



REMOTE TOWERS

**A report for Prospect on the procurement of
a new Air Traffic Management System for
Highlands and Islands Airports.**

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September 2020

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Executive Summary

- Highlands and Islands Airports Limited (HIAL) are planning to radically change their Air Traffic Management System (ATMS), removing Air Traffic Control operations from several airports and centralising them in Inverness. This report was commissioned by the trade union Prospect, which represents the staff who deliver the Air Traffic Control operations at these airports.
- HIAL employed aviation consultants HELIOS to undertake a scoping study that identified several options. They recommended centralisation using remote towers while recognising that this option is *“the most difficult and risky to implement”*. They also identified several constraints on this option, not all of which are under the control of HIAL.
- HIAL decided in principle on centralisation in January 2018 and agreed to a Business Case in December 2019. However, only a heavily redacted version has been published, and no updated version has been released. At this stage, the capital cost of the project had risen from £18m in the HELIOS report to £33.5m. The bottom line through-life costs increase total expenditure from the business as usual option cost of £178m to £251m with the ATMS Improvement plan. The plan recognises a range of risks, although none of the risks is wholly apportioned to the supplier. Other studies argue that the costs of Remote Towers are often underestimated, and the costs of sustaining conventional towers are overestimated.
- The consultants EKOS were commissioned to report on the siting of the Centralised Surveillance Centre (CSC) and the Board approved a building in Inverness. They also commissioned a connectivity review from the consultants Farrpoint. Both of these reports are again heavily redacted.
- The National Audit Office (NAO) remind us that *“IT projects in the public sector have too often been associated with failure”*. These failures have cost an estimated £250m in Scotland alone. The lessons learned from the many procurement failures include sufficient capacity and capability, early stakeholder engagement, over-reliance on suppliers, avoiding optimism bias and cost creep. These are all identifiable concerns in the ATMS programme.
- While there is significant interest worldwide in the use of Remote Towers to deliver air traffic control services, there is limited practical experience using multiple Remote Towers. Those that are planned mostly involve fewer airports than in the ATMS programme. Early adopters of new technology like HIAL, not only face a risk of functionality but also that the technology is quickly updated.
- A range of concerns have been identified with the operation of Remote Towers.
 - The breakdown of data transmission systems with no on-site backup ATC service, procedures, infrastructure or equipment such as radios, signal lamps and controls to operate items like runway lightning and navigation aids.
 - The growing risk of cyber-security. There are around 1,000 cyber-attacks on airports and aviation systems every month.

- Weather assessment and the evaluation of the runway surfaces status. There is no evidence that ATMS will improve flight reliability or ability to land in fog, crosswinds or snow and ice conditions – a vital issue the Highlands and Islands.
 - The need for long-time studies on how human performance is affected in Remote Tower operations.
 - Few air traffic controllers hold ratings for more than one tower, and it is unlikely that these would be exercised in a single shift. HIAL will be unable to confirm how many controllers are required in Inverness until the endorsements of each controller have been established.
- While the ATMS programme has adopted the structures of project governance set out by the Scottish Government, the practice has been less than transparent. There is no published updated Business Case or programme plan. Audit-Scotland has identified user buy-in and commitment to the solution as a critical success factor in IT procurement. In the ATMS programme, staff engagement has been limited, and 92% of ATC staff surveyed by Prospect oppose the plan.
 - The social and economic implications of the ATMS programme are significant, especially for island communities. The programme will take at least £18m of economic benefit from island economies – a proportionate loss to the Glasgow economy would equate to the loss of some 800 jobs. The Procurement (S) Act obliges public bodies to show how their procurement activities improve economic, social and environmental wellbeing. The Scottish Government's Infrastructure Investment Plan has similar objectives.
 - The Islands (S) Act requires public bodies like HIAL to have regard to island communities in the exercise of their functions. When introducing a new or revised policy, strategy or service, they have to prepare an impact assessment. HIAL has only recently appointed consultants to draft such an assessment, a process which should be undertaken before decisions are made. All the island local authorities oppose the ATMS programme saying, *"HIAL are putting their own priorities and dogma way above the needs of their customers and partners. Taxpayers money is being spent on a needless vanity project. It is utterly unacceptable in this day and age for a publicly funded body to behave in this high handed way"*. They have called for a moratorium on the programme. MSPs have articulated similar concerns in a parliamentary debate.
 - HIAL hope to be able to sell the expertise gained in the ATMS programme to other providers. This is a market dominated by a small number of commercial operators who already have business partners better resourced to offer these services.
 - The introduction of surveillance methodologies at all in-scope airports within the ATMS programme has been changed with cost implications. Primary Radar and Secondary Radar feeds will be delivered for each airport, to assist in reducing the risk of airborne conflict. The HELIOS report discounted the provision of surveillance locally at airports because it said the CAA would not approve the use of Radar in the Tower (RiTT). However, RiTT has been approved for use at several airports in the UK. HIAL now plan on using RiTT in a remote tower facility which has never been done in the UK. RiTT is only used elsewhere as an occasional option in very low traffic situations with several caveats. HIAL intend to use RiTT as the normal operation for several airports.

- The ATMS programme was developed before the COVID-19 pandemic, which has had a massive impact on air travel with a 97% reduction in flights and an estimated £20 billion in lost revenue. Industry analysts all agree that a global recovery in air travel will take many years, if at all given behaviour changes. At the very least, such a significant difference in the operating environment needs to be the subject of a full, transparent, programme review.

Introduction

Highlands and Islands Airports Limited (HIAL) are planning to radically change their Air Traffic Management System (ATMS), removing Air Traffic Control operations from several airports and centralising them in Inverness.

HIAL claim this is necessary because of staff recruitment and retention problems, ageing infrastructure, regulatory requirements and the provision of a more cost-effective service.

This report has been commissioned by the trade union Prospect, which represents more than 145,000 members who work as scientists, engineers, tech experts and in other specialist roles. Prospect, representing staff employed on ATMS, question the claimed benefits of centralising this service on several grounds.

The overall aim of this report is to assess this procurement, applying the lessons learned from previous public service procurement exercises. It is not a technical assessment.

It will outline the planned procurement reflecting on developments since the project was approved, including the COVID-19 pandemic. We will describe the experience and lessons learned from major procurement exercises in the public sector, with a particular focus on the challenges of 'cutting edge' technology infrastructure projects.

The report will look at relevant national and international ATMS experience. This will include project governance, procurement costs and the use of internal and external consultants. It will also consider the assessment required by the Islands (Scotland) Act 2018 and the broader economic and social implications - including the scope for expanding the project to achieve economies of scale.

Finally, the report will assess the assumptions in the business plan, including the regulatory requirements, radar provision, physical and data security, the resilience of communications infrastructure, staffing and safety.

HIAL emphasise their transparency and publish a range of documents on their website. However, these do not always include detailed costings, and other parts are redacted. The HIAL board minutes are also routinely heavily redacted.

HIAL 'Remote Towers' Project

Highlands and Islands Airports (HIAL) and ATMS

Highland and Islands Airports Limited (HIAL) is a public corporation wholly owned by the Scottish Ministers. The public corporation operates and manages 11 Airports at Barra, Benbecula, Campbeltown, Dundee, Islay, Inverness, Kirkwall, Stornoway, Sumburgh, Tiree and Wick. HIAL's airports are vital to the social and economic welfare of the areas they serve, but are loss-making, and are supported by subsidies from the Scottish Government.

The HIAL board consists of five non-executive and two executive directors. The Scottish Ministers appoint a non-executive Chair and four non-executive directors. The Managing Director and the Finance Director are the executive directors appointed by the Board. The Board's role is to deliver its functions effectively and efficiently and in accordance with the aims, policies and priorities of the Scottish Ministers.

HIAL has a public service obligation set out in a framework document¹ by Transport Scotland and is treated as Services of a General Economic Interest (SGEI) as defined in the Commission Communication on European Union framework for State Aid. Financial considerations, such as the 'Remote Towers' project, must follow the Appraisal and Evaluation section of the Scottish Public Finance Manual (SPFM) and the Scottish Government's Programme and Project Management (PPM) Principles².

HIAL argues that it must transform its air traffic management system to meet operational needs now and into the future, because:

- The air traffic control industry is experiencing staff retention and recruitment challenges.
- Our air traffic management infrastructure is ageing, and our operating model requires modernisation.
- We need to be trained, equipped and ready to meet changing legislation and regulatory requirements within the aviation industry.
- We must ensure best value and operate in the most efficient but effective way.

