credit. Without real-time data, they cannot distinguish between a resilient, high-value plot and a high-risk asset, leading to capital misallocation and an accumulation of hidden risks in their loan books.

There is an immediate market opportunity to replace these static processes with a continuous, data-driven framework. A neutral infrastructure provider can translate complex satellite data into a single, actionable risk metric. Instead of overwhelming banks with raw data on biomass or soil moisture, this solution condenses millions of data points into a standardized Agri Risk Index. This allows lenders to monitor their entire portfolio remotely without a single site visit. Such an index transforms agricultural land from an opaque asset into a transparent financial instrument. It enables banks to perform dynamic Loan-to-Value adjustments and precise risk-weighted asset calculations. Ultimately, it allows for proactive portfolio management that aligns with the realities of a changing climate.

Solution Design

The proposed Agri Risk Index (ARI) is designed as a standardized financial benchmark that quantifies agricultural risk at a granular level. Unlike traditional models that rely on slow-moving yield data, the ARI operates as a composite index powered by real-time satellite telemetry and meteorological inputs. The solution design is shown in **Figure 5**. The core engine relies on three primary data streams. High-resolution satellite imagery monitors biomass development and soil moisture. This is combined with gridded meteorological data to track precipitation and temperature anomalies. Additionally, the system incorporates historical "ground truth" yield records to calibrate the risk weighting for specific crops and regions.

This raw data is processed through a proprietary algorithm that normalizes disparate environmental factors into a single, tradable index value ranging from 0 to 100. A score of 100 represents optimal growing conditions, while a lower score signals a more adverse environment. Crucially, the index is location-agnostic but spatially precise. It can generate risk scores for a single hectare or aggregate them across an entire portfolio of thousands of square kilometers. Importantly, the system maps these physical coordinates directly to financial identifiers (International Securities Identification Number (ISINs), Loan IDs). This scalability allows financial institutions to monitor exposure at both the micro-level of individual loans and the macro-level of total asset allocation.

The delivery mechanism is built for seamless integration into existing financial workflows. The ARI is distributed via standard market data feeds and APIs. This ensures that banks and asset managers can ingest the risk metrics directly into their existing trading and risk manage-

Figure 5: Financial Translation. Source: Authors

ment systems without needing specialized agronomic software. By providing a neutral, audit-proof "golden source" of truth, the infrastructure provider ensures that the index can serve as the legal basis for smart contracts. This effectively bridges the gap between physical agricultural volatility and the precision of financial markets.

Additional revenue streams can be derived from licensing the index for use in structured financial products. The cost structure remains efficient and asset-light. Expenses are primarily driven by data licensing fees and platform operations rather than heavy hardware maintenance. This flexibility allows the provider to continuously upgrade the underlying technology without significant sunk costs. It ultimately creates a sustainable ecosystem where technological innovation meets financial stability.

4. Retail Sales Prediction

Case Background & Scope

Retail consumption is a central driver of economic growth, corporate earnings, and financial market performance. Shifts in consumer behavior influence equity valuations, inflation expectations, and monetary policy decisions. Despite its importance, retail activity remains poorly observed by financial markets in real time. Official retail sales statistics are released with material delays, frequently revised, and provide only aggregated backward-looking views of consumption. As a result, financial institutions are forced to make forward-looking decisions based on incomplete and lagging information.

The market lacks a neutral, financial-grade integrator between satellite analytics and institutional capital.

This structural limitation has become more pronounced as macroeconomic volatility has increased and consumer behavior has grown more sensitive to inflation, interest rates, and geopolitical uncertainty. Asset managers, banks, hedge funds, and central banks increasingly require early, independent indicators that capture changes in consumption before they appear in earnings reports or official statistics. However, no standardized benchmark currently exists that translates physical retail activity into a trusted, high-frequency financial signal comparable across regions and time. This whitepaper proposes Retail Sales Prediction, a standardized retail activity indicator derived from satellite-based earth observation data and distributed as a financial-grade data product. By observing retail locations directly from space, physical indicators such as site utilization and parking density can be measured consistently and transformed into predictive consumption signals. Governed and distributed by a neutral financial market infrastructure provider, these signals can complement traditional macroeconomic and corporate data. For the data provider, the opportunity is to extend its established role in data standardization and trust into the domain of alternative data. By institutionalizing satellite-derived retail indicators, the data provider can create a new category of bank-grade economic intelligence while reinforcing its strategic relevance within global financial markets (16).

