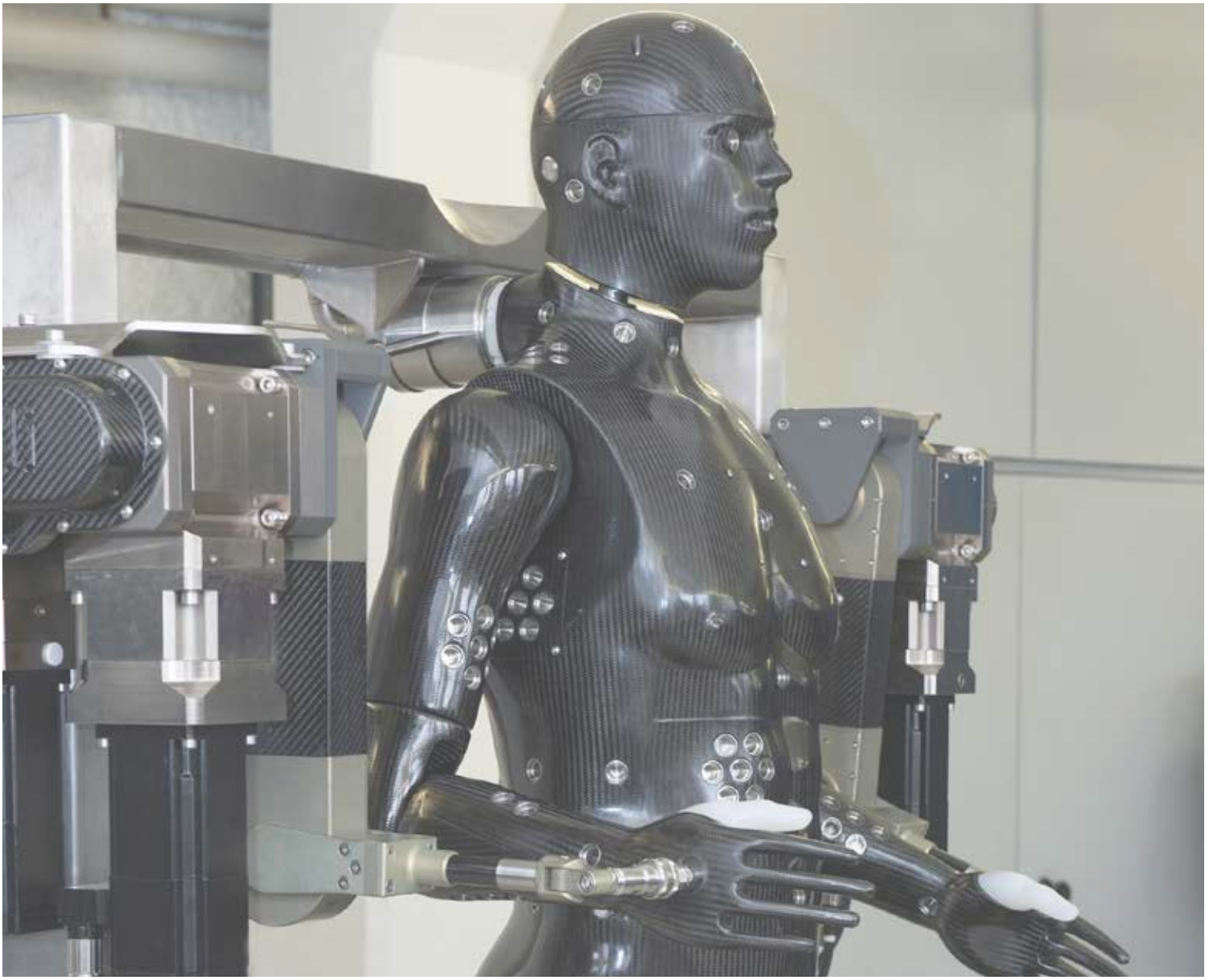
SSRO

Single Source
Regulations Office

DefCARS Future Technology Strategy

October 2021



Introduction

1. DefCARS Future

1.1 This document sets out a roadmap for the future development of the technology that underpins the Defence Contract Analysis and Reporting System (DefCARS). It explains how we will develop the capabilities in DefCARS that enable the system to support the regulatory framework for single source defence contracts, meeting stakeholder needs and addressing the strategic objectives set out in the SSRO's corporate plan and data strategy.

1.2 The document is structured as follows:

Introduction	An explanation of the role of the SSRO, the statutory reports, DefCARS services and the SSRO's data strategy.	Sections 1-5
Vision	The purpose of DefCARS, our vision for the system and what good looks like.	Section 6
Current state	An outline of the current system and a gap analysis taking into account stakeholder feedback.	Sections 7-8
Technology strategy	The SSRO's IT principles, strategic technology objectives and proposed architecture.	Sections 9-12
Delivery	Our priorities for delivering DefCARS Future.	Section 13

2. The SSRO

2.1 The Single Source Regulations Office (SSRO) is an executive non-departmental public body, sponsored by the Ministry of Defence (MOD). We were established by the Defence Reform Act 2014, which also created a regulatory framework for single source defence contracts, placing controls on the pricing of qualifying contracts and requiring greater transparency on the part of defence contractors.

2.2 We provide independent, expert leadership on the regulation of single source contracts and carry out a range of statutory functions in support of the regulatory framework. When exercising our functions, we aim to ensure that good value for money is obtained in government expenditure on qualifying defence contracts, and that persons who are parties to qualifying defence contracts are paid a fair and reasonable price under those contracts.

3. Reporting on qualifying contracts

3.1 Defence contractors are required to provide reports (Figure 1) to the SSRO and the MOD if they hold qualifying contracts under the regulatory framework. The Single Source Contract Regulations 2014 prescribe the types of reports, their contents and the circumstances in which they must be provided.

Figure 1: Reports required under the regulatory framework*

Report category	Reports
Contract reports (Part 5 of the Regulations) Reports required for each QDC and QSC (some of which may additionally be required on-demand). Data about contract requirements, payments, estimated and actual costs, profit, delivery and sub-contracts.	Contract Pricing Statement Contract Reporting Plan Contract Notification Report → Interim Contract Reports Quarterly Contract Reports → Contract Completion Report Contract Cost Statement
Supplier reports (Part 6 of the Regulations) Reports required about defence contractors when relevant triggers are met. Data about a contractor's overhead costs in standard categories, its strategic capacity and opportunities for SMEs in the supply chain.	**Overhead reports** Estimated Rates Agreement Pricing Statement Estimated Rates Claim Report Actual Rates Claim Report QBU Estimated Cost Analysis Report QBU Actual Cost Analysis Report Rates Comparison Report (on demand) **Strategic reports** Strategic Industry Capacity Report Small or Medium Enterprises Report

*In this table, and in the Regulations, "QBU" refers to a qualifying business unit.

3.2 The reported data provides a significant, growing resource. As at 31 March 2021, defence contractors had submitted 2,314 contract reports and 686 supplier reports.

3.3 The data may be used to help ensure the government obtains good value for money from its expenditure on qualifying defence contracts and that contractors are paid fair and reasonable prices. The SSRO's data strategy sets out the SSRO's approach to reported data and how we intend to work with stakeholders to deliver our associated functions.

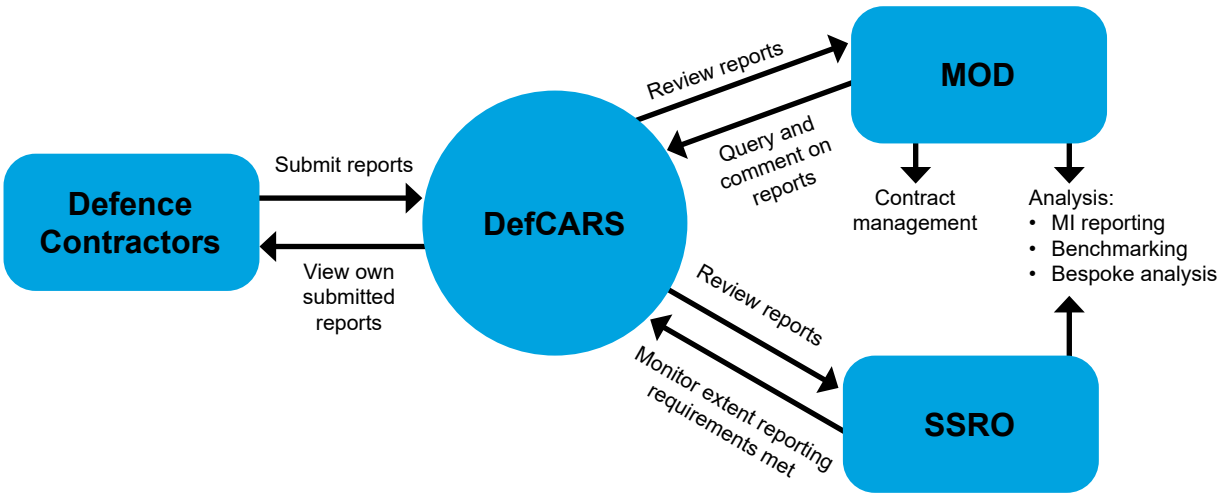
4. The Defence Contract Analysis and Reporting System (DefCARS)

4.1 Contractors are required to submit reports electronically to the MOD and the SSRO, except for the Strategic Industry Capacity Report. We have established DefCARS to receive the reports on behalf of both the MOD and the SSRO. For each report, contractors make a single submission into the system, which both the MOD and the SSRO can access.

4.2 To support the regulatory framework the SSRO has sought, through DefCARS, to facilitate reporting, improve data quality and promote use of reported data (Figure 2). We have established DefCARS as a secure, online system that is easy to use and which:

- Enables contractors to submit statutory reports and access their data.
- Facilitates monitoring of compliance with reporting requirements by the SSRO, and enables MOD to query and comment on reports.
- Holds reported data and makes it accessible, for example to support contract management.
- Produces reports and supports analysis of reported data in aid of better defence procurement.

Figure 2: DefCARS is the central system for the capture, storage and analysis of all data submitted in accordance with statutory reporting requirements



5. SSRO data strategy

5.1 The SSRO's data strategy for information provided in statutory reports under the Defence Reform Act 2014 explains that data is at the core of the SSRO and the single source regulatory framework. All public bodies, including the SSRO, are embracing digital techniques to drive efficiency and improve insight. DefCARS holds a wealth of valuable data for the MOD and its contractors as well as the SSRO. Potential uses of the data include to support procurement decisions, to support contract management, and the development of the regulatory framework.

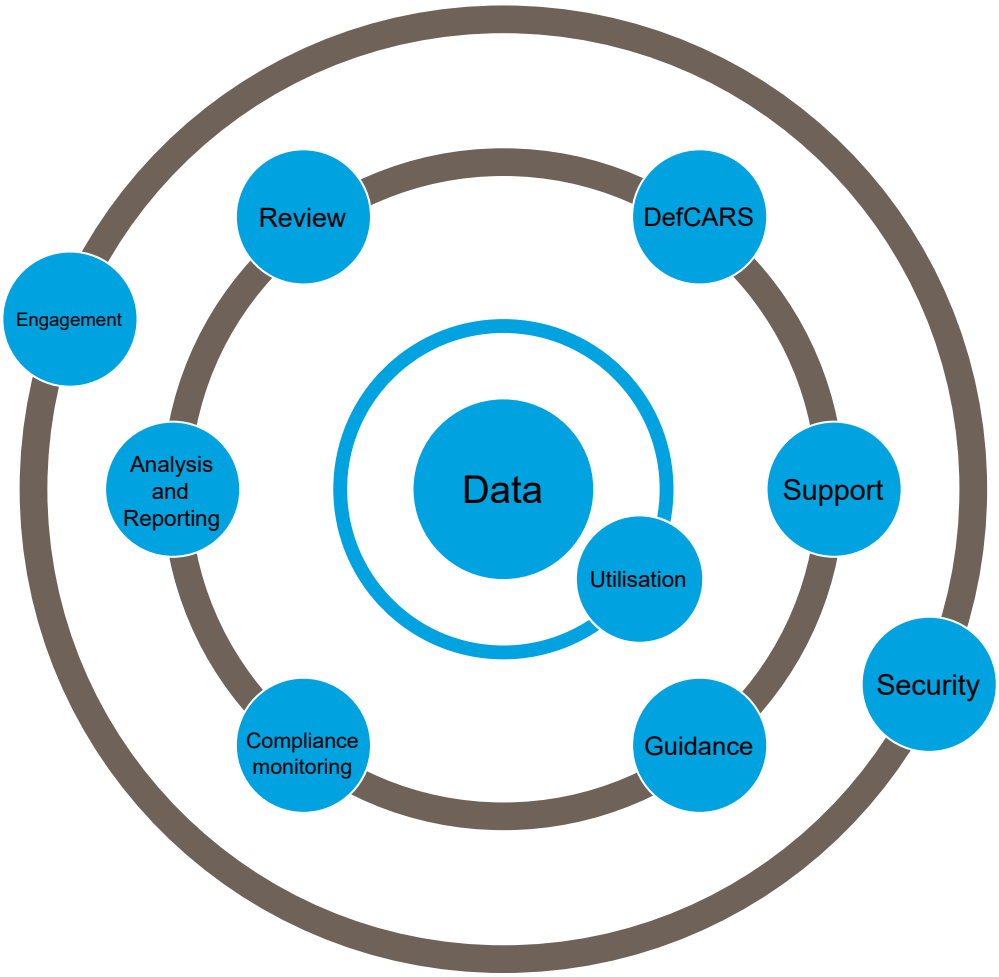
5.2 The capture and analysis of key datapoints will ultimately help the MOD drive best value from its single-source procurement activities, which include multi-billion-pound programmes. The transparency and insight that will flow from DefCARS will continue to improve as more, higher quality, data is collected and analysed, strengthening the SSRO ability to deliver its statutory functions.

5.3 In our data strategy we set out our vision that "the data submitted by contractors in statutory reports is fully utilised in procurement decisions, contract management and the development of the regulatory framework to deliver value for money and fair and reasonable prices".

5.4 To achieve the vision, reported data must be relevant, comparable and reliable. References in the strategy to good quality data are to data that satisfy these requirements. Data collection must also be efficient, the data must be accessible for those who have a legitimate right to do so and data will be held securely.

5.5 Our data strategy sets out the components of the data strategy. We will deliver the SSRO vision for data that is utilised across the eight components of our work (Figure 3).

Figure 3: Components of the data strategy



5.6 Our Corporate Plan 2021-24 explains that we collect data on qualifying contracts and suppliers which provides a valuable, growing evidence-base to inform value for money and fair and reasonable prices. We provide support and guidance to contractors to help them use DefCARS and understand their reporting obligations. We review report submissions and promote the provision of quality data, and we carry out analysis.

Our vision for DefCARS

6. Vision

6.1 The purpose of DefCARS is to enable contractors to meet reporting requirements by submitting statutory reports electronically to the SSRO and the MOD. Associated with the main purpose, DefCARS provides additional functionality to enable the following:

- Compliance reviews.
- Analysis of the reports in response to requests by the Secretary of State.
- Use of reported data in line with the statutory intent.

Our vision is that DefCARS will:

- continue to be the primary tool for securely capturing, storing and facilitating the use of the information submitted in statutory reports;
- efficiently and flexibly capture data and provide value for money; and
- be easy to use, engaging to users, and encourage use of data in line with the SSRO's data strategy.

6.2 Achieving the vision will require that DefCARS satisfies the requirements set out in Table 1. Delivering these capabilities will require designing and optimising each element of the system to make best use of available technology at an affordable cost.

Table 1: DefCARS Future vision: what good looks like

Easy to use	The system is intuitive, easy to use and enhances the user experience.
Flexible	It is simple and cost-effective to modify the system in line with user needs and changing reporting requirements.
Efficient capture	The system supports compliance with reporting requirements, facilitating data upload and the submission of good quality data.
Value for money	The costs of reporting, compliance and day to day running are minimised, and the value from utilising the data is understood.
Engaging	The system supports use of the data by providing appropriate access and tools to analysts and useful information to decision makers. There is high demand for the system from MOD users.
Secure	The system maintains appropriate security over submitted data and has the confidence of all users.

6.3 By delivering the vision we will provide a system that better meets the needs of users. It will also be a system capable of keeping pace with changing regulatory requirements and user needs. When the MOD identifies a demand for information (for example, segmented profit rates in contracts), we will be better able to respond.

6.4 We recognise that wider work will be required in line with our data strategy to ensure that the capabilities we make available in DefCARS provide value to users. Meeting the MOD's need for information to support better procurement will require ongoing review and engagement, better analysis and reporting, and continuing guidance and support for industry. The work carried out under our data strategy will drive further development of DefCARS within the architecture that we deliver through the DefCARS Future roadmap.

Current state and gap analysis

7. Current state

7.1 DefCARS provides a range of services to users via a web interface. DefCARS broadly does three things to deliver on its intended purpose. It captures data, stores that data, and facilitates use of the data.

Capture

Contractors can enter statutory reported data into DefCARS via a web app service, using three main data input methods:

- manual entry;
- copy & paste (for larger data entry web pages); and
- auto-population (subsequent reports and corrections).

In many cases, contractors will use all three methods to input data when completing a report. There is also a file upload facility for contractors to provide supporting information.

Contractors access DefCARS through a Graphical User Interface (GUI). This is designed to allow users to navigate through the site, create, edit and submit reports and respond to compliance reviews. Help is accessible through links to the relevant parts of reporting guidance on each page.

DefCARS includes compliance functionality in the web app, consisting of:

- validations, which identify areas of potential error, with rules typically checking for completeness, consistency, and whether an input is within rational parameters;
- compliance messaging inside DefCARS, which allows SSRO and MOD to communicate potential issues with the data and industry to respond;
- correction reports, which allow industry to re-submit reports to correct errors in an original submission; and
- auto-population, which aims to help ensure consistency of data with previous reports.

There is an automatic email service, for example to notify users of events in the system, such as a report being submitted, a user account being created and to notify users of compliance activity in DefCARS.

7. Current state (continued)

Store

The SSRO DefCARS system is a secure data capture, analysis and reporting application delivered via a web-based interface to a closed group of users (the SSRO, the MOD and Defence Suppliers). The solution is developed, supported, and maintained by a third party and the infrastructure is located across private secure data centres in the UK. The third party provide all required technology and associated services, i.e. all licences, hardware, maintenance, security, and disaster recovery is supplied and managed by them. SSRO own all the data and code used to make DefCARS.

Users access the system over the public Internet (using Transport Layer Security (TLS1.2) to encrypt data), but are only permitted to log in if the source IP address is on an allowed IP list, and they successfully complete two-factor authentication via an email one-time passcode.

In order to provide the necessary segregation of the various stages of development, delivery and ongoing operational changes, the SSRO DefCARS services are hosted in four distinct environments: Development, Quality Assurance, User Acceptance Testing, and Production. In these environments, the DefCARS applications are handled by three primary server roles: Web Server, SQL Server and Mail Server. The web and SQL virtual servers provided are dedicated servers for the sole use of DefCARS and not shared or controlled by any other organisation or project.

DefCARS is built on a Microsoft technology stack (including SQL servers) and data is entered via the web application into the Application Database. The Analytics Database is updated every 24 hours overnight with a copy of the reporting, compliance, and reference data from the Application Database. This data goes through a manual cleansing process before it is used by the SSRO to provide analysis, statistics and management information.

The DefCARS Web App, data and reports are backed up to a secondary site over an encrypted fibre connection with backups retained for three months. All services delivered by the DefCARS service provider are covered by certified ISO27001:2013 processes. Configuration control for all hardware and software assets is managed through the JIRA change control and enterprise Asset Management systems.

The network environment that hosts DefCARS is used exclusively for two Government systems both of which are subject to formal technical risk assessment, risk treatment, and assurance processes.

Use

Authorised MOD and SSRO users can use secure integrated analytical tools within DefCARS to view and extract data, produce bespoke analysis and management information reports. These are custom built tools, based on SQL Server Reporting Services (SSRS), which are integrated and accessed through the website, rather than off-the-shelf products that connect to the database. Authorised users can also access individual reports and supporting files for the contracts they have permission to see, and view them in the format they were submitted. Some SSRO analyst users have permissions to link directly to a copy of the database to use off the shelf analytical and data management tools. Contractors can view their own reports via the user interface and download them.

8. Gap analysis

8.1 We have considered a range of evidence to understand the extent to which DefCARS is meeting our vision for the system. Our evidence sources include:

- meetings with internal and external stakeholders;
- discussions at the Reporting and IT sub-group of our Operational Working Group;
- surveys of DefCARS users;
- compliance reviews and annual compliance reports; and
- helpdesk queries.

8.2 Our views as to the strengths of the current system and areas for improvement are summarised below. We have identified improvements based on feedback from stakeholders and our assessment of their needs. We have outlined our findings by reference to capture, storage and use of reported data.

Capture

Contractors we spoke to during our engagement on this project have indicated that they are generally comfortable with the current data input offering, and this view is consistent with the most recent stakeholder survey, where 72% of the respondents were satisfied or very satisfied with DefCARS for the purpose of submitting reports into it. Contractors interviewed would, however, support moving to a consolidated upload template where much or all of the required data can be input to the system in a few clicks. Some contractors have already created a spreadsheet to pre-populate report data prior to entry in DefCARS. Several contractors would like more control over the auto-population in reports, with the ability to decide which source data to use rather than relying on system-defined rules.

Contractors did not generally consider that more automated upload of data (through for example an API (Application Programming Interface)) would be useful at this stage. Contractors may need to access more than one company system to gather the data required by reports, and also value the chance to check data before provision.

The GUI is generally considered by contractors to meet their needs. However, we have identified the following potential areas for improvement in the GUI for contractors:

- some contractors would like more ‘help service’ interactivity (e.g. worked examples or hover over pinpoints that provide more guidance on specific fields);
- some of the workflows in DefCARS are currently too open, allowing scope for errors when creating and submitting reports;
- pop-up prompts are widely used to steer users to do the right things but this takes graphical capability which can cause the site to run slowly when working in large reports; and
- the layering effect of changes to the reporting forms over time adds to the complexity of design and creates a higher risk of errors than if the forms were redesigned from scratch, however current error rates are within manageable levels.

We have received mixed feedback from users on the validation and compliance issues functionality in DefCARS. SSRO and industry users have found the validation rules and issues logging functionality helpful in identifying areas of potential concern. The SSRO’s 2020 Stakeholder Survey showed that around three fifths (63%) of 72 MOD respondents who had used DefCARS as a platform for raising queries and engaging with contractors as part of compliance monitoring were satisfied or very satisfied with the system as a platform for this use.

8. Gap analysis (continued)

Our analysis has shown, however, that only around 25 per cent of the contract report submissions made have been reviewed by the MOD and that some MOD users have reported difficulty in understanding:

- how to review reports and validation warnings; and
- the compliance workflow and what they are meant to be doing at different stages (raising issues, how contractors can address issues by providing a correction, and resolving issues).

User feedback has also suggested that compliance processes could be improved by the additional ability to conduct bespoke analysis on DefCARS data. The ability to view changes between reports, extract trend and variance analysis from the system and develop internal management information reports would help improve compliance processes by allowing users to focus on specific areas for follow up, particularly where trends and variances being reported are not in line with expectations.

We wish to improve the way compliance information is made available to better engage MOD users, simplify the workflow for raising and resolving issues within the system, and to look at whether more sophisticated analysis can then be developed within DefCARS to support the compliance process.

Store

Our analysis of DefCARS ‘as is’ has identified some issues that we wish to resolve in DefCARS Future:

- The analytical database is designed to provide analysts in MOD and SSRO with full access to the data, and so does not contain row and column level security to allow us to produce personalised MI using granular permissions.
- Descriptive information relating to some report data items, for example company name, is duplicated and is often in the database several times differently.
- Data is not modelled in a business ready data set so personalised data and automated MI is limited to analysts with advanced skills to prepare reports on behalf of others.
- We wish to improve the way development is managed, increasing velocity and simplifying quality assurance.

We consider that a redesigned system based on modern cloud technologies could help us resolve the issues above and allow us to use modern services. Benefits will also include the potential for financial efficiencies compared to the current costs and would also align with Government ‘Cloud First’ policy.

8. Gap analysis (continued)

Use

Positive feedback was received from users about viewing individual reports and excel downloads. The SSRO's 2020 Stakeholder Survey showed two thirds (67%) of 90 respondents who had used DefCARS for monitoring and analysis of reports were satisfied with DefCARS as a platform for this use. The ability to view analysis, individual reports and compliance issues in one place was appreciated by MOD and SSRO users.

Although users can currently view the reports they have access to, management information based on individual permissions cannot be automated for delivery through DefCARS. Access to management information and analytical tools is restricted to a small number of MOD and SSRO users, who have permission to view all reports within DefCARS. The feedback we received from MOD and SSRO users highlighted the following issues:

- Commercial officers find DefCARS data 'raw', not analysed or interpreted, whereas they would like to see trends or areas highlighted for their attention.
- Navigation of the database for analysis could be improved to help users locate the correct data tables/fields and understand the definitions and relationships between them. The addition of a data dictionary would help with this.
- The inability for users to view analysis linked to their user permissions is a barrier to MOD use of DefCARS data. MOD users were keen to see more MI and analysis of DefCARS data and there is a desire to create more self-service opportunities for people to do data analysis.
- A lack of granularity in DefCARS data or misalignment with other MOD sources led to concerns about its utility.

Row level security needs to be implemented in DefCARS to be able to deliver personalised management information to MOD users, such as those in contracting teams. Other improvements that can be made include better access to cleansed DefCARS data for analysts and improved navigation of the database. Interoperability with other MOD systems is also important so that users can view DefCARS data alongside other contract or supplier information.

Our technology strategy for DefCARS

9. Summary

9.1 DefCARS is operational and is successfully enabling contractors to submit contract and supplier reports. The MOD and the SSRO have access to the reports and make use of the reports for analytical purposes.

9.2 We want to continue to improve DefCARS in line with our vision for the system. Based on our understanding of the current system and stakeholder feedback, we have identified a set of objectives that will improve DefCARS and provide value to users.

Table 2: Summary of strategic objectives for DefCARS

Vision element	Objective	
Easy to use		System based on modern technology
		Simplified user interface
Flexible		Simple and cost effective to make changes
		User roles that better reflect user needs
Efficient capture		Better data upload
		Right first time
		Simple and engaging compliance process
Value for money		Capture cost of reporting
		Understand the MOD's data use
		Reduce day to day running costs
Engaging		Easy to access management information
		Enhanced analytical capability
		Inter-operability, enriched data
Secure		Maintain security accreditation

10. Guiding IT principles

10.1 The SSRO's information technology developments and operational services are based on a set of guiding principles. These guide all the SSRO's IT developments and investment, including those on DefCARS.

10.2 We have considered how our guiding IT principles may impact on the delivery of our vision for DefCARS. Table 3 sets out each of the principles and our assessment of how they affect the future development of DefCARS.

Table 3: Guiding IT principles and implications for the future of DefCARS

SSRO's guiding IT principles	DefCARS Future
Independent IT systems and services, which is important given the necessary independence of the SSRO from both the MOD and the defence industry.	DefCARS should continue to be a system provided by the SSRO.
Cloud based and flexible.	The next iteration of DefCARS should be hosted in the public cloud. Flexibility of the system is an important part of our vision and should have associated objectives in our technology strategy.
Appropriate for OFFICIAL level of information, including sensitive information.	DefCARS should remain suitable for information at OFFICIAL, including sensitive information.
UK Government IT standards and utilising recognised patterns and frameworks, which improves interoperability between systems and improves quality.	DefCARS should align to government digital services policy where applicable.
Based on and around the Microsoft technology stack. The SSRO has elected to use a Microsoft environment at the current time.	Microsoft by default (as the current system is), unless compelling reasons for change.
Technology as an enabler not a barrier.	DefCARS should enable industry to submit data, facilitate MOD use of the data and support delivery of the SSRO's functions.
Operating model buying in specialist technical services. Specialist services are contracted in from a number of suppliers.	We will continue to buy in specialist technical services to enable us to provide DefCARS in the most cost effective, secure and risk managed manner.

10.3 We have considered the implications of our guiding IT principles in setting out a technology strategy for DefCARS and an associated architecture. The IT principles will continue to affect how we deliver our technology strategy.

11. Technology strategy for DefCARS

11.1 To achieve our vision for DefCARS, we are setting change objectives relating to each of the areas where we have defined what good looks like. The objectives have been developed by reference to feedback from stakeholders and our associated gap analysis. