



# **CIMA/CGMA**

# **Strategic Case**

# **Study**

**Free Starter Kit**



**Leothayre**

**May/August 2025**

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# Introduction to the SCS exam

Accounting  
Practise  
Center



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## SYLLABUS CONTENT

### Session 1: Exam

- Preseen and unseen; Marking, Writing style

## Topic 1: Exam

### Introduction to the exam

- Based on preseen material.
- 6 variants exams – with 3 questions/sections in each variant.
- 150 marks in total, passing marks are 80.
- 3 hours available, with 60 minutes per section, with detailed number of sub-tasks available in each section, ie if there are two sub-tasks in Section 1 (you are expected to spend 30 minutes/sub-task).
- May/August (Same preseen case); Feb/November (Same preseen case)
- **Role:** Finance Director – Your answer should be from the HOLISTIC's point of view, ie always think about the framework and impact on other stakeholders.

### Marking

#### Overall marks allocation:

Sub-Task	Core Activity		Sub-task weighting (% section time)
Section 1			
(a)	A	Develop business strategy.	60 %
(b)	B	Evaluate business ecosystem and business environment.	40 %
Section 2			
(a)	B	Evaluate business ecosystem and business environment.	40 %
(b)	C	Recommend financing strategies	60 %
Section 3			
(a)	D	Evaluate and mitigate risk.	50%
(b)	E	Recommend and maintain a sound control environment.	50%

#### *Example from 2022 SCS Exam Sitting*

Sub-task	Core Activity		Sub-task weighting (% section time)
Section 1			
(a)	A	Develop business strategy.	40%
(b)	B	Evaluate business ecosystem and business environment.	60%
Section 2			
(a)	A	Develop business strategy.	34%
(b)	D	Evaluate and mitigate risk.	33%
(c)	D		33%
Section 3			
(a)	C	Recommend financing strategies.	50%
(b)	E	Recommend and maintain a sound control environment.	50%

#### *Example from 2021 SCS Exam Sitting*

#### Specific question marking:

SECTION 1			
<b>Task (a)</b> Assuming that we decide to build more hangars at HCI, <b>explain</b> whether the Board would be justified in calling that a strategic decision.			
<b>Trait</b>			
<b>Arrfield strategy</b>	<b>Level</b>	<b>Descriptor</b>	<b>Marks</b>
		No rewardable material	0
	<b>Level 1</b>	Identifies strategy	1
	<b>Level 2</b>	Provides a realistic and relevant overview of Arrfield's strategic management	2-3
	<b>Level 3</b>	Provides a realistic and relevant overview of Arrfield's strategic management, with good justification	4
<b>Strategic issues</b>	<b>Level</b>	<b>Descriptor</b>	<b>Marks</b>
		No rewardable material	0
	<b>Level 1</b>	Discusses relevance of decision	1-2
	<b>Level 2</b>	Provides a clear and full evaluation of the argument that this decision was part of Arrfield's ongoing strategy	3-5
	<b>Level 3</b>	Provides a clear and full evaluation of the argument that this decision was part of Arrfield's ongoing strategy, with good justification of points made	6-9
<b>Task (b)</b> Recommend how we should evaluate and manage the interests of the three stakeholders which I have listed above.			
<b>Trait</b>			
<b>NorFly</b>	<b>Level</b>	<b>Descriptor</b>	<b>Marks</b>
		No rewardable material	0
	<b>Level 1</b>	Identifies NorFly's interests	1-2
	<b>Level 2</b>	Provides a relevant recommendation for managing the relationship with NorFly	3-5
	<b>Level 3</b>	Provides a relevant recommendation, with good justification, for managing the relationship with NorFly	6-7

### Example from 2021 SCS Exam Sitting

SECTION 2			
<b>Task (a)</b> Ignoring issues relating to our share price, <b>identify</b> the key stakeholders who were affected by the tournament's failure and recommend how we should manage their interests.			
<b>Trait</b>			
<b>First stakeholder</b>	<b>Level</b>	<b>Descriptor</b>	<b>Marks</b>
		No rewardable material	0
	<b>Level 1</b>	Identifies stakeholder	1
	<b>Level 2</b>	Recommends approach to management	2-3
	<b>Level 3</b>	Recommends approach to management with justification	4
<b>Second stakeholder</b>	<b>Level</b>	<b>Descriptor</b>	<b>Marks</b>
		No rewardable material	0
	<b>Level 1</b>	Identifies stakeholder	1
	<b>Level 2</b>	Recommends approach to management	2-3
	<b>Level 3</b>	Recommends approach to management with justification	4
<b>Third stakeholder</b>	<b>Level</b>	<b>Descriptor</b>	<b>Marks</b>
		No rewardable material	0
	<b>Level 1</b>	Identifies stakeholder	1
	<b>Level 2</b>	Recommends approach to management	2-3
	<b>Level 3</b>	Recommends approach to management with justification	4
<b>Task (b)</b> Explain whether the behaviour of our share price is consistent with manipulation linked to a deliberate attack on our tournament and explain the significance of any such manipulation.			
<b>Trait</b>			
<b>Consistency</b>	<b>Level</b>	<b>Descriptor</b>	<b>Marks</b>
		No rewardable material	0
	<b>Level 1</b>	Identifies possible reasons for price movement	1-3
	<b>Level 2</b>	Explains consistency of price movement with suspicions of manipulation	4-7
	<b>Level 3</b>	Explains consistency of price movement with suspicions of manipulation with good justification	8-11

### Example from 2022 SCS Exam Sitting

### Writing tips

- Answer the requirement, rather than quote general stuff from the preseen.
- Each paragraph builds on a single idea.
- Build paragraph structure - Each paragraph should contain: situation → implication → possible outcome → evaluation.
- Use cause-and-effect reasoning - For example: "If X happens → then Y will occur → which could result in Z." This logical flow is crucial to good marks.
- Balanced view - Strong answers consider both benefits and risks, and occasionally highlight alternative options.
- Include long-term thinking - Mention brand, culture, talent, investor perception—not just this quarter's profits.
- NO theory is required in your answer.
- Although CIMA does not require any words requirements, however, per our experience, for each question, write about 500 words (with 40 words per paragraph), about 12 paragraphs.