Market Need and Limitations

Financial institutions exposed to consumer-driven sectors face a persistent visibility gap. Retail sales data and household consumption statistics are typically published weeks or months after the underlying activity occurs. During periods of rapid economic change, this latency materially impairs forecasting accuracy and risk management. Portfolio reallocations, credit assessments, and macroeconomic projections are therefore often based on outdated information, increasing uncertainty and market inefficiency.

Existing private-sector alternatives remain structurally constrained. Transaction-based datasets sourced from payment processors or point-of-sale systems are fragmented, geographically uneven, and subject to demographic bias. Coverage depends on market penetration and contractual access, limiting their representativeness at scale. In addition, proprietary methodologies and limited transparency raise concerns for regulated institutions regarding auditability, continuity, and vendor concentration risk (4).

Satellite-based analytics offer a fundamentally different approach by directly observing economic activity rather than inferring it indirectly. Empirical research demonstrates that satellite-derived indicators such as parking occupancy and site utilization correlate strongly with retail revenues and broader economic outcomes. However, the current market for satellite retail analytics remains fragmented. Solutions are often bespoke, region-specific, and designed for niche hedge fund use cases. Methodologies lack standardization, historical validation is inconsistent, and outputs are difficult to integrate into mainstream financial systems.

This fragmentation creates a clear opportunity for a neutral infrastructure provider. By aggregating multiple satellite and analytics sources, validating outputs against historical benchmarks, and translating physical observations into standardized indicators, retail activity can be transformed from an opaque statistic into a transparent financial signal. Such standardization reduces information asymmetry and enables earlier detection of consumption slowdowns or accelerations, supporting more informed capital allocation decisions.

Solution Design

The Retail Sales Prediction solution is designed as a standardized financial indicator that captures retail activity through direct physical observation. High-resolution optical satellite imagery is used to monitor spatial utilization around retail locations, while Synthetic Aperture Radar imagery ensures continuity under cloud cover and low-light conditions. This multi-sensor approach provides consistent temporal coverage across regions.

Specialized geospatial analytics partners convert raw satellite imagery into structured activity metrics that reflect changes in retail site utilization over time. These metrics act as proxies for consumer footfall and purchasing intent. The system is deliberately vendor-agnostic, combining multiple data sources and methodologies to reduce dependency on any single provider and enhance long-term resilience.

The data infrastructure provider offers the central validation and standardization layer. Retail activity metrics are calibrated against historical retail sales, earnings data, and macroeconomic indicators to ensure predictive relevance and stability. Quality assurance frameworks aligned with financial market standards are applied to ensure reliability, comparability, and auditability. The output is a standardized retail activity indicator as opposed to raw imagery or technical analytics.

A key design feature is the mapping of physical activity to financial identifiers. Retail signals are linked to listed companies, sectors, indices, and geographic economic regions, enabling direct integration into research, trading, and risk management workflows. Distribution occurs through existing APIs and data feeds, minimizing adoption friction and embedding retail signals alongside traditional market data.

In this configuration, Retail Sales Prediction functions as a neutral “golden source” for retail activity intelligence, supporting earnings forecasting, macroeconomic analysis, and index construction within a regulated financial environment (16). ■

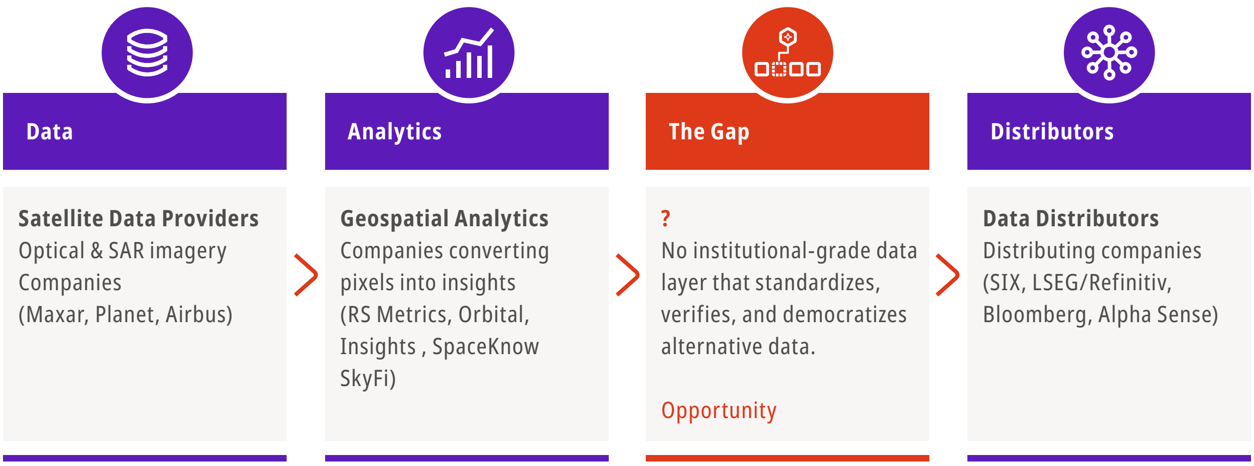

Figure 6: Positioning in the Satellite Data Value Chain. Source: Authors

5. Earth Observation Intelligence Hub

Case Background & Scope

ESG and risk data are becoming decisive inputs for investment decisions, credit assessments, insurance underwriting, and regulatory reporting. At the same time, many ESG indicators are still based on self-reported disclosures and third-party models that differ in methodology, coverage, and update cycles. This creates information asymmetries between issuers and investors, and increases the risk of unsupported sustainability claims (11). Satellite earth observation can reduce this gap because it provides objective, observable evidence of real-world activity. It can capture signals such as land use change, infrastructure disruptions, flooding events, crop stress, or port congestion. Recent work emphasizes earth observation as a scalable input for climate and sustainability monitoring and decision making, especially where traditional reporting is slow or incomplete.

The Earth Observation Intelligence Hub (EOI Hub), is a solution that turns raw satellite and geospatial data into standardized, financial-grade ESG and risk intelligence. The EOI Hub is positioned as a neutral verifier that complements existing market and ESG datasets with independent evidence and continuous monitoring (15).

Market Need and Limitations

The primary customers are corporates, insurers, reinsurers, and asset managers. Across these groups, the core need is similar: decision-grade signals that are auditable, comparable across assets and regions, and available with sufficient timeliness to manage risk. These include ESG claim validation, supply chain event monitoring, physical climate risk detection, portfolio screening, due diligence, and regulatory reporting preparation.

Current approaches have three structural weaknesses: First, many ESG and risk datasets rely on corporate reporting, surveys, and model-based estimation. This can increase exposure to greenwashing and reduce comparability, because different providers apply different assumptions and coverage rules. The credibility gap is visible on the demand side (11). Second, the data landscape is fragmented. Financial institutions typically combine multiple vendors because each provider covers different hazards, geographies, or asset classes. This increases integration costs and creates inconsistent results across internal systems. In practice, this can lead to conflicting ratings and weak auditability because data lineage and definitions are not aligned. Third, visibility is often not timely enough for operational risk, especially for supply chains and physical assets. Many risk signals reach decision makers only after internal reporting cycles, external audits, or incident notifications. This weakens early warning, limits proactive mitigation, and can lead to mispricing or delayed response during disruptions. Regulatory pressure amplifies these weaknesses and creates a clear opportunity. Sustainability disclosure regimes and anti-greenwashing expectations increase the demand for verifiable claims and substantiated evidence. Swiss public guidance explicitly warns against environmental claims that cannot be substantiated and stresses the importance of verifiable information (7). In parallel, industry commentary expects ESG mandates to accelerate adoption of earth observation data where it improves measurement and verification.

Satellite verification reduces reliance on self-reported ESG data.

Solution Design

The EOI Hub is built around a shared Satellite Integrity Core. It combines satellite signals with contextual datasets, linking them to market data, and computing standardized indicators from the integrated inputs. This shared backbone enables modular products that reuse the same data layer to serve different customer needs and workflows.

The process starts with continuous data sourcing and harmonization. Optical and radar imagery, land use and infrastructure layers, and climate and natural hazard datasets are integrated into a shared data model. Inputs are aligned in space and time, calibrated, and quality checked so that signals can be compared consistently across regions and update cycles. The hub combines public and commercial sources depending on required resolution, revisit frequency, and licensing constraints. After harmonization, the platform performs feature extraction, event detection, and indicator computation. Imagery is converted into measurable features such as land cover change, vegetation indices, water extent, and proxy indicators of activity. Satellite derived indicators are increasingly recognized as a way to close data gaps for climate and land use monitoring, including vegetation metrics such as NDVI. The EOI Hub then translates these features into financial grade Key Performance Indicators (KPIs), i.e. deforestation alerts near supplier sites, flood detection, port activity anomalies, or hazard exposure metrics.

To remain auditable and usable in financial workflows, definitions and thresholds must be transparent and repeatable, and outputs should include confidence measures and quality flags (15).

A key differentiator is the financial mapping step. By linking harmonized geospatial signals with the data providers trusted reference, market, and ESG datasets, the platform builds a bridge from earth observation to financial entities. Geographic coordinates are mapped to issuers, securities, facilities, and supply chain entities using existing reference data. This transforms raw imagery into financially meaningful evidence, as each observed change can be tied back to a concrete company, asset, or infrastructure component (15). The results are distributed through machine-readable datasets, dashboards, and APIs that integrate into existing systems for risk management, due diligence, investment research, and reporting, instead of static reports (15).

These capabilities translate into six value effects, visualized in **Figure 7**. The hub enables independent verification of ESG claims and supply chain events, addressing concerns about unsupported sustainability claims (11). It provides regulatory-ready, traceable datasets that reduce friction in audit and disclosure substantiation, aligned with guidance that environmental information should be verifiable (7). It strengthens market integrity and resilience by offering independent visibility on disruptions (26). It improves risk and ESG intelligence with location-specific indicators that capture dynamic risk drivers (26). It supports sustainable finance innovation by providing satellite-derived KPIs that can feed indices and monitor for sustainable instruments (5). Finally, it generates scalable data-as-a-service (DaaS) revenue through subscriptions, APIs, analytics packages, and licensing, supported by rising demand for auditable ESG data and due diligence capabilities (10).

To ensure scientific correctness, the EOI Hub must manage uncertainty and communicate limits. Satellite signals can be affected by resolution constraints, cloud cover for optical sensors, and classification errors. The platform should therefore publish confidence scores, quality flags, and full provenance, and should focus on observable indicators rather than overstating causality. Governance and data rights also shape what can be distributed and how, so a financial-grade operating model must include compliant procurement, model governance, and audit-ready documentation (15).