The solution is set out in the HIAL ATMS 2030 strategy, which includes by 2025:

- Replacement of standalone Procedural Air Traffic Services with a single Centralised Approach Control (APS);
- Introduction of Remote Tower infrastructure at 7 airports;
- Implementation of a Remote Tower Centre for remote control of the 7 airports (with capacity to include further airports).

¹ <http://www.hial.co.uk/wp-content/uploads/2018/01/HIAL-Framework-Document.pdf>

²

<https://www.webarchive.org.uk/wayback/archive/20170701140555/http://www.gov.scot/Topics/Government/ProgrammeProjectDelivery/Principles>

Scoping study

The aviation consultants HELIOS presented their 'ATM2030 Technical Scoping Study' to the HIAL board on 15 December 2017. The (redacted) report³ and PowerPoint presentation is published on the HIAL website⁴.

HELIOS argued that the current model is not sustainable in the long term for similar reasons as HIAL set out above. However, they recognised several change constraints, including staff attachment to their location, connectivity and regulatory requirements, achieving stakeholder acceptability, and the capacity of a small organisation like HIAL to achieve the scale of change. As we will note later in this report, it is at least questionable if the project has successfully addressed these issues.

They went on to develop four options:

- Implement controlled airspace (CAS) and retain procedural approach (APP) at all HIAL ATC airports (Option 1b).
- Implement approach surveillance control (APS) at all ATC airports, using surveillance other than radar (Option 2b).
- Implement remote centre to provide approach control (APS) to all ATC airports, using surveillance other than radar (Option 2c).
- Implement remote centre for aerodrome (ADI) & approach (APS) control (Option 3).

The relevant costs of the baseline option (1b) were calculated and then compared costs with the other three options. Centralising the service offered some modest operating savings, at the expense of higher capital costs. How these numbers were calculated, or the assumptions behind them have not been published.

HELIOS recommended Option 3, centralisation using remote towers, as the best long-term and sustainable solution. However, the report does make clear that this option is *“the most difficult and risky to implement. Whilst HIAL may not be the first in the world, or even the first in the UK to implement remote towers, HIAL could still be an early mover and the first in the UK to roll it out across a large number of airports. This translates to risk and must be considered carefully.”*

This option required a capital spend of £18m and highlighted several dependencies outwith HIAL's control:

- The UK CAA having the resource to be able to match HIAL's timelines.
- The UK CAA approving the changes to existing regulation (e.g. provision of APS using secondary surveillance only, non-radar).
- Public consultations on airspace changes (without which centralised APS becomes difficult).

³ <http://www.hial.co.uk/wp-content/uploads/2018/01/Air-Traffic-Management-2030-Strategy-Scoping-Study.pdf>

⁴ HIAL ATM 2030 Technical Scoping Study presentation: <https://www.hial.co.uk/hial-group/air-traffic-management-strategy/document-resource-library/>

Like the constraints identified above, we will look at current costings and the dependencies later in this report to see if the project has addressed these.

Business Case

HIAL decided in principle to introduce a remote tower air traffic management system (ATMS) in January 2018. In October 2019, the HIAL Board sought and received funding from the Scottish Government to progress the ATMS programme. It is a Scottish Government requirement that projects like this produce a Business Case, which was approved in December 2019. A redacted version has been published⁵.

The Business Case sets out a refined set of options:

1. Option 1 -To do nothing
2. Option 2 - Provision of Controlled Airspace and Surveillance at each site (minimum effort option). To centralise as originally approved and outlined in the HELIOS report
3. Option 3 – Centralisation without increased efficiency (Approved ATMS Programme)
4. Option 4 – Centralisation with increased efficiency

Of these, Option 1 was considered non-viable as staff resilience issues, and changes in regulation are not addressed. Option 2 would address regulatory change, but would significantly increase staff numbers to manage extra positions. It would intensify business resilience issues and increase costs. Option 3 would address all programme issues, but scope remains for increased efficiencies. Option 4 claims to address all programme issues and delivers an improved and more efficient operation.

The HIAL Board gave the approval to progress with Option 4, which assumes a Centralised Surveillance Centre (CSC) building in Inverness with remote links to seven airports. The HIAL Board has approved the purchase and refit of New Century House in Inverness, although costing of these options has been redacted. There is a location options appraisal report⁶ (with redactions) commissioned from EKOS for the siting of the CSC. The data in this report highlights the staff relocation problems facing the project.

The additional funding required for the favoured option almost doubled the capital cost of the project from £18m in the HELIOS report, to £33.5m. Also, the Business Case identifies £12.5m additional revenue funding from FY20/21 till FY25/26 on top of £2.4m already released in FY19/20.

The redacted Business Case somewhat expands on the case for change and the reasons for selecting the centralisation option. The financial numbers in the body of the Business Case (through-life costs, typically used for option evaluation) use slightly different numbers without setting out how they have been calculated. Capital cost using this method is now estimated at £32.2m, and the revenue cost increases to

⁵ <https://www.hial.co.uk/wp-content/uploads/2020/01/ATMS-Briefing-Pack-Business-Case-December-2019-Redacted-Final-20200121.pdf>

⁶ <https://www.hial.co.uk/wp-content/uploads/2018/11/HIAL-Location-Options-Scoping-Final-Report-October-2018-v2-Redacted-....pdf>.

£13.5m. The financial case for approval settles on £31m capital funding and £12.3m revenue funding for the programme, plus £3m per annum additional revenue funding to operate the new system.

The bottom line through-life costs increase total expenditure from the business as usual option cost of £178m to £251m with the ATMS Improvement plan. The capital cost contingency has been increased from 10% to 25% based on recent experience with capital projects. This reflects how the costs of projects like this can grow, and this is something we will examine later in this report. The revenue costs increase even within this Business Case.

It should be recognised that not adopting ATMS isn't a cost-free option. Building and systems will need normal levels of upgrading with consequential capital and revenue funding requirements. However, the ATMS programme has a planned 15-year equipment lifecycle, so we can reasonably expect 'ATMS 2' to begin work, and start incurring costs, in the not too distant future.

The Business Case also outlines some potential 'opportunities', which are not accounted for in the ATMS programme. These include revisions to the service provided at Benbecula and Wick and reviewing the positioning of Dundee in the ATMS programme. It also claims there will be future income generation opportunities, which include providing air traffic services to non-HIAL airports and selling this expertise to other organisations. Of course, this also highlights the cutting-edge nature of the proposed system and the consequent risks.

The section on people management emphasises the importance of the skilled staff to this programme. There are 86 staff⁷ employed in the seven airports. It also recognises that *"The most significant risk to the programme exists around current staff who may choose not to transition into the CSC. This could result in a significant number of controllers opting not to join the CSC, resulting in an over-reliance on the recruitment of external controllers."*

The budget includes funding for Flexible Early Severance for an estimated (unspecified, although 30% is mentioned in the risk register) number HIAL staff who may choose this option. This is a recognition that many staff will not be prepared to relocate to Inverness. Recent board minutes⁸ indicate that this remains a significant concern. The Business Case sets out a range of conventional HR solutions, including resettlement packages, commuting, training and flexible working patterns. However, the geographical challenges of the relocation envisaged in this scheme are enormous. Experience with other public and private sector reorganisations involving such a significant disruption to staff and importantly their families would suggest that the measures described in the Business Case are likely to fall short of meeting the project aims. The 50% cut in the possibly already optimistic hazards scoring in the risk register for this issue, also appears overconfident.

The rest of the Business Case outlines the general procurement strategy provisions with risk allocation, payment mechanisms and governance arrangements. It assumes

⁷ As of June 2018, of which 54.5 are Air Traffic Controllers with the remainder assistants and trainees

⁸ <https://www.hial.co.uk/wp-content/uploads/2020/06/April-2020-HIAL-Board-Minutes.pdf>

a six-year delivery period and a 15-year equipment lifecycle. None of the risks is wholly apportioned to the supplier. Even factors such as design and construction are to be shared between HIAL and the supplier. This no doubt reduces costs, but it also increases the risks to the public sector.

A report written by the IT advisory services company BPG said the most common mistake was that customers take responsibility for supplier's mistakes – a factor in 98% of cases. *“If the purchaser has paid the supplier for specialist advice, then [the supplier] should take responsibility for making the project work,”* says BPG⁹.

This Business Case is described as the 'redacted' version, and there are some references to this in the document. However, compared with other public sector procurement business cases, this document is exceptionally light on detail. It sets out many of the positives but does not demonstrate consideration of the full range of risks and the relevant costing of those risks. For example, we are only given the 'high-level' risk register. This gives the impression that this version has been prepared mainly for public relations purposes and falls somewhat short of the claimed transparency.

Connectivity review

A vital element of the new ATMS is connectivity between the CSC (or Remote Tower Centre (RTC)) and the 7 HIAL airports covered by the plan. Airport based ATCOs can mitigate multiple failures through local means, such as using a handheld radio in case of the main radio failure, or a signal lamp in case that fails.

HIAL commissioned the consultants FarrPoint to review the connectivity requirements, and they reported¹⁰ in July 2019. Again, only a redacted report has been published.

Farrpoint looked at existing telecom ducts and microwave radio options based on the requirements for resilient and fail-safe links and specified bandwidth to ensure data is sent with minimal delay. The report identifies possible solutions for each airport based on their understanding of available ducting and fibre links. The report makes frequent references to 'they believe', 'assume' ducting is available.

They identified Sumburgh as the most difficult location to provide diverse routing, both from fibre and a radio perspective. Further work is required on the feasibility of radio/fibre combinations.

Due to the remote nature of many of the airport locations, diverse fibre routing is not deemed to be a feasible option due to the cost of installing dedicated second routes. Microwave is therefore recommended as the most cost-effective method for diverse routes at Sumburgh, Kirkwall, Wick, Stornoway and Benbecula.

There are no costings in the published report, and excess construction costs are largely unpredictable without firm quotations. Unpublished approximations have been provided for these, and surveys will need to be carried out by operators, and this could result in significant variation from the estimates given to HIAL. There is also very little

⁹ <https://www.information-age.com/it-procurement-mistakes-blamed-for-project-failures-295936/>

¹⁰ <https://www.hial.co.uk/wp-content/uploads/2020/02/HIA1D1V2.0-Connectivity-Review-July-2019.pdf>

competition for fibre services, as in many cases BT provides the only connectivity option, and is likely to be in a monopoly position in some HIAL locations.

The original HIAL specification was for a minimum backup bandwidth of 5Mbps. However, following a meeting with HIAL on 25/03/19, these have now been revised up to 100Mbps and costs modified (redacted) to reflect this change. While these costs are claimed to be 'relatively insignificant' they cannot have been included in the Business Case. It is not clear why such a low bandwidth was initially specified when the earlier HELIOS report¹¹ says it could vary from 30 to 100Mbps.

The report recommends a trial involving a radio link to Stornoway where there is an existing NATS radar site.

Procurement progress

HIAL has published the pre-tender consultation and contract notice. They have also appointed a new senior post of Chief Operating Officer, whose duties will include ATMS and other large-scale capital projects.

The programme has been revised from the Business Case to introduce remote aviation services at Dundee, Inverness, Kirkwall, Stornoway and Sumburgh. For Benbecula and Wick John O'Groats, they are pursuing a revision in the level of air traffic service to a flight information service.

HIAL has invited tenders to deliver the remote tower technology as part of the next phase of the strategy. Future procurement processes will cover the refurbishment of New Century House as the CSC and the provision of a surveillance solution.

The procurement documentation is published¹² on the Public Contracts Scotland site. The deadline date was 4 June 2020. The latest update refers to a revised procurement timetable being issued to candidates after 23 July 2020.

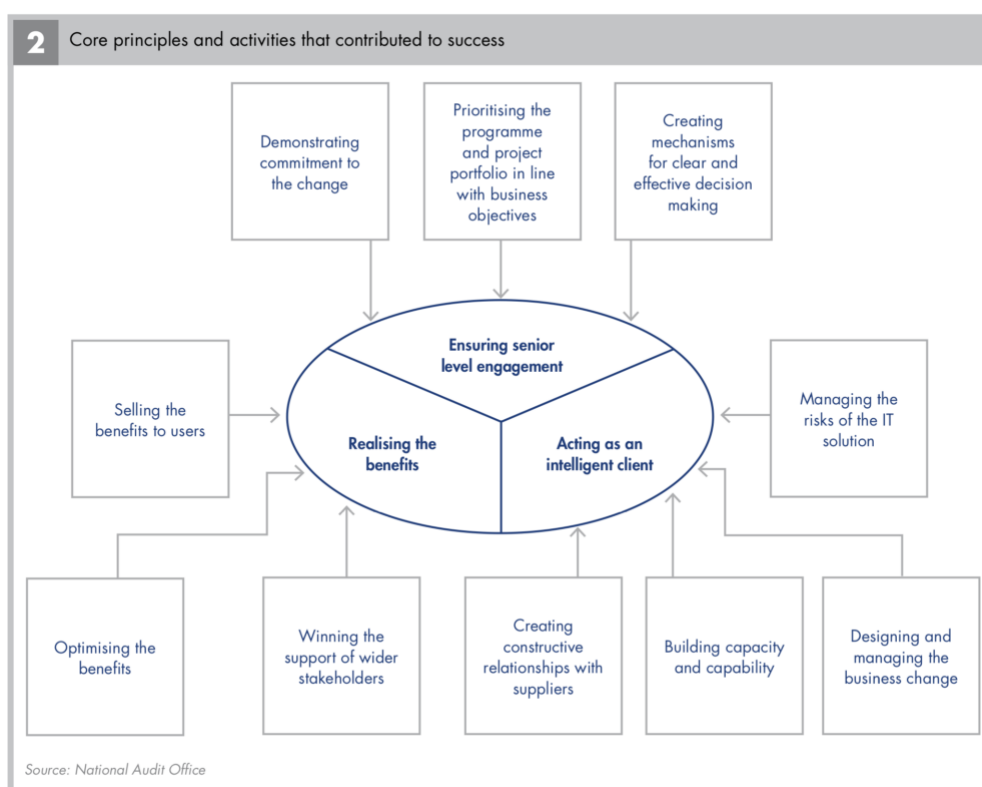
¹¹ <http://www.hial.co.uk/wp-content/uploads/2018/01/Air-Traffic-Management-2030-Strategy-Scoping-Study.pdf>. P55.

¹² https://www.publiccontractsscotland.gov.uk/search/show/search_view.aspx?ID=MAY385925.

Procurement in the public sector – lessons learned

“IT projects in the public sector have too often been associated with failure”. This is the opening line on the National Audit Office (NAO) web page¹³ introducing their report ‘Delivering successful IT-enabled business change’. The Scottish Government also includes an extract from this report in its ‘Lessons Learned’ guidance¹⁴ for programme and project management.

The NAO report seeks to identify the factors that make a successful IT procurement following the many failures examined by the Westminster Committee of Public Accounts and the National Audit Office. The key requirements are set out in this graphic.



The HIAL ATMS project does appear to have taken the process recommendations into account in designing the programme. The areas that need further examination include; winning the support of wider stakeholders, building capacity and capability, and managing the risks of the IT solution.

The examples of successfully delivered IT projects in the NAO report include two Scottish projects. Scottish Water’s customer management programme and City of Edinburgh Council’s ‘Smart City Programme’. Both of these programmes have subsequently not been without their critics, including the staff who use them. However, they mostly used well-established technology to deliver the programme, which limits

¹³ <https://www.nao.org.uk/report/delivering-successful-it-enabled-business-change/>

¹⁴

<https://www.webarchive.org.uk/wayback/archive/20160105005110/http://www.gov.scot/Topics/Government/ProgrammeProjectDelivery/overviewlessonslearned/CausesofFailure>

the risks, albeit with the downside that the product may not meet all service delivery needs.

The NAO report successful case study organisations endeavoured to reduce the risks by relying wherever possible on their existing IT infrastructure, mature technology and off-the-shelf software. Re-using the existing infrastructure means that systems already have skilled support staff and are well understood by the organisation, as well as the more obvious savings through lower procurement costs. This does not mean that these are without risk, particularly where system inter-operability is involved. Novel solutions require extensive support and evaluation of prototype demonstration systems.

Key to the claimed success of the NAO case studies was a recognition of the need to build the capability and capacity to deliver major programmes and projects. This was also identified as a key issue in the ATMS project in the HELIOS scoping study. All the NAO case studies were delivered by large organisations, typically with much greater capacity and capability than HIAL.

To realise the benefits projected in the Business Case of a major IT-enabled change, the report recommends that projects will need to identify the key stakeholder groups at the earliest stage and to engage with them throughout the change to ensure that their needs are addressed, and their support and commitment gained and maintained. The ATMS project has engaged with stakeholders throughout the project. However, it is less clear that they have listened fully to the concerns raised and gained support and commitment.

It is important to recognise that these challenges are not limited to the public sector. The Standish Group research¹⁵ (highlighted by the NAO) showed a staggering 31.1% of projects will be cancelled before they ever get completed. Further results indicate 52.7% of projects will cost 189% of their original estimates. The cost of these failures and overruns are just the tip of the proverbial iceberg when opportunity cost is considered. Even for successful projects, only 16.2% of software projects are completed on-time and on-budget. More positively, they recognised there are fewer failures than five and ten years ago, and that progress has probably been maintained to the present day. Particularly relevant to the ATMS project, in the Standish research, the number one factor in project success/failure was user involvement/lack of user input.

Given the nature of the ATMS project, a relevant comparison might be major procurement projects in the Ministry of Defence, which include communication systems that have been subject to delays. The NAO Major Projects Report¹⁶ gave a progress review of the 16 largest defence projects. There had been a total forecast slippage of 139 months and increased costs of £468 million. This means that, since the projects were approved, costs have increased by £6.6 billion (around 12 per cent more than the planned cost) and the projects have been delayed by 468 months, taking almost a third longer than initially expected.

¹⁵ <https://www.projectsmaart.co.uk/white-papers/chaos-report.pdf>

¹⁶ <https://www.nao.org.uk/wp-content/uploads/2013/03/Major-Projects-full-report-Vol-1.pdf>

In May 2017, Audit Scotland published 'Principles for a digital future: Lessons learned from public sector ICT projects'¹⁷. They recognised that while the digital world has moved on the principles in the NAO reports looked very similar. However, they also identified a factor that was given limited attention in the NAO reports, optimism bias.

“Organisations have a tendency to be over optimistic about timeframes; to overestimate the benefits to be delivered and to underestimate the costs and complexity of implementation.” (Victoria, Australia, Auditor-General 2008)

It is, therefore, necessary to build an appropriate contingency into plans, timescales and costs to compensate for in-built but often unrealistic optimism. This ranges from the very specific requirement to amend costs within the Business Case to build in optimism bias, to the need to continually challenge assumptions and estimates.

“Optimism bias is such a common cause of failure in both public and private projects that it seems quite remarkable that it needs restating. But it does – endlessly.” (Institute for Government 2016)

The Audit Scotland report also identifies some other factors that are relevant to the ATMS project. Most problems with IT procurement occur at the start of the project, which requires significant user engagement and needs to be guided by what the people who will use it want to achieve, rather than by technology. Shiny new technology can often drive a procurement when more straightforward, more cost-effective solutions exist.

Scotland has not been exempt from problematic procurement, even outside the well-documented problems associated with the Private Finance Initiative¹⁸. These are some of the IT procurement failures:

- The Police Scotland i6 programme¹⁹ was a complex and highly ambitious project to develop a national IT system for the new force. Police Scotland and their contractor Accenture incorrectly believed that the majority of the i6 system could be based on an existing Accenture system. As the project developed, it became apparent that Accenture would need to develop significantly more than had been originally anticipated. Despite delays and serious problems throughout the lifetime of the programme, Accenture provided regular assurance, in the face of strong challenge, about their confidence in delivering the i6 system. This assurance proved misplaced, and the £46m project collapsed.
- In 2009, NHS 24 began a programme²⁰ to improve the patient experience by modernising its core telephone and online technology. Following continued delays in implementation, the system had to be withdrawn shortly after launch in 2015 as it did not meet patient safety performance measures. The total cost of the programme had risen by 55 per cent to £117.4 million, compared to a Business Case cost of £75.8 million.

¹⁷ https://www.audit-scotland.gov.uk/uploads/docs/report/2017/briefing_170511_digital_future.pdf

¹⁸ <https://unison-scotland.org.uk/comms/atwhatcostoct07.pdf>

¹⁹ https://www.audit-scotland.gov.uk/uploads/docs/report/2017/nr_170309_i6_review.pdf

²⁰ https://www.audit-scotland.gov.uk/uploads/docs/report/2016/s22_161006_nhs_24.pdf

- A £19m ICT system for Disclosure Scotland was delivered 18 months later than planned.
- The £10m Phoenix case management programme for the Crown Office and Procurator Fiscal Service was terminated due to increased costs and a reduced capital budget.
- A new ICT service provision programme for Registers of Scotland had an estimated closure cost of £66m, which grew to £112m.
- The Scottish Public Service Pensions Agency (SPPA) which runs pensions for half a million public sector workers in Scotland spent £6.3m on an abandoned project to make its processes more efficient. Capita failed to meet milestones for delivery in 2016, the new dates of October 2017 then August 2019 were agreed, but following a third project review in January 2018 the agency ended the project. Caroline Gardner, the auditor general for Scotland, commented²¹ *“we are seeing more instances of bodies embarking on IT projects without the necessary staff and assurance arrangements in place to manage them properly,”*
- The Scottish Parliament Health and Sport Committee²² have found that the "profound failings" of IT systems are the biggest problem facing a medicine-prescribing service that does not sufficiently focus on patients. This followed appointment systems collapsing, which led to a national review of IT systems²³.
- Elements of the Scottish Government's superfast broadband programme are up to two years late, and a voucher scheme has been substituted in some areas. The contract for the North of Scotland, particularly relevant to the ATMS project, has been further delayed while a contract dispute is resolved²⁴.
- Smaller failures include an extra £440,000 for a Scottish Prison Service Procurement System; £120,000 on a Skills Development Scotland online scheme; and £150,000 in staff overtime costs for the chaos surrounding the CAP payments project for Scottish Government staff.

A key point identified by Audit Scotland²⁵ in the programmes they reviewed was that programmes were central to the organisation's activities and therefore failure had wide-ranging consequences outwith the project itself. Other key lessons that may be relevant to the ATMS project included a Business Case of variable quality and the public sector bodies' lack of specialist skills and experience. This contributed to a lack of understanding about the complexity of the programmes and an over-reliance on the supplier for key decisions affecting the design and implementation of the necessary technology.

In November 2017, reviewing Scottish IT procurement failures the Scottish Parliament's Public Audit and Post-Legislative Scrutiny Committee Convener, said²⁶:

²¹ <https://www.audit-scotland.gov.uk/report/scottish-public-pensions-agency-update-on-management-of-ps-pensions-project>

²² <https://www.parliament.scot/parliamentarybusiness/CurrentCommittees/113038.aspx>

²³ <https://www.dailyrecord.co.uk/news/scottish-news/nhs-computer-meltdown-systems-back-2334323>

²⁴ <https://news.gov.scot/speeches-and-briefings/ministerial-statement-enhancing-scotlands-digital-connectivity>

²⁵ https://www.audit-scotland.gov.uk/docs/central/2012/nr_120830_ict_contracts.pdf

²⁶ <https://www.parliament.scot/parliamentarybusiness/CurrentCommittees/106710.aspx>

“The recent string of IT failures clearly demonstrates that there is a significant problem for the Scottish Government and other public bodies to address.”

In June last year, the Scottish Conservatives did an analysis²⁷ of Scottish public sector IT project failure, which claimed they had cost the taxpayer more than £250m in recent years.

We could add a whole string of procurement failures across the UK and internationally, such as HS2, NHS England IT (costing £10bn), rural broadband, police procurement etc. All of which identify similar concerns.

Expensive though this long list of IT procurement failures is, in both financial and operational terms, it does not mean that the public sector should abandon technology-led projects. Technology is essential in improving public services and can often offer a better and more cost-effective service delivery solution. It also has to be recognised that both public and private sector bodies have learned from these IT procurement failures, although as we highlight above, not always.

The same may apply to the HIAL ATMS project. However, these failures do raise several questions about the project, including:

- Are the costings robust enough, with sufficient contingency for ‘scope creep’?
- By opting for innovative and relatively new technology is there a risk of optimism bias. Has the shiny bright technology solution blinded the Board to simpler, more practical solutions?
- Has the procurement process sufficiently listened to the users and other stakeholders?
- Does a small organisation like HIAL have the capacity and capability to manage such a complex procurement?
- Will the project be overly reliant on one or two suppliers with much higher technical expertise? Are those suppliers bearing enough of the risk?

If this was a secondary system procurement, some of these concerns might be less important. However, in this case, the project is central to the organisation's activities and the delivery of an essential service to people across the highlands and islands of Scotland.

²⁷ <http://www.scottishconservatives.com/2019/06/the-250m-cost-of-snps-botched-it-projects/>

Remote Air Traffic Management System experience

The Remote Tower concept is being studied in Europe and countries such as the USA, Australia and Japan.

The ATMS Business Plan states; *“Upon completion of the HIAL Remote Tower operation delivery into the CSC, HIAL will be the only Air Navigation Service Provider (ANSP) in the UK, and one of only three in Europe to possess the skills and experience to deliver these services.”*

This statement highlights the cutting-edge nature of the technology being used in the ATMS project. As we show above, this is a high-risk factor in public and private sector procurement.

The HELIOS study presented a selection of Remote Tower projects in Europe. There are two factors which immediately strike the reader. The first is how few of these projects were operational. This means that there is a minimal experience of this technology being used in practice. Secondly, most of the projects, including those that are operational, involve far fewer airports than those included in the HIAL project. Only two projects are similar to the number of airports covered in the HIAL scheme.

There is a European Union funded, public-private partnership, Remote Tower project called Project PJ05²⁸. The aim is to bring the concept to a ‘higher maturity level’ and provide a harmonised and widely accepted solution. It was launched in November 2016 and sought to *“validate the concept that the provision of air traffic services (ATS) for two or three aerodromes is possible simultaneously.”*

The initial project report was published in November 2019²⁹ and claims that the concept provides a safe Air Traffic Service over the two or three airports tested. It now proposes to continue to the next research and development phase. It should be noted that this project covered fewer airports than in the HIAL project and still has some way to go. So far, so good, but that is not the same as extensive operational experience over many airports covering a large and diverse operational area. After a validation exercise, a Hungarian controller highlighted the need for further research³⁰.

There are a small number of companies who are investing in this technology in the hope of achieving a return on their investment. They also highlight the potential to improve and make use of technologies such as artificial intelligence or advanced camera technologies to continue to enhance situational awareness for controllers. This raises a further procurement issue. Early adopters of new technology, not only face a risk of functionality but also that the technology is quickly updated following the experience of early adopters and the availability of new technologies.

²⁸ <https://www.remote-tower.eu/wp/>

²⁹ https://www.remote-tower.eu/wp/wp-content/uploads/2020/02/D1.2_Final-Project-Report_PJ05_V1.0.pdf

³⁰ <https://www.ainonline.com/aviation-news/business-aviation/2018-05-23/testing-proves-multiple-remote-tower-operations-can-work-europe>

For example, one of the most advanced Remote Towers projects is in northern Norway. Yet the first commercial passenger flight to the Arctic airport of Rost was only last October. At this time the system was still in test mode. They are building the world's largest remote tower centre in Bodø, Norway which is due to open in the second half of 2020 and will accommodate 15 airports by 2022³¹.

The European Cockpit Association (ECA) is the representative body of European pilots at the EU level and includes the pilot union BALPA in the UK. They have a position paper³² on Remote Tower services, which recognises the potential benefits and the need to update regulatory standards and procedures. However, they also have areas of concern that include:

- Contingency measures at conventional towers include the use of handheld transmitters or light-guns, as well as signal rockets. This is different for RTS, where no controller is located at the airport itself. While data transmissions can be backed-up by a second system or other measures, the impact of hardware failures might be fatal for operations.
- Cyber-security has become an increasing source of concern within the aviation community, and remote tower operations have the potential to increase the vulnerabilities of the system, given the very nature of the concept.
- Traffic separation, especially for VFR flights, is usually based on visual observation in conventional towers. Displays at RTS CWP's do not allow for visual evaluation of airborne aircraft positions. This is why the usage of radar data appears to be essential for RTS operation.
- It is air traffic controllers who nowadays often do weather assessment and the evaluation of the runway surfaces status. In the case of RTS operations, these would have to be performed by dedicated staff or adequate systems and sensors. It is also questionable how far weather assessment can be done by RTS controllers when being presented with a compressed or limited view of the airport. There is no evidence that ATMS will improve flight reliability or ability to land in fog, crosswinds or snow and ice conditions – a vital issue the Highlands and Islands.
- The concept of RTS fundamentally changes the working environment of tower controllers, and different procedures and techniques have to be used. This is especially true for Multiple Tower operations. While research has shown that the concept can generally work, not all implications on daily operations are yet fully understood. There are currently no long-time studies on how human performance is affected in Remote Tower operations, and current results indicate that there are certain limitations for humans with regards to working in an RTS environment.
- Nowadays only a few air traffic controllers hold ratings for more than one tower, and it is highly unlikely that these would be exercised in a single shift. In Multiple RTS controllers might be required to work at airports with completely different or very similar layouts and weather patterns. Both can lead to a fragmented situational awareness, causing misunderstandings, mix-ups and other working errors, thus having the potential to decrease the safety of operations significantly. HIAL will be

³¹ <https://airtrafficmanagement.keypublishing.com/2019/10/21/first-passenger-aircraft-lands-using-ninox-remote-tower-tech/>

³² <https://www.eurocockpit.be/positions-publications/remote-tower-services>

unable to confirm how many controllers are required in Inverness until the endorsements of each controller have been established.

There are other pilot concerns, but the above points may be particularly relevant to the HIAL project.

Another concern for airlines is the choice of diversion/alternate airports when flight planning. Given the weather conditions, particularly in Shetland and Orkney, this is a key consideration. If all airports are being controlled from a single centre then that is a potential single fail point which would remove the availability of 5 airports (Wick & Benbecula already being unavailable as no longer ATC airports) so they may have to include an airport not controlled from the centre as a diversion and carry sufficient fuel for that location. In practice that means Aberdeen would have to be the diversion airport for flights to Orkney and Shetland and if the weather forecast at Aberdeen is not suitable (e.g. fog) then it would be Edinburgh, Glasgow or Prestwick.

In the USA, Remote Towers are being promoted by free-market lobbyists on competition and cost grounds. The Reason Foundation published a report³³ in 2017 promoting Remote Towers. Interestingly, similar free-market think tanks in the UK, while sharing the competition ideology, are sceptical about the cost savings claimed for Remote Towers.

In Europe, the Air Traffic Management (ATM) system is fully stretched to its capacity limit, and the creation of a fully-functioning Single European Sky (SES) is still a distant prospect. Last year the European Commission invited a Wise Persons Group to come forward with collective recommendations³⁴ on how to make the European ATM system more efficient, flexible and sustainable in the future. These include short-term measures to alleviate the problems, coupled with longer-term recommendations. It remains to be seen if the COVID-19 measures impact on these recommendations.

There is growing European and worldwide experience in the development of single remote towers. There is significantly less experience of using multiple remote towers. While the technology is being promoted actively, we do not have the years of post-implementation expertise to be confident that large scale investment is justified.

³³ https://reason.org/wp-content/uploads/2017/07/air_traffic_control_remote_towers-1.pdf

³⁴ https://ec.europa.eu/transport/modes/air/news/2019-04-15-recommendations-on-air-traffic-management-in-europe_en

Project Governance

In Scotland, public sector capital investment projects have to follow the Scottish Government's project and programme management principles³⁵, which include several key governance processes. These include internal processes such as reporting arrangements, an updated Business Case and resource plan, as well as clear lines of responsibility and stakeholder engagement. Besides, there are some external checks which provide some independent assurance³⁶ at different stages – the starting gate, gateway review and the key stage review.

For the HIAL ATMS project, there is a project team and regular reports to HIAL Board and the Business Case outlines (11.1) the need to learn lessons from other programmes and submit the project to a formal gate review.

HIAL has stated that they understand the importance of transparency as part of the governance process. They have established a dedicated section on their website for the ATMS programme, which includes key documents, albeit redacted, as we have highlighted above. In a private-sector project, you will usually find a heavy spin as part of the communications strategy. In the public sector, with many more stakeholders and taxpayer's money involved, there is a legitimate expectation of a more balanced approach. For example, the 'interesting articles' includes almost entirely positive views of Remote Towers, and omits more critical studies.

More importantly, despite an assurance that the pages will be updated, there is no updated business plan or detailed programme plan. It is a Scottish Government requirement is that *"The Business Case must be kept up to date, showing approved changes"*. Similarly, it is a requirement the programme plan which *"shows dependencies between projects, it may show project and resource dependencies. At the delivery level it should record the key milestones such as deliverables or decision points"*. Neither have the independent assurance stage reviews been published. It appears from communications to staff that these essential documents exist, they just haven't been shared more widely.

Staff engagement had taken place during the project, although consultation, before the decision was taken, was limited. There is a trade union representative on the ATMS Programme Board and a communications strategy with staff. Given the concerns raised by staff and their trade union from the outset of the project, it is less clear if the HIAL Board has listened to the messages that have come out from the staff engagement process. A Prospect survey of its members who work for HIAL showed that 94 per cent oppose the Remote Towers plan and that 82 per cent would be more likely to leave HIAL if it was implemented. On this basis, HIAL is creating a recruitment crisis instead of solving one. As Audit Scotland puts it; *"This is not just about involving users in testing the proposed solution. It is about getting them involved in designing the whole process from the start. Involving them from the start, and throughout the*

³⁵

<https://www.webarchive.org.uk/wayback/archive/20181225122628/https://www2.gov.scot/Topics/Government/ProgrammeProjectDelivery/Principles>

³⁶

<https://www.webarchive.org.uk/wayback/archive/20150721152834/http://www.gov.scot/Topics/Government/ProgrammeProjectDelivery/IAOverview>

process, will help get their buy-in and commitment to the solution, meaning it is more likely to achieve desired outcomes.”

Staff engagement is also a vital element of the Scottish Government's Fair Work Action Plan³⁷, which expects all public bodies to lead by example.

HIAL has recently (May 2020) appointed³⁸ a Chief Operating Officer who among other duties, will be responsible for managing the ATMS. Having a senior and experienced project manager is an important feature of good project governance. It is perhaps surprising that this appointment did not happen earlier in the project - accepting that a Programme Director was in place from October 2018, again to implement the programme.

The Audit Scotland review³⁹ of lessons learned from IT projects also emphasises the importance of active governance. Having the appropriate skills to act as an intelligent client is one of those. As is honest and accurate project monitoring and appropriate quality assurance processes. For example, in the Audit Scotland review of the Crown Office ICT programme⁴⁰ they found that *“Structured governance framework in place for the programme as a whole but was not always used to support decision-making.”*

Freedom of Information requests have sought additional financial information. However, they have only been partially successful. For example, in a request made on 18 March 2020⁴¹ about ATMS costs, HIAL responded that they do not hold information about the amount of time spent on the project. It did include some details of revenue expenditure between April 2018 and December 2019 totalling nearly £1million. Training costs (£252,186) exceeded salaries (£220,603), although project team staff costs are allocated to capital expenditure (£394,766). Consultancy fees totalled £200,359, and travel costs were an impressive £172,525.

User engagement, other than staff, is also an essential part of project governance. In this case, key stakeholders are the communities the airports serve. As we will see in the next chapter, these communities do not support the ATMS programme.

³⁷ <https://economicactionplan.mygov.scot/fair-work/>

³⁸ <https://www.hial.co.uk/whats-hot/hial-appoints-new-chief-operating-officer/>

³⁹ https://www.audit-scotland.gov.uk/uploads/docs/report/2017/briefing_170511_digital_future.pdf

⁴⁰ https://www.audit-scotland.gov.uk/docs/central/2012/nr_120830_ict_contracts.pdf

⁴¹

https://www.whatdotheyknow.com/request/639346/response/1549984/attach/3/SKM%20C335120031_816580.pdf?cookie_passthrough=1

Social and economic implications

The ATMS programme will have social and economic implications for communities across the region. The primary impact will come from the loss of high-quality jobs from remote communities and centralise the economic benefits in Inverness.

The EKOS location options report⁴² (Oct 2018) gives a high-level appreciation of the economic impact. It focuses on the immediate impact and does not consider broader economic impacts, such as family members in employment or undertaking other economic activity. Also, Comhairle nan Eilean Siar highlights the potential implications for QinetQ's operations on the MOD Hebrides range. The EKOS report concludes; *"The relocation of jobs from some of the more remote and rural locations will likely have a disproportionately negative effect within both the local economy and wider community."*

Table 7.1 of the report identifies a net salary impact of £4.7m. This includes £1m from the Comhairle nan Eilean Siar (Western Isles Council) area, £600,000 from Orkney and £800,000 from Shetland. As the report notes, this is because of the high skill nature of ATCO jobs in comparison to the average labour market wages in these areas.

Table 7.2 looks at the uplift in the economic impact these jobs bring to each location. Unsurprisingly, it is much higher proportionately in more remote locations. This totals £9.3m from the Comhairle nan Eilean Siar (Western Isles Council) area, £4.2m from Orkney and £4.3m from Shetland. To put the job losses into perspective, a proportionately similar loss in the Glasgow economy would equate to the loss of some 800 jobs. In Edinburgh 600 jobs⁴³.

Most of these sites are on island communities, although the £3.8m impact on Wick is also very significant. Island communities are already facing the challenges of depopulation and out-migration of skilled workers, and the ATMS programme will put further stress on the sustainability of local communities. Future population projections suggest that islands are at further risk of depopulation with Orkney and Shetland both projected to lose 2.2 per cent of their population by 2041 and Comhairle nan Eilean Siar 14 per cent.

The Procurement Reform (Scotland) Act 2014 and the new EU Procurement Directives place sustainable and socially responsible purchasing at the heart of the process. For example, the Act introduces a Sustainable Procurement Duty on public bodies to consider how, through their procurement activities, they can improve economic, social and environmental wellbeing. It is unclear how the ATMS project has addressed this duty.

⁴² <https://www.hial.co.uk/wp-content/uploads/2018/11/HIAL-Location-Options-Scoping-Final-Report-October-2018-v2-Redacted-....pdf>

⁴³ <https://www.cne-siar.gov.uk/Media/10432/J%20Item%2010A%20-%20HIAL%20Air%20Traffic%20Management%20Strategy%202030.pdf>

The Scottish Government's Infrastructure Investment Plan⁴⁴ also references the regeneration strategy which sets their continuing vision for Scotland – *"where our most disadvantaged communities are supported and where all places are sustainable and promote wellbeing"*. The plan also says transport investment priorities, *"reflect the geographic dispersal of our population and the importance of transport in supporting our rural and island communities through the stimulation of social and economic growth."*

The Scottish Government has recognised the issues facing island communities. In 2014, it published 'Empowering Scotland's Island Communities' with an update in 2016. This led to the Island's (Scotland) 2018⁴⁵, which introduces measures to support and help meet the unique needs of Scotland's islands now and in the future. It will also seek to help create the right environment for sustainable growth and empowered communities. The consultation responses⁴⁶ (para 3.54) included the suggestion that there should be *"Guidance on relocation of workplaces and offices to allow for consideration of whether they could be carried out in an island location."*

The Act requires the Scottish Government to produce a National Plan for Scotland's Islands, and the first such plan was published⁴⁷ in December 2019. One of the key areas identified by the minister was improving and promoting sustainable economic development. The strategic objectives in the plan include, *"Display leadership in the public sector by demonstrating that jobs and careers can be successful on islands"*. As with all such policies, the public sector must lead by example. Removing ATC jobs from the islands with the consequential loss of nearly £18m of economic activity, and centralising them in Inverness is not compatible with this objective. The plan also states, *"Transport is a key sector where island communities want to have an even greater voice so that they can genuinely inform decisions that will affect them day in day out"*. As island opinion has been ignored on this issue, it does not bode well for implementation.

There have been some limited efforts to relocate public sector jobs from Edinburgh. An Audit Scotland report in 2006⁴⁸ found that 1,653 posts had been transferred from Edinburgh, although most of them were moved to Glasgow. In 2008 the new Scottish Government accepted that the previous policy had not achieved the benefits intended, particularly assisting areas most in economic need. The new policy⁴⁹ included relocation only after a transparent appraisal of options, and it continued the work of the Small Units Initiative which had *"brought high quality jobs to remote and rural areas, where even a small number of posts brings demonstrable benefits to the community"*. Ineffective though government policy may have been, there is no policy intention to reverse the process as planned by HIAL.

The Islands (S) Act requires public bodies like HIAL to have regard to island communities in the exercise of their functions. When introducing a new or revised

⁴⁴ <https://www.gov.scot/publications/infrastructure-investment-plan-2015/pages/4/>

⁴⁵ <https://www.legislation.gov.uk/asp/2018/12/enacted>

⁴⁶ <https://consult.gov.scot/islands-team/islands-bill-consultation/results/j421958.pdf>

⁴⁷ <https://www.gov.scot/publications/national-plan-scotlands-islands/pages/1/>

⁴⁸ https://www.audit-scotland.gov.uk/docs/central/2006/nr_060921_relocation_km.pdf

⁴⁹ <https://www.wired-gov.net/wg/wg-news-1.nsf/0/24E7AB60488E7C82802573DF003E2A1F?OpenDocument>

policy, strategy or service, they have to prepare an impact assessment when the impact on island communities is likely to be significantly different from the effect on other communities. HIAL has recently commissioned consultants (Refecon Consulting) to prepare such an assessment. However, even allowing for the delayed secondary legislation, HIAL has been aware of this duty since the legislation was first muted. This is very late in the project to be conducting an impact assessment.

Given the response from island councils to the ATMS programme, it is perhaps understandable that HIAL has been avoiding this assessment. As one MSP put it during the members' debate in Parliament, *"I feel—as do colleagues on the islands—that the assessment should have been conducted prior to publishing the proposed plans."*

In January 2020, Comhairle nan Eilean Siar hit out⁵⁰ at HIAL's lack of ambition for the Islands displayed in their announcement that plans for the centralisation of Air Traffic Control services are proceeding and that Benbecula Airport is to be downgraded. They have also raised their concerns⁵¹ with the UK minister given the reserved regulatory aspects of the plans. Comhairle Leader Roddie Mackay said: *"This is not an attitude or approach we would expect from a Scottish Government owned company"*. The council argues that the centralisation of services goes against the principles of the Islands Act. They also have safety concerns given weather patterns in the islands. The Transportation convenor concludes; *"HIAL are putting their own priorities and dogma way above the needs of their customers and partners. Taxpayers money is being spent on a needless vanity project. It is utterly unacceptable in this day and age for a publicly funded body to behave in this high handed way."*

In February 2020, all three Island Authorities have called for a moratorium on HIAL's plans to centralise Air Traffic Control services pending an Islands Communities Impact Assessment as legislated for under the Islands Act. They said; *"Centralisation of services and jobs is entirely contrary to what island authorities have been working towards over the past few years in terms of growing Island economies. We believe there are other options which should be more fully explored, such as those that HIAL's own consultants previously highlighted. In the meantime it is imperative that the centralisation process is halted to assess the true impact this will have on our Island communities"*.

These concerns have been raised in the Scottish Parliament. There was a member's debate on 23 January 2020 based on Motion S5M-20382⁵² in the name of Beatrice Wishart MSP. The motion acknowledged the importance of modernisation, *"but believes that this must be balanced with the safety of passengers, the reliability of lifeline services and the need to sustain high-skilled jobs in island communities"*. It also identified a series of concerns about the project and the failure to consult all stakeholders properly.

In the debate, all Highland and Islands MSPs raised concerns about the programme, including the technology and current communication failures, as well as the extreme

⁵⁰ <https://www.cne-siar.gov.uk/news/2020/january/hial-displaying-gross-lack-of-ambition-for-islands/>

⁵¹ <https://www.cne-siar.gov.uk/news/2018/august/comhairle-meets-with-uk-transport-minister/>

⁵² <http://www.parliament.scot/parliamentarybusiness/report.aspx?r=12474&mode=pdf>

changeability of weather in the Highlands. The failure to adequately consult staff and the lack of an impact assessment was also raised.

A Petition (PE1804⁵³) on behalf of Benbecula Community Council has also been lodged in Parliament. It *“Calls on the Scottish Parliament to urge the Scottish Government to halt Highlands & Islands Airports Ltd's Air Traffic Management Strategy Project to conduct an independent assessment of the decisions and decision-making process of the ATMS project.”*

The above shows that the ATMS programme will have serious social and economic implications for the island authorities. The proposals have very little support in the region and are vigorously opposed by all three island authorities and most MSPs. It is also incompatible with several Scottish Government strategic plans. In particular, it falls considerably short of the policy intent and practice required by the Islands (S) Act.

⁵³ <https://www.parliament.scot/GettingInvolved/Petitions/airservices>

Future developments

While not an essential element of the ATMS programme, one of the claimed benefits of adopting such advanced technology is the ability to sell on the expertise to other providers. As the Business Case (p18) puts it:

“Upon completion of the HIAL Remote Tower operation delivery into the CSC, HIAL will be the only Air Navigation Service Provider (ANSP) in the UK, and one of only three in Europe to possess the skills and experience to deliver these services. As such, an opportunity exists to provide a comprehensive service to other ANSPs who intend to set up a remote tower centre.”

This does, of course, emphasise the risks in procuring advanced technology ahead of others as set out above. It also raises the question of how well a relatively small public corporation is placed to enter into such a commercial market.

There is a limited precedent in another public corporation with Scottish Water’s subsidiary, Scottish Water Horizons⁵⁴. Among other functions, they seek to sell their experience of service improvement using their public sector model of delivering water and wastewater services. They have won a few international contracts in Malawi, Ireland, Australia, Canada. It is unclear from the Scottish Water Annual Report how much net revenue these operations bring in. Still, it involves a small number of staff and is not significant enough to justify a line on the group annual accounts. Also, Scottish Water is offering well-established expertise, developed over many years. It is not attempting to sell cutting edge technology solutions.

This is also a sector with established commercial operators. Unlike Scottish Water, it is not clear what HIAL brings in terms of a unique selling point. For example, the commercial operator Frequentis already has partners to create a joint venture, Frequentis DFS Aerosense, and sees itself as offering the expertise and remote tower services to other airports⁵⁵.

Another commercial operator Saab Digital Air Traffic Solutions (SDATS) has signed a 20-year framework agreement with Air Traffic Control the Netherlands (LVNL) for remote tower systems⁵⁶.

The Kongsberg Remote Towers solution used in Norway for Avinor Air Navigation Services has been selling its expertise to Australia⁵⁷.

The competition is not limited to overseas providers. NATS the largest UK-based air traffic services provider has signed an agreement with its Hungarian counterpart HungaroControl to collaborate on digital tower projects around the world. Their sales pitch is, *“Between NATS, HungaroControl and Searidge Technologies, I believe we*

⁵⁴ <https://www.scottishwater.co.uk/about-us/scottish-water-horizons/international-activities>

⁵⁵ <http://www.airport-business.com/2019/06/next-decade-will-see-remote-digital-towers-airports-just-different-use-cases/>

⁵⁶ <https://airtrafficmanagement.keypublishing.com/2019/12/11/saabs-sdats-wins-three-dutch-digital-tower-orders/>

⁵⁷ <https://airtrafficmanagement.keypublishing.com/2019/12/10/kongsberg-demonstrates-remote-tower-capabilities-in-australia/>

can offer airports around the world unrivalled expertise in the development, transition and deployment of digital towers, from safety assurance and training right through to certification and live operational experience⁵⁸.”

Given the public subsidy HIAL receives, such services may also result in a challenge under State Aid rules, depending on the outcome of EU and other trade negotiations.

In summary, there are better placed, larger, funded, and well-established commercial players in this market. Add to this the likely drop in investment due to the COVID_19 pandemic. In this context, the idea that HIAL is expected to generate significant revenues from this market appears to be very optimistic.

⁵⁸ <https://www.nats.aero/news/nats-signs-digital-tower-cooperation-agreement-hungarocontrol/>

Business Case assumptions

We have covered a number of the Business Case assumptions above, particularly those based on public sector IT procurement experience, future developments and the social and economic implications. However, there are other issues in the Business Case that need to be addressed.

Regulatory issues

The Business Case risk register⁵⁹ highlighted regulatory risks as the highest level risk for the programme. In particular, that regulation may not keep pace with the advanced technology being proposed for the ATMS programme.

The Civil Aviation Authority (CAA) published new guidance in July 2019⁶⁰ for the approval of remote aerodrome air traffic services. They recognise these developments and expects to be involved in the implementation of projects from an early stage, working collaboratively with the affected Air Navigation Service Provider (ANSP) and aerodrome operator/s to determine how the approval process affects their proposal. They set out a range of requirements which reflect many of the concerns set out by the ECA and others (see above), including data transmission, cybersecurity, and human factors.

The regulatory framework means that Remote Towers do not necessarily achieve the claimed efficiencies. For example, Air Traffic Controllers cannot operate three or more units or operate two (or more) units simultaneously. There are human safety factors such as eye fatigue due to digital representation of information and bright lights instead of an out-of-window-view. Irregular air traffic in many airports also makes it difficult to plan in advance. It, therefore, increases the risk of simultaneous movements in multiple airspaces and consequentially restricts the possibility to pool controller positions at multiple airports.

In practice, airport opening hours in HIAL are largely driven by the requirements of the airlines, primarily Loganair. Inverness currently has a night shift and night work is covered by on-call arrangements elsewhere. The new centre will require an expanded night shift with the associated costs. Controllers on this shift will need to be qualified to cover multiple airports.

The scoping study identified that EU regulations may require HIAL to introduce controlled airspace at all airports. Even outside the EU, international rules are similar. This issue has yet to be resolved and is likely to have further implications for ATMS.

One change from the original plan relates to the re-classification of airspace. The introduction of surveillance methodologies at all in-scope airports within the ATMS programme has been changed. Primary Radar (PSR) and Secondary Radar (SSR or MLAT) feeds will be delivered for each airport, to assist in reducing the risk of airborne conflict and, thereby, increase safety. It is unclear what the cost implications of this change will be. However, this was identified by HELIOS as cost-prohibitive for the

⁵⁹ (page 31 – ATMS Flag 006.)