#### Example of ONE good point:

If Leothayre fails to comply with emerging orbital decommissioning standards (Space Junk Charter), it could lose access to lucrative EU government contracts that increasingly mandate ESG compliance. This would impact revenue growth and reputational positioning as a responsible space infrastructure provider. While current platforms are not yet mandated to deorbit, pre-emptive compliance could offer strategic first-mover advantages.

#### Example of ONE bad point:

Leothayre might lose business if it doesn't follow the Space Junk Charter because clients may not be happy.

- **Too vague** - What kind of clients? Which business? How is this linked to the case context?
- **No analysis** - No cause-and-effect reasoning, no discussion of impact (e.g., contracts lost, markets affected, brand damage).
- **No depth** - Lacks reference to the satellite industry, ESG trends, or strategic implications.
- **No judgement** - Doesn't evaluate risk severity, likelihood, or trade-offs.

# Preseen Application

## Part 1

### Introduction

- Leothayre is a quoted company based in Wexland.
- It designs and delivers small satellites for low Earth orbit.
- Supports clients in arranging launch services.
- Prepares financial statements under IFRS, in W\$.
- You are a senior finance manager reporting to the Board.
- You advise on strategic matters and special projects.

### Satellite AND Rocket

In September 2016, a major disaster struck the space industry — before the rocket even launched. **An Israeli company, Spacecom, had built a high-value satellite called AMOS-6, worth around \$200 million.** This satellite was meant to deliver internet to rural Africa, and Facebook was one of the key customers behind the mission. The satellite was scheduled to launch on a SpaceX Falcon 9 rocket from Cape Canaveral, Florida. But just two days before launch, everything went wrong.



During a pre-launch procedure called a “static fire test”, the rocket suddenly exploded on the ground. The explosion destroyed the Falcon 9 and the AMOS-6 satellite mounted on top — before either had even left the launch pad.

#### **So what was the test for?**

A static fire test is a routine part of SpaceX's launch process. In it, the rocket is fully fueled and the engines are briefly fired while the rocket stays on the ground. It's a way to check for engine performance and system readiness — but it's still very risky. At that moment, AMOS-6 was already attached to the rocket, ready for launch.



The explosion was caused by an unexpected issue between liquid oxygen (LOX) and pressurized helium inside the upper-stage tanks. The structure failed, the fire spread instantly, and the rocket blew up in seconds — along with the \$200 million satellite.

#### **The consequences were huge.**

At the time, Spacecom was negotiating a sale of the company to a Chinese investor, and AMOS-6 was a key part of that deal. After the explosion, the deal collapsed. Spacecom's stock price fell by nearly 50%, and the company was left with nothing.

**Even worse — insurance didn't cover the loss.**

Why? Because satellite insurance usually only starts once the rocket lifts off. Since the explosion happened before launch, during ground testing, the insurance didn't apply. That meant Spacecom had to turn directly to SpaceX and demand compensation. Spacecom filed a claim for more than \$200 million. In the end, instead of going to court, the two companies reached a private settlement. SpaceX agreed to:

1. Give Spacecom a free priority launch in the future
2. Pay some cash compensation (the amount was never made public)

But the damage was already done. Facebook's project was delayed (Facebook was not the satellite owner, but it was the main customer of AMOS-6's communication capacity), ie Facebook was working on a project called Internet.org, which aimed to bring affordable internet access to remote and underserved areas — especially in sub-Saharan Africa.

**'CLUES FROM THE PRESEEN PAGE 12':**

*Leothayre does not operate its own rockets, but it has close working relationships with several launch providers. It can negotiate launch slots on behalf of clients, ensuring that satellites will be placed in the correct orbit in time to meet client deadlines. Alternatively, clients can request completed satellites to be delivered to them so that they can make their own arrangements for launching.*

## Missing Post Launch Monitoring Services

Leothayre currently does not offer post-launch technical support services such as in-orbit satellite health monitoring, early anomaly detection, or predictive diagnostics. In contrast, competitors like **Aerospacelab** provide comprehensive support that extends beyond manufacturing, including LEOP (Launch and Early Orbit Phase) assistance, real-time telemetry analysis, fault detection, and operational intervention guidance.



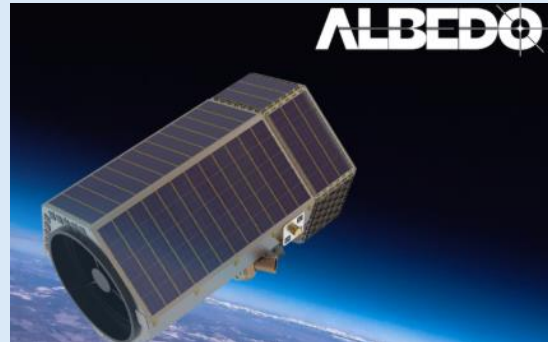
**aerospacelab**

This gap presents a clear competitive disadvantage. As satellite buyers increasingly expect life-cycle support — especially during the critical early orbit phase — Leothayre's limited service scope may reduce its appeal to risk-averse clients. Without enhancing post-delivery support capabilities, the company risks falling behind more integrated solution providers in client retention and long-term contract opportunities.



## Killed by Customization - Albedo Space

Albedo Space — a U.S. startup with big ambitions in the commercial Earth observation sector. In 2021, they launched their first satellite, which was designed to capture high-resolution images at sub-meter level. The satellite was meant to serve clients in agriculture, insurance, and urban monitoring. Before the launch, the leadership was confident, investors were excited, and preparations for a second funding round were already underway. But then things went wrong. Less than three hours after the satellite reached orbit, it completely lost contact. From the moment it separated from the rocket, ground stations received no data and couldn't send any commands. At first, the engineering team assumed it was just a delay in establishing the communications link, or that the satellite's orientation systems hadn't yet stabilized. They tried adjusting signal frequencies from multiple ground stations, and even brought in a specialized RF lab in Europe to help scan for signals — but nothing worked.



Eventually, an internal investigation identified the root cause: a failure in the satellite's electric power system (EPS). The system had been designed in-house by Albedo's engineering team, but the actual hardware was customized and supplied by a small aerospace electronics company in Denmark. The base module was a commercial off-the-shelf product with flight heritage, but for this mission, it was partially modified to handle the satellite's high-power imaging payload. Albedo also changed the software logic for how the system would "wake up" in space and manage power distribution. In the early planning stage, Albedo had evaluated EPS modules from larger, well-known vendors like AAC Clyde Space and Blue Canyon Technologies. While those systems were reliable and proven in orbit, their form factors were bulky, and their rigid interfaces didn't fit well with Albedo's custom onboard image-processing unit. With limited space in the CubeSat frame, the team looked for a smaller, more flexible solution.

The Danish supplier offered just that — a highly customized power module that could retain a compact design while allowing configuration of startup voltage thresholds and load management. It seemed ideal: compact, affordable, and perfectly matched to the mission's needs. Initial lab tests showed no critical issues, so project managers quickly approved the design for integration. One engineer raised a concern about testing the system's behavior under cold conditions, suggesting a longer verification phase. But with a tight schedule and limited resources, that warning was ignored.

This is where the real problem emerged. The startup voltage and redundancy features were not fully validated. The backup battery, which was supposed to provide the initial wake-up current, had already shown signs of instability during factory testing — but those signs were dismissed as minor fluctuations. The system also lacked a secondary thermal control mechanism to maintain battery health. Once in space, during its automated self-check, the satellite's power system failed to provide enough energy to start the main control unit. The satellite never turned on.

The consequences weren't just technical. Albedo had already signed three commercial agreements to deliver Earth observation data. One client, a major agri-tech company relying on satellite imagery for crop yield forecasting, canceled its deal and requested a refund. An investor later remarked: "Failure isn't the issue. What's worrying is the lack of engineering judgment and transparency about risks."

The event triggered a full internal review. The next planned satellite was delayed, and Albedo's board began rethinking the balance between in-house design and outsourcing. They also revisited the tension between design flexibility and quality assurance.

The lesson was clear: even if a component has flight heritage, once you modify its logic or operating parameters, it's no longer a mature product. Decisions on key systems like power must be based not only on size, interface, or delivery time — but on a deep understanding of how that system fits into the whole satellite architecture.

As one engineering lead later reflected, "We focused too much on optimizing parts, and underestimated the complexity of the system. That's what caused the mission to fail." In satellite engineering, success doesn't come from assembling good parts — it comes from managing how those parts work together under real conditions. This case reminded the whole industry that good engineering is not about maximizing flexibility, but about minimizing the unknowns.

## When Systems Don't Talk

OrionVision is a small but ambitious space company that builds and operates its own satellites to deliver on-demand radar imagery from space. Unlike Google Earth, which shows satellite pictures that are often months old and only useful for general reference, OrionVision offers something very different: real-time, high-resolution images captured by request, for professional use.

**Tutorial note:** OrionVision is a vertically integrated satellite service provider — it designs, builds, and operates its own satellites, and holds full responsibility for mission execution and outcomes. In contrast, Leothayre, as stated in the pre-seen, transfers ownership and risk to the customer upon delivery of the satellite to the launch site, and does not assume responsibility for in-orbit operations or mission results.



Their clients are not casual users. They are businesses and government agencies that need fresh, reliable, and very precise images for serious decisions. An agriculture company, for example, might ask: "Please take a radar image of this field in central California between 8 AM and 12 PM tomorrow, with 1-meter resolution, and deliver it by 8 PM."

These clients rely on OrionVision to support things like:

- Monitoring crop growth
- Tracking construction progress
- Detecting damage in energy pipelines
- Observing changes along national borders
- Studying economic activity through port and factory traffic

OrionVision's satellites use radar imaging (SAR), which means they can take pictures at night, in the rain, or through clouds—something regular optical satellites can't do.

So what exactly do customers send when they submit a task?

It's not a simple "take a picture here." Each request includes detailed, structured data—such as the target coordinates, desired resolution, time window, image angle, output file format, and delivery deadline. These details directly affect how the satellite must position itself, when it will fly over the area, and how the data will be processed and transmitted.

Behind every image request, there are seven steps that must happen in order: target scheduling, orbit matching, satellite positioning, imaging mode selection, command creation, data link assignment, and downlink bandwidth allocation. Each of these steps is handled by a different team—orbit engineers, satellite controllers, radar specialists, ground station schedulers, software coders, and customer service staff.

The problem? These teams worked in silos:

Each used their own tools, spreadsheets, scripts, and assumptions. Some relied on email to pass tasks, others used manual file editing. There was no central platform tracking the full process, and no system to check if a request was actually executable. So when something failed—say, the satellite couldn't turn fast enough or the command didn't get uploaded—no one knew where the breakdown happened. The system would simply show "Task not completed," and that was it.

To make things worse, OrionVision had no one overseeing the full task flow. There was no task manager to coordinate across teams, no simulations to test the full chain before launch, no real-time feedback to customers. In short: there was no risk ownership at the system level. Each team did their part, but no one made sure the parts worked together. As a result, customers stopped trusting the service. Several contracts were cancelled. A planned funding round was delayed. Only after this breakdown did the company rebuild its system: adding live tracking of task status, automating cross-team coordination, and creating a single point of task responsibility.

To solve these problems:

First, the company must establish a centralized, end-to-end mission management system that actively tracks each task across all departments — from customer submission, through orbit planning, attitude control, radar configuration, command uplink, to data delivery. This system must not just pass information between teams, but enforce synchronization, validate constraints (e.g., pointing limits, bandwidth conflicts), and provide real-time status updates and failure feedback. Without this integration, the process remains fragmented and blind to where and why breakdowns occur.

Second, a dedicated mission coordinator role must be created — someone who is responsible not for executing individual technical tasks, but for owning the entire workflow of a customer request. This person would bridge across teams, resolve scheduling conflicts, monitor resource bottlenecks, and ensure accountability for each mission's success. Without this role, ownership diffuses, and risks go unmanaged across silos.

## Satellites

*A satellite is an object in space that orbits around a larger object. Satellites can be natural, such as the planets in the Solar System orbiting round the Sun, or they can be artificial, such as communication satellites orbiting round the Earth.*

### Orbital Types Comparison:

Feature	LEO (Low Earth Orbit)	MEO (Medium Earth Orbit)	GEO (Geostationary Orbit)
Altitude	300–1,200 km	2,000–35,000 km	~36,000 km
Orbit period	~90 minutes	~4–12 hours	~24 hours
Fixed over Earth point	No	No	Yes
Typical use	Imaging, internet, Earth observation	GPS, navigation, timing	TV, telecom, weather
Active satellites (2025)	~7,000+	~130–150	~550–600
Estimated unit cost	<b>\$0.5M–\$10M</b>	<b>\$10M–\$40M</b>	<b>\$100M–\$300M+</b>

# The Satellite Engineer Who Tried to Sell Secrets

In 2016, Gregory Allen Justice, a satellite systems engineer based in California, was arrested by the FBI for attempting to commit economic espionage. Justice wasn't a known spy or foreign agent; he was an everyday employee working on some of America's most sensitive military satellite technologies, including GPS systems and classified military communications platforms.



Justice was employed by a major aerospace contractor that handled defense contracts, including projects with the U.S. Air Force. His role gave him access to export-controlled data related to secure satellite communications, encryption protocols, and propulsion system design. The technology he had access to was protected under the Arms Export Control Act (AECA), which prohibits sharing U.S. defense-related technology with foreign nationals or governments without authorization.

The case began when Justice reached out—voluntarily—to what he believed were representatives of the Russian government. He claimed he was willing to sell classified satellite data in exchange for cash. But unbeknownst to him, he was in contact with an undercover FBI agent posing as a Russian intelligence officer. Over a series of meetings and communications, Justice handed over sample materials to demonstrate his access and capabilities. These materials included technical drawings and design information about military-grade satellite components, much of which was classified or export-restricted.

What made the case particularly strange—and disturbing—was Justice's stated motivation. He didn't claim ideological opposition to U.S. policies, nor did he appear driven solely by money. During the FBI sting, he told the agent that he needed money to care for his seriously ill wife. However, it later emerged that Justice was also entangled in a bizarre online relationship with a woman he had never met in person. He had reportedly spent tens of thousands of dollars on gifts and financial support for this individual, who may have been manipulating him emotionally. At one point, he expressed his hope to use the proceeds from the espionage to "run away" with her and leave the country.

The FBI arrested Justice before any sensitive material could be transferred to an actual foreign entity. He was charged with attempting to commit economic espionage and violating the AECA, both serious federal crimes. The Department of Justice stated that had his actions been successful, they could have compromised U.S. military capabilities, particularly in the realm of secure global communications and strategic satellite infrastructure.

In his plea agreement, Justice admitted to knowingly attempting to provide national defense information to a foreign government, even though he was ultimately dealing with undercover agents. He was sentenced to five years in federal prison, stripped of his security clearance, and barred from ever working on defense-related projects again.

This case shocked many in the aerospace and defense sectors because it revealed just how vulnerable sensitive space technologies can be—not necessarily from hacking or state-level espionage, but from individuals within the system who may be unstable, emotionally compromised, or ethically weak. Justice wasn't a foreign agent or a career criminal. He was a cleared contractor with top-level access, who became a national security threat almost by accident.

#### **Implications to companies:**

1. Companies must implement insider threat detection programs, beyond background checks. This includes continuous behavioral monitoring, anomaly detection in data access, and confidential employee support systems to mitigate personal stress before it escalates into espionage risk.
2. Companies must ensure strict compliance with export control laws (such as AECA, ITAR, and equivalents in other jurisdictions). Failure to do so — even unintentionally via an employee — can lead to criminal prosecution, license suspension, or disqualification from government contracts.
3. Risk management must include cross-functional coordination between HR, security, and compliance to identify early warning signs, provide support, and act quickly if internal risk escalates.

*There are approximately 10,000 active satellites in orbit around the Earth. That number is expected to grow significantly over the next few years.*

## **Key success factors in this industry – Funding + Business model to turn funding into sales revenue and profits**

Founded in 2012 by entrepreneur Greg Wyler, OneWeb set out to provide worldwide internet coverage through a constellation of low Earth orbit (LEO) satellites. The company garnered significant investments, raising approximately \$3.4 billion from major backers, including SoftBank Group, Virgin Group, and Qualcomm. By March 2020, OneWeb had successfully launched 74 satellites into orbit.

However, despite these achievements, OneWeb faced substantial financial challenges. The estimated cost to complete the satellite network was around \$7.5 billion, leaving a significant funding gap. Efforts to secure additional

financing were underway when the COVID-19 pandemic emerged, leading to economic uncertainties and causing potential investors to withdraw. Consequently, in March 2020, OneWeb filed for Chapter 11 bankruptcy protection in the U.S. Bankruptcy Court for the Southern District of New York.

In a turn of events, a consortium comprising the UK Government and India's Bharti Enterprises invested \$1 billion to acquire OneWeb, facilitating its emergence from bankruptcy by November 2020. This strategic move aimed to position OneWeb as a competitor to other satellite internet providers, such as





SpaceX's Starlink. Post-bankruptcy, OneWeb appointed Neil Masterson, a former co-chief operating officer at Thomson Reuters, as its new CEO, signaling a fresh start for the company.

In the satellite industry, technological achievement alone is not enough to ensure survival—what ultimately determines long-term viability is a company's ability to establish a commercially self-sustaining business model. This means turning high upfront investments into predictable, recurring revenue through reliable customer demand, service delivery, and financial resilience. The collapse of OneWeb in 2020, despite its advanced satellite deployments and strong investor backing, highlighted the critical danger of failing to close the commercial loop—its constellation was only partially operational, and revenue had not yet materialized to offset escalating costs. In this capital-intensive and delay-sensitive sector, business model closure—the ability to generate cash flow that supports operations independent of constant external financing—is not just a growth factor, but a survival threshold.

## Technology Is Not the Most Critical Factor in the Satellite Industry

In today's satellite industry, technology is no longer the main barrier to entry. Thanks to the rise of open-source satellite platforms like CubeSats, and accessible design frameworks such as Open Cosmos, SatNOGS, and the Open Space Toolkit, building and launching a small satellite has become increasingly standardised. Commercial suppliers now offer plug-and-play components — power systems, control modules, antennas — that can be integrated with minimal proprietary engineering. As a result, even small startups and university teams can now construct functional satellites and deploy them into orbit using commercial launch providers like SpaceX or Rocket Lab. The engineering challenge has shifted from raw invention to system integration and risk reduction.

Moreover, technical knowledge in the space sector is no longer scarce or guarded. Much of the know-how — from satellite bus design to ground station protocols — is available through open research, government publications, and global academic collaboration. Skilled engineers can be recruited from top aerospace programs or brought in as consultants.

From the customer's perspective, technology is only valuable if it translates into dependable results. Clients don't evaluate satellite operators based on what chips or protocols they use — they care whether their imaging request is fulfilled on time, whether data quality meets the promised resolution, and whether delivery systems are stable and secure. Whether the satellite runs on a next-generation onboard computer or a proven legacy system is secondary to performance, uptime, and responsiveness. In this sense, customers pay for certainty, not complexity — and operational reliability becomes far more important than technical novelty.

*In the past, satellites were almost exclusively large objects that were launched into geosynchronous Earth orbit (GEO). Geosynchronous satellites remain stationary in relation to the Earth's surface because their orbit takes the same 24 hours as the Earth's rotation. They maintain that position because the forces created by the satellite's velocity and the Earth's gravitational pull are in balance.*

*These satellites maintain their positions for a very long time because there is no atmosphere in space and so there is nothing to change their velocity.*

## The Galaxy 15 "Zombie Satellite" Incident

The Galaxy 15 incident is one of the most bizarre "zombie satellite" cases in space history. Operated by **Intelsat**, this geostationary (GEO) communication satellite lost control in April 2010. Initial investigations suggested that the failure was caused by a solar storm or space radiation damaging its onboard control system. Normally, when a GEO satellite goes out of control, it automatically shuts down its signal transmission to prevent interference with other satellites. **However, Galaxy 15 defied this standard behavior—it continued transmitting signals to Earth, even broadcasting data as if nothing had happened.** It completely ignored all commands from the ground control center, making it an unprecedented anomaly in the satellite industry. Due to this, it quickly earned the title of a "zombie satellite."

**Zombie satellite Galaxy 15 still won't die**  
A wayward satellite that has spent months drifting in orbit has not shut itself down as originally predicted, and continues to pose a signal interference risk for other craft.



After losing control, Galaxy 15 did not remain in its designated geostationary orbit but started drifting toward neighboring satellite slots. Since its communication payload was still active, it posed a major threat to nearby operators. The most affected was SES World Skies, whose AMC-11 satellite was directly in Galaxy 15's path. AMC-11 was responsible for transmitting television signals for major U.S. broadcasters, including HBO and CBS. Intelsat engineers tried every possible solution, including sending remote reboot commands and adjusting ground control algorithms, but Galaxy 15 remained unresponsive. It continued drifting out of control, raising concerns that it could also interfere with military and aviation communication networks. This unprecedented situation alarmed global satellite operators, as frequent occurrences of such incidents could severely undermine the stability of GEO-based communications.

Economically, the incident inflicted significant losses on Intelsat. Galaxy 15, valued at over \$250 million, was originally designed to provide more than 15 years of service. However, after the loss of control, Intelsat had to rearrange its satellite network, incurring additional operational costs and facing a credibility crisis among its clients. Regulatory authorities and governments took notice, emphasizing the need for improved emergency management protocols for GEO satellites. Agencies such as NASA and the U.S. Department of Defense (DoD) became involved in assessing the potential national security risks posed by uncontrolled satellites. This event sparked industry-wide discussions on how to prevent another "zombie satellite" scenario in the future.

Ultimately, after drifting uncontrollably for eight months, Galaxy 15's battery finally depleted, leading to a complete communication blackout. This gave Intelsat the opportunity to regain control, and engineers successfully reestablished a connection, maneuvering the satellite into a "graveyard orbit" to prevent further disruption to operational GEO satellites. However, the incident exposed critical weaknesses in GEO satellite management, prompting



significant industry changes. **Satellite manufacturers began developing more advanced auto-shutdown systems to prevent similar failures, and the concept of "on-orbit servicing" gained traction.** Companies like Northrop Grumman developed the MEV-1 servicing satellite, capable of extending the life and correcting the orbits of GEO satellites. The Galaxy 15 case served as a wake-up call for the space industry, driving advancements in GEO orbit management, emergency response mechanisms, and satellite technology, ensuring a more stable and reliable future for space communications.

## Other ways to prevent such problems

### 1. Protective Design

#### Gallium Nitride (GaN) Semiconductor Devices

Gallium Nitride (GaN) is widely used in satellite high-frequency power amplifiers and control circuits. Compared to traditional silicon-based chips, GaN offers higher radiation resistance and better heat tolerance, reducing the damage caused by cosmic radiation to electronic components. For example, the U.S. Defense Advanced Research Projects Agency (DARPA) has funded the "Radiation-Hardened Electronics Program," which focuses on developing highly reliable satellite control chips based on GaN technology.

#### Multi-layer Kevlar and Polyurethane Shielding

Kevlar, a high-strength, heat-resistant synthetic fiber, has been used in protective layers for the International Space Station (ISS) and certain military satellites to mitigate micrometeoroid impacts and space radiation exposure to electronic equipment. For example, the European Space Agency (ESA) has incorporated multiple layers of polyurethane coating and Kevlar shielding into the external structure of the Sentinel series satellites to reduce electromagnetic radiation exposure to critical electronic systems.

### 2. Improving Satellite Redundancy Systems

#### NASA's Dual Redundancy Control System

NASA employs a "dual flight control system" in its deep-space probes and communication satellites (e.g., the TDRS series), where two independent computing systems act as backups for each other. If the primary control system fails, the backup system automatically takes over. For instance, in 2003, the TDRS-9 satellite experienced a failure in its main processing unit, but the mission continued smoothly by switching to the redundant backup system.

#### ESA's Triple Redundancy System

ESA's Galileo navigation satellite system adopts a "triple redundancy" mechanism, equipping each satellite with three independent atomic clocks (rubidium, hydrogen, and cesium clocks). When the primary system fails, the backup system seamlessly takes over, preventing mission failure. For example, during a clock failure in one of the Galileo navigation satellites in 2017, ESA successfully activated the backup system, allowing the satellite to continue functioning normally.

### 3. Remote Intervention Capabilities

#### NASA's Laser Communication Ground Station

In 2022, NASA tested a new laser communication system (LCRD) capable of establishing more stable data links between deep-space and GEO satellites. Compared to traditional radio signals, laser communication offers higher

bandwidth and is less susceptible to disruptions caused by solar storms, thereby improving remote satellite control capabilities. NASA plans to deploy this technology in future Artemis lunar missions to enhance control precision for lunar orbiting satellites.

#### Boeing's Autonomous Recovery Protocol (ARP)

Boeing has developed an "Autonomous Recovery Protocol" (ARP) for its 702X series GEO communication satellites, allowing ground stations to send recovery commands via multiple backup channels (e.g., Ka-band, S-band). Even if the primary control channel is disrupted or fails, satellites can still receive commands through an alternative link. For example, in 2019, the SES-14 satellite experienced a signal loss during orbital insertion, but Boeing engineers successfully restored satellite control using the ARP mechanism.

### **4. Active Orbit Management**

#### U.S. CSpOC's Space Situational Awareness System

The U.S. Space Operations Command (CSpOC) has developed a "Space Situational Awareness System" that continuously monitors satellites in Low Earth Orbit (LEO), Medium Earth Orbit (MEO), and GEO to predict potential collision risks. In 2021, CSpOC issued a warning about a possible collision between India's GSAT-30 communication satellite and another GEO satellite. This early warning enabled operators to adjust the orbit and prevent an accident.

#### ESA's "E.Deorbit" Active Removal Project

ESA is developing the "E.Deorbit" capture system, which employs a robotic arm or net-equipped orbital cleanup satellite to actively capture defunct or uncontrolled GEO satellites and tow them to graveyard orbits. The system is scheduled for its first deployment before 2030, targeting a defunct European commercial communication satellite for safe relocation to a designated orbit.

### **5. International Satellite Emergency Coordination**

#### ITU's GEO Orbit Interference Management Protocol

The International Telecommunication Union (ITU) oversees global radio spectrum management and has implemented the GEO Orbit Interference Management Protocol (Resolution 186). This protocol requires satellite operators to report incidents of satellite malfunctions or signal interference to ITU and coordinate with other affected nations. For example, in 2019, after India's INSAT-4B satellite experienced abnormal signal interference, ITU facilitated coordination between satellite operators from India, the U.S., and Europe to adjust frequency bands, preventing widespread communication disruptions.

#### United Nations' "Space Sustainability Guidelines (COPUOS)"

The United Nations Office for Outer Space Affairs (UNOOSA) has established international guidelines for space sustainability (COPUOS Guidelines), requiring that newly launched GEO satellites incorporate an "autonomous failure mode." This ensures that if a satellite loses control, it can transition into a "graveyard orbit" or automatically shut down its signals to prevent interference with other satellites. Since 2020, all newly launched GEO satellites from Europe and the U.S. have adhered to these regulations to minimize disruptions to existing orbital operations.

# ONE Tipped Question – From Mock Exam



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## ***Tutorial note:***

The SCS examiner requires students to demonstrate their storytelling techniques in the answer, ie showing the relationship of X-Y-Z technique in the answer. In our answer, we carefully reflect them per the examining team's guidance. The style of the answer would be very similar to what you learnt in MCS exam.

## Tipped Question

### **EXHIBIT: Extract from Board Meeting Minutes – Confidential Client Assignment Discussion**

**Date:** 27 April 2025

**Subject:** Board Discussion – Client Request for Orbital Surveillance Report

The Board received a proposal from Krydonia Earth Systems, a commercial geospatial intelligence provider. Krydonia has requested Leothayre to conduct a satellite-based “risk assessment” of orbital signal interference in a densely populated LEO corridor near the equator.

Krydonia has framed the assignment as a technical analysis of electromagnetic interference patterns, but during the meeting, it was revealed—via a confidential conversation between a Non-Executive Director and Krydonia’s Chair—that the real purpose is to gather evidence against a regional satellite operator, SolaraOne, which Krydonia suspects is operating outside agreed orbital parameters and compromising Krydonia’s satellite uplinks.

Leothayre’s existing 6U CubeSat platform is capable of passive RF monitoring and location triangulation, and Krydonia has offered a premium fee for rapid deployment using Leothayre’s launch brokerage links. Krydonia has asked that Leothayre not disclose the true purpose of the assessment in any documentation.

Some Board members expressed concern that this might be perceived as a covert monitoring operation under the guise of technical consultancy, potentially straining Leothayre’s neutrality within the satellite industry.

No formal decision has been made. The CEO will convene a follow-up meeting tomorrow morning.

#### **Required:**

**(a) Identify and evaluate the implications for the stakeholders of both Leothayre and Krydonia who will be affected if Leothayre accepts this assignment.**

*(60%)*

**(b) Identify and evaluate the ethical implications for Leothayre of accepting this assignment under the pretence of conducting a neutral interference risk assessment, as requested by Krydonia’s Chair.**

*(40%)*

**Exhibit:**

**News Report – “Rogue Satellite Allegations Spark Regional Tensions”**

*Published in OrbitalTech News, 26 April 2025*

Industry analysts are closely watching developments following claims by unnamed sources that a regional LEO operator, SolaraOne, may have breached orbital coordination guidelines. These allegations suggest that SolaraOne’s recent CubeSat deployments may be drifting beyond their registered positions, potentially causing signal interference with nearby assets operated by a “large geospatial data firm.”

While no company has officially filed a complaint, speculation is growing across regional media outlets, with industry blogs citing leaked telemetry snapshots and suggesting that an investigative report is being commissioned. A government official from a neighbouring space agency was quoted anonymously, stating that “uncoordinated orbital shifts can undermine years of trust-building between satellite operators in this region.”

SolaraOne’s leadership has issued a brief statement denying any misconduct and warning that “malicious reporting or competitive surveillance by commercial entities under false pretences may itself breach international orbital agreements.”

The article also notes that a prominent space technology firm based in Wexland is believed to be in discussions with the unnamed geospatial company to assist with technical verification. If confirmed, this would mark the first time a commercial satellite platform has been used in a potential inter-operator dispute, raising concerns about neutrality, licensing, and the blurred lines between consultancy and surveillance.

## **How to approach the above question? – As Ideas rather than Full Answers**

### **(a) Stakeholder Implications if Leothayre Accepts the Krydonia Assignment (60%)**

Krydonia's stakeholders will be directly impacted by Leothayre's decision. The most immediate group affected are Krydonia's shareholders, who are likely to perceive the assignment as a strategic move to protect spectrum access and orbital integrity. If Leothayre's diagnostics validate the interference claims against SolaraOne, this could strengthen Krydonia's competitive position and support legal or regulatory challenges. However, there is significant reputational risk if it becomes known that Krydonia engaged Leothayre under false pretences to carry out what may be perceived as covert orbital surveillance. Regulatory authorities or clients may question Krydonia's transparency, which could damage long-term trust and commercial relationships.

The Board and senior management of Krydonia will face increased scrutiny if the operation is leaked, particularly if regulators perceive the act as industrial espionage rather than technical risk management. The Non-Executive Chair's request to conceal the true purpose raises potential governance and accountability issues, especially if internal stakeholders were misled or if evidence is later challenged on procedural grounds.

### **(b) Ethical Implications of Accepting the Assignment under False Pretence (40%)**

Accepting the assignment under a misrepresented purpose—framing it as a neutral interference assessment while intentionally targeting a competitor—raises several ethical red flags, particularly around integrity, objectivity, and transparency.

Leothayre's consultants would be expected to act in the public interest and maintain trust across industry stakeholders. Misrepresenting the purpose of their actions to third parties, including regulators or other satellite operators, could be seen as a deliberate breach of ethical norms. While the Non-Executive Chair of Krydonia may insist on confidentiality, Leothayre must consider whether compliance with that request would compromise its own professional standards.

From an integrity perspective, conducting work under false pretences could amount to deception, especially if data is gathered with the intent to implicate SolaraOne, not as part of a neutral, multi-party analysis. This could undermine Leothayre's credibility as a provider of objective diagnostics and harm long-term stakeholder trust.

## EXAMPLE RESPONSES

### Part (a) – Stakeholder Implications

#### Good Answer Excerpt:

Leothayre's acceptance of the assignment may satisfy Krydonia's short-term strategic needs but risks undermining industry trust if the assignment's true nature becomes known. Shareholders of both companies could be affected by litigation or reputational damage. Leothayre staff could face ethical discomfort if they feel compelled to disguise their work, which may affect morale and increase whistleblowing risk. Regulators may reassess Leothayre's licensing credibility, especially if perceived as enabling covert surveillance. In the long term, the damage to neutrality could limit Leothayre's access to collaborative partnerships.

#### Poor Answer Excerpt:

If Leothayre does this job, it could make money and help Krydonia. But SolaraOne might be angry. The staff might be confused. It depends what happens. Maybe it will go fine, or maybe people will be upset. Either way, the board needs to think about what could go wrong.

#### Weaknesses:

- Vague stakeholder identification.
- No structured analysis or evaluation.
- No reference to Leothayre's strategic risks or trust-based business model.
- Overly general and speculative.

### Part (b) – Ethical Implications

#### Good Answer Excerpt:

Conducting a disguised surveillance mission breaches principles of integrity and objectivity. Leothayre may mislead affected parties, particularly if telemetry is interpreted to support a client's accusation. Evidence gathered under pretence may be inadmissible or unethical. Consultants risk being drawn into unethical practices and could be professionally compromised. Accepting the assignment would likely violate stakeholder trust and could be seen as complicity in industrial deception. The ethical path may involve refusing the brief or renegotiating terms to ensure transparency.

#### Poor Answer Excerpt:

Leothayre might not want to lie, but the client asked them to. If they do what the client says, it's not really their fault. Ethics can be hard to deal with sometimes. It's probably okay if they don't get caught. Also, the Non-Exec said it was fine.

#### Weaknesses:

- Lacks understanding of core ethical principles.
- Justifies unethical conduct based on authority.
- No mention of transparency, objectivity, or consultant responsibility.
- Poor structure and lack of critical thought.



# Top 4 Likely Scenarios

Accounting  
Practise  
Center



## 1. Mission Failure

There might be a case where a satellite failure stemming from Leothayre's current approach to engineering flexibility — particularly its willingness to accommodate client-specific design requests and adapt off-the-shelf components for bespoke missions. This mirrors the cautionary tale of Albedo Space, whose satellite failed due to a seemingly minor yet unverified modification in a power subsystem sourced from a niche supplier. In Leothayre's case, a similar outcome might arise from a rushed integration of customised modules without sufficient environmental or systems-level testing. The commercial drive to meet aggressive delivery deadlines, combined with distributed supply chain partners, creates the conditions for poor oversight and incomplete validation cycles. A failure of this nature would not merely represent a technical setback — it would expose Leothayre to client liability claims, investor scrutiny, and reputation erosion. The exam might place the candidate in a crisis meeting after a satellite fails shortly after deployment, requiring an analysis of root causes and strategic recommendations on how to balance customisation flexibility with stronger engineering governance, supplier selection protocols, and system-level risk testing.

## **2. Loss of Competitive Position**

Leothayre's strategic positioning as a hardware-first satellite manufacturer, while commercially efficient in the short term, may soon become its greatest vulnerability. As industry expectations shift toward integrated lifecycle services — including launch and early orbit phase (LEOP) support, real-time anomaly detection, and post-deployment diagnostics — Leothayre's limited scope may alienate risk-sensitive or institutional clients. In contrast, competitors like Aerospacelab have moved up the value chain by embedding post-launch telemetry analysis and operational intervention capabilities into their service offerings. The underlying issue is that modern satellite buyers increasingly demand not just a physical satellite, but mission continuity — a full assurance model that supports the critical "early hours" and extends into in-orbit troubleshooting. The exam may present a scenario where Leothayre has lost a key government or defense contract to a competitor offering these bundled services, or where a client suffers in-orbit malfunction and blames Leothayre's lack of support infrastructure. Candidates may be asked to evaluate the strategic risks of this narrow business model and propose a roadmap for service expansion — such as strategic partnerships for LEOP support, internal capability building, or post-launch analytics integration — to safeguard client retention and enhance long-term contract revenue streams.

## **3. Systemic Mission Disruption**

There might be a case where a mission disruption caused not by technical faults, but by organisational failure within Leothayre's internal processes. Drawing inspiration from the OrionVision breakdown, the root of the issue would lie in fragmented workflows, siloed departments, and the absence of a dedicated mission integrator. In such a scenario, a client submits a complex imaging or communication task with time-critical parameters, but the coordination between engineering, scheduling, and launch teams is so decentralised that no single point of accountability exists. When the mission fails — whether due to misconfigured satellite orientation, missed launch window, or incompatible command protocols — no one in the company can trace the root cause efficiently, nor take full responsibility. For Leothayre, this exposes a dangerous governance flaw: it positions itself as a "mission enabler" but lacks the cross-functional command structure to ensure delivery. The exam might simulate a high-profile mission failure just days before a major investor presentation, placing the candidate in the role of recommending organisational reforms. These could include introducing a dedicated mission coordinator role, building a centralised task management system that validates inter-team dependencies, and embedding system-level accountability protocols to ensure that every customer request is executable, traceable, and accountable.

#### **4. Reputational Fallout**

With low Earth orbit (LEO) increasingly congested due to mega-constellations from players like Starlink and OneWeb, regulators are intensifying scrutiny of smallsat providers to prevent collisions, uncontrolled re-entries, and space debris proliferation. Leothayre, which focuses on micro and nano satellites, currently does not offer advanced propulsion systems, automated deorbiting, or collision avoidance features — a weakness that may soon become a strategic liability. A potential exam variant may position the candidate in the aftermath of a near-miss collision involving a Leothayre-built satellite, prompting complaints from international regulatory bodies and key customers. Alternatively, the company may face delayed launch approvals due to non-compliance with ITU or COPUOS sustainability protocols. Candidates could be asked to assess the legal, operational, and brand implications of these events, and recommend mitigation strategies — such as redesigning satellite platforms to include smart propulsion modules, investing in end-of-life automation features, and ensuring international compliance through traceability and licensing audits. This scenario would test the candidate's understanding of not only technical upgrades but also how regulation, investor perception, and operational credibility interact in the emerging rules-based space economy.