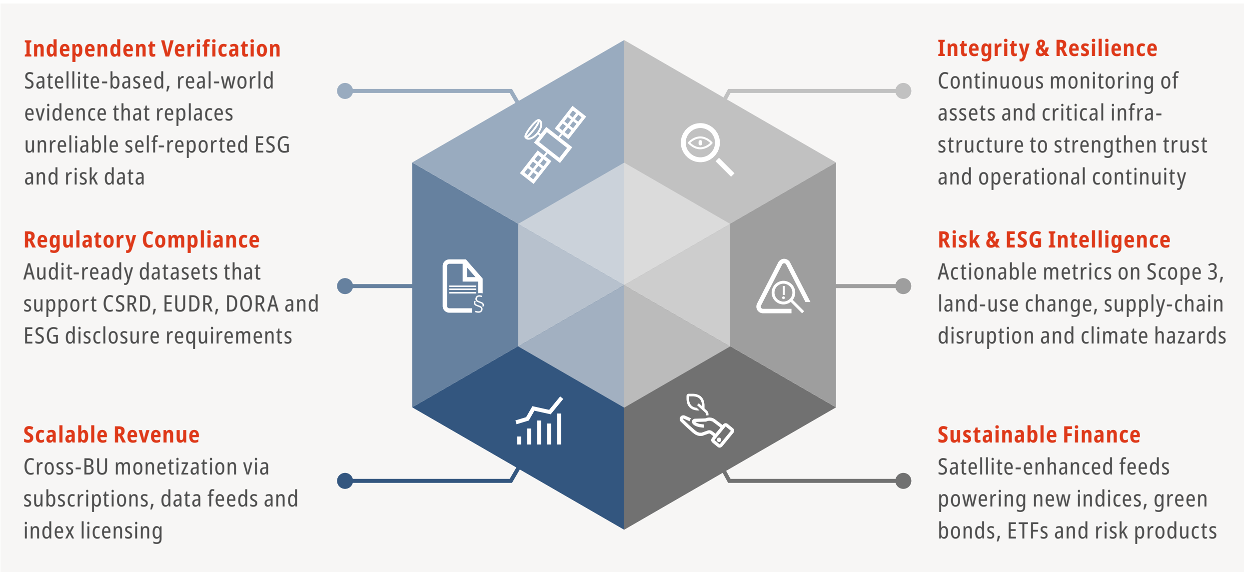

Figure 7: Market Integrity and Sustainable Finance through Satellite Intelligence. Source: Authors

Recommendation and Final Remarks

Recommended Positioning

Based on the insights from the market and ecosystem analysis, a compelling strategic option for financial data infrastructure providers is to position themselves as a trusted Space-Financial Hub, adopting an integrator model rather than developing proprietary satellite analytics capabilities. This approach can be structured around three strategic levers.

First, executing a strategic pivot in the business model. Instead of building end-to-end space analytics in-house, providers can license raw or semi-processed analytics from best-in-class satellite data vendors. This significantly reduces capital intensity and technology risk in a rapidly evolving space ecosystem. Differentiation is achieved by transforming these inputs into validated, audit-ready financial signals, such as ESG indicators, physical risk metrics, or credit risk inputs, that meet regulatory, compliance, and assurance requirements of financial institutions.

Win by integration, not by competing with satellite analytics vendors.

Second, driving commercial growth through focused use-case prioritization. Early traction can be achieved by concentrating on use cases with clear and immediate demand, such as Construction Monitoring and Agricultural Risk Indices. Both address the growing need for physical asset verification and contribute to closing the climate data gap faced by financial institutions. Over time, a broader Earth Observation Intelligence Hub can evolve into a long-term ecosystem, supporting regulatory reporting requirements such as Corporate Sustainability Reporting Directive (CSRD) and EU Taxonomy disclosures.

Third, enabling execution through distribution and integration. A key advantage of established data infrastructure providers lies in their existing connectivity to financial institutions. By embedding space-derived risk signals directly into core banking and risk systems via secure API infrastructure, providers can remove a critical adoption barrier that currently constrains many space-data startups.

Together, this combination of licensed space data, financial-grade validation, and seamless distribution offers a scalable and sustainable pathway for integrating satellite intelligence into financial decision-making.

Challenges and Limitations

Before moving into execution, several structural challenges must be addressed to ensure a credible and scalable entry into the space-data domain. Importantly, each of these challenges can be mitigated through targeted design choices.

First, data validation and attribution. Satellite signals alone are insufficient for financial decision-making. To achieve financial-grade reliability, satellite-derived insights must be anchored in real-world validation. Therefore, we recommend co-developing validation frameworks jointly with pilot customers to ensure that models are grounded in operational reality and aligned with client expectations from the outset.

Second, regulatory and liability considerations. ESG and climate-related data introduces new questions around accountability, governance, and legal responsibility. Addressing these requires clear governance structures and well-defined liability frameworks. Establishing standardized policies early will provide clarity for clients and regulators alike and reduce adoption friction over time.

Third, technical complexity. Integrating satellite data across multiple use cases and client environments requires a high degree of standardization. This challenge can be addressed through modular earth observation data pipelines, supported by a unified API architecture and a consistent translation layer that converts technical signals into usable financial insights.

Fourth, market and user maturity. Adoption of space-derived data depends on the readiness of banks and insurers to integrate new data types into existing workflows. A phased go-to-market approach, starting with early adopters and supported by structured education and enablement campaigns, will help build confidence and accelerate uptake.

Fifth, geo-cybersecurity & infrastructure resilience. Satellite data ecosystems depend on globally distributed space and ground infrastructure that may be exposed to geopolitical tensions, cyberattacks, signal spoofing, or targeted service disruption. As satellite data becomes embedded in financial workflows, resilience and data integrity become critical trust factors. Mitigation requires diversified data sourcing, redundancy across providers, robust cybersecurity standards, and transparent incident response protocols.

Sixth, technological disruption & cryptographic risk. Rapid advances in computing, particularly quantum computing, may challenge current encryption standards and data protection mechanisms over time. Although not an immediate operational threat, forward-looking architecture design should incorporate quantum-resilient cryptographic planning and upgrade pathways to ensure long-term security and regulatory compliance.

Finally, competition and differentiation. While satellite vendors compete on analytics, the data provider can differentiate by offering financial-grade validation, trust, and standardization. By positioning itself as the trusted integrator rather than a data vendor, the data provider can become the financial industry's standards setter for space-enabled insights.

Taken together, these measures allow data infrastructure providers to enter the space-data domain with confidence and control. By addressing validation, governance, integration, and adoption in parallel, organizations can position themselves not just as any other data provider.

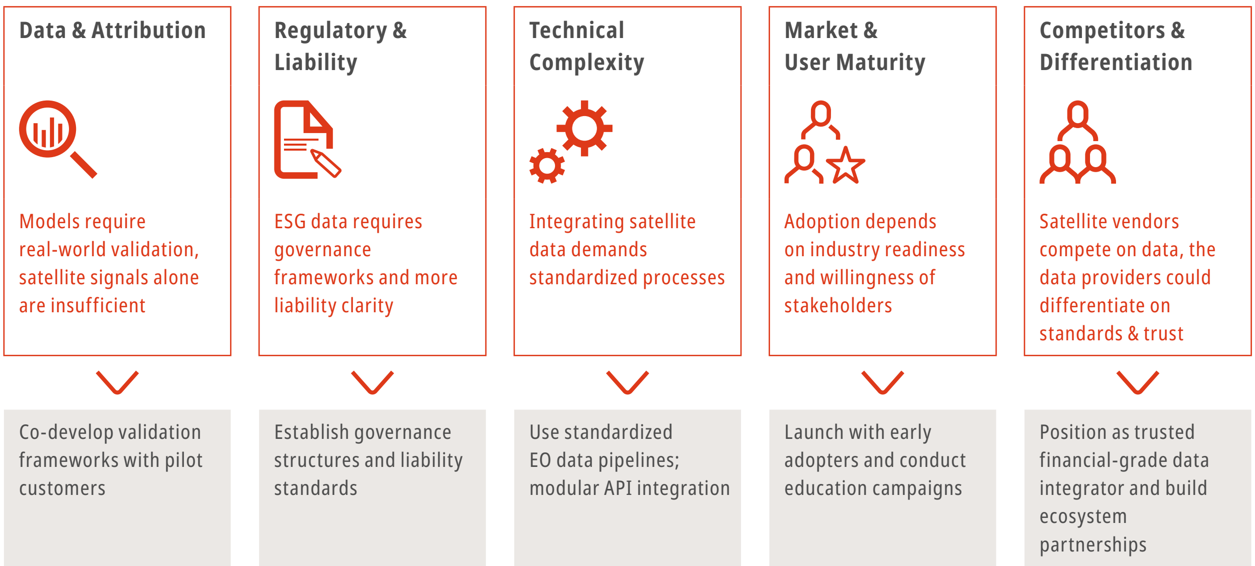

Figure 8: Challenges and how they are addressed. Source: Authors

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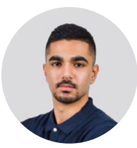

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