⁶⁰ <http://publicapps.caa.co.uk/docs/33/RemoteTowersPolicyStatementV2.pdf>

project and maybe a factor in downgrading Benbecula and Wick to reduce costs. However, there may be implications for these smaller airports given the defence contractor's requirements and the spaceport bids⁶¹.

The HELIOS report discounted the provision of surveillance locally at airports because it said the CAA would not approve the use of Radar in the Tower (RiTT). However, RiTT has been approved for use at several airports in the UK. HIAL now plan on using RiTT in a remote tower facility which has never been done in the UK. RiTT is only used elsewhere as an occasional option in very low traffic situations with several caveats. HIAL intend to use RiTT as the normal operation for several airports.

Costs

HIAL make a point of emphasising that revenue cost savings are not a driver of this project. Given the increase in revenue costs set out above, this is probably the case, even before the capital cost is factored in. However, one of the worldwide drivers for Remote Towers is to achieve cost savings. For example, in Sweden, the projects aim to make 10% savings.

Those promoting increased competition in the ATM sector, such as the ATM Policy Institute argue that savings might not be realised. They commissioned a report⁶² from Copenhagen Economics, which argues that the business case is exaggerated because the costs of Remote Towers are underestimated and comparable investments in conventional towers may be overestimated. This makes Remote Towers seem more cost-efficient. They give examples of both these factors in the USA and Sweden. This should at least cause us to question the costs of conventional towers in any procurement.

As we show in procurement experience, the costs of IT procurement rarely keep to budget. The HIAL project may avoid this given the contingencies already built in. However, those contingencies add to the overall costs of the programme.

Cyber Security

As we highlighted under procurement experience, cyber-security has become an increasing source of concern within the aviation community and remote tower operations have the potential to increase the vulnerabilities of the system. Cybersecurity is a concern shared across the public and private sector, particularly where IT is a core element of delivery systems, and safety is a key issue. HIAL is not exempt from these risks and had a recent cybersecurity issue⁶³ during the pandemic lockdown. Even the companies promoting Remote Towers accept the solutions of the future need to be based on resilient, cloud-based architectures, protecting against cyber threats.

⁶¹ <https://www.bbc.co.uk/news/uk-scotland-highlands-islands-48593633>

⁶² <https://www.atmpolicy.aero/wp-content/uploads/2019/04/reducing-costs-of-air-traffic-control.pdf>

⁶³ <https://www.hial.co.uk/wp-content/uploads/2020/06/April-2020-HIAL-Board-Minutes.pdf>

A report from PA Consulting, 'Overcome the Silent Threat'⁶⁴, suggests that there are currently around 1,000 cyber-attacks each month on airport and aviation systems worldwide according to the European Aviation Safety Agency statistics. Their research also indicates that airports are at a higher risk of cyber-attack due to increasing use of technologies and digital infrastructure in day to day operations, new data-sharing obligations and greater connectivity across staff and passenger devices within airports.

Examples of cyber attacks on airports include Bristol Airport in September 2018⁶⁵, which resulted in flight information display screens being offline for two days. Warsaw Airport in June 2015 saw an attack on LOT's Flight Planning System, which left 1,400 passengers stranded for over five hours.

The Copenhagen Economics report (see above) also suggests that the risks of cyber and physical attacks on centralised remote towers are downplayed in reports on Remote Towers. They highlight the additional costs of fully functioning conventional backup systems. This is why Remote Towers have the additional cost of a backup tower, physically separated wherever possible. However, in other public sector IT failures or cyber-attacks there have at least been physical backup arrangements. Even if, as in the case of NHS24⁶⁶, it is only a pen and paper. With all ATC staff based in Inverness that is not an option with the ATMS programme.

Staffing

A crucial part of the HIAL case for this project has been their concern over the recruitment of Air Traffic Control Operators. This appears to be less of a problem in the current operating environment. The professional body for air traffic controllers, GATCO has said, "*There is currently a surplus of air traffic controllers to cope with the very limited demand and it is not clear how demand for air travel will recover*"⁶⁷.

The HIAL board recently noted '*good quality applications received*'. However, there is an evident reluctance of experienced and qualified staff on island locations to relocate to Inverness (as the prospect survey shows above). The HIAL Board recently asked the "*ATMS Team to look at what more they can do to encourage more staff on island locations to relocate to the centre.*"⁶⁸

COVID-19 Pandemic

The Business Case was written before the COVID-19 pandemic and is an excellent example of why the Business Case needs to be regularly updated. The opening pitch in the Business Case highlights growing air travel and the unprecedented demand for air traffic controllers.

⁶⁴ https://www2.paconsulting.com/airport-cyber-security.html?_ga=2.116035014.1307577290.1526286674-258725269.1525775910

⁶⁵ <https://www.bbc.co.uk/news/uk-england-bristol-45539841>

⁶⁶ <https://www.bbc.co.uk/news/uk-scotland-34668168>

⁶⁷ <https://www.innovationnewsnetwork.com/the-impact-of-covid-19-on-air-traffic-management/5960/>

⁶⁸ HIAL board minutes April 2020: <https://www.hial.co.uk/wp-content/uploads/2020/06/April-2020-HIAL-Board-Minutes.pdf>

In evidence to the Westminster Transport Committee⁶⁹ International Air Transport Association (IATA) has pointed to a 97% reduction in passenger flights compared to the previous year with estimates that the industry in the UK could lose over £20 billion in revenue in 2020. Globally that figure could be as high as \$314 billion⁷⁰. The Eurocontrol videos give a vivid air traffic control perspective of the changes in the UK⁷¹.

The IATA predictions are that global recovery will take several years, and many UK airlines believe their recovery will be slower than some global markets. As a result, UK and other airlines are proposing long-term reductions in operations and others have gone into administration or liquidation⁷². While the companies promoting Remote Towers see this as an opportunity to expand⁷³, others argue that the economic situation with lower revenues due to a slow recovery of traffic volumes will act as a dampener on investment.

The risks of air travel on the geographic spread of viruses are not new. Academic studies⁷⁴ have been highlighting this for some time. However, in light of COVID-19, there is likely to be a long-term reassessment, even after a vaccine and other measures hopefully address the current crisis. In particular, analysts are suggesting that business travel will be slashed as companies continue to make much greater use of video conferencing. For example, the mining group Rio Tinto has said its spending on long-haul could fall by as much as 75 per cent over six months⁷⁵.

Other regulatory decisions have been postponed until the impact of the pandemic is clearer. For example, The Competition and Markets Authority (CMA) investigation into price control of air traffic services over the Atlantic has effectively been frozen until the end of 2022 because the long-term effects of the pandemic remain unknown⁷⁶.

At the very least, such a significant change in the operating environment needs to be the subject of a full, transparent, programme review. Prospect has also advised the Board (23 March 2020) they have requested that the ATMS Programme be suspended during the crisis.

⁶⁹ <https://publications.parliament.uk/pa/cm5801/cmselect/cmtrans/268/26807.htm#footnote-150>

⁷⁰ <https://www.statista.com/topics/6178/coronavirus-impact-on-the-aviation-industry-worldwide/>

⁷¹ <https://www.youtube.com/embed/KdWB9jI8qXo?autoplay=1>

⁷² https://en.wikipedia.org/wiki/Impact_of_the_COVID-19_pandemic_on_airlines

⁷³ <https://airtrafficmanagement.keypublishing.com/2020/05/26/covid-19-compels-aviation-industry-to-speed-up-the-modernisation-of-the-atm-system/>

⁷⁴ <https://link.springer.com/content/pdf/10.1023/A:1026140019146.pdf>

⁷⁵ <https://www.ft.com/content/abc6355a-3801-4e32-a992-f55e475d4454>

⁷⁶ <https://www.gov.uk/government/news/cma-final-decision-on-air-traffic-control-charges>

Conclusion

The HIAL ATMS programme is by any standards a high-risk procurement. Lessons learned from other IT procurement highlights the risks of being an early adopter of new technology. In this case, the risks are not just financial; they are fundamental to the operation of airport services to the Highlands and Islands.

Remote Towers are not as yet proven technology in a setting as challenging as the Highlands and Islands of Scotland. Weather assessment, data transmission, and cyber-security are vital concerns that need long-term evaluation. These and other concerns have not been adequately addressed in project governance. As a consequence, the programme has failed to gain the support of staff or the communities HIAL exists to serve.

Also, the COVID-19 pandemic and other regulatory factors constitute a significant change in the operating environment on which the original Business Case was based. In these circumstances, the sensible approach would be to place a moratorium on the programme until a full, transparent programme review is undertaken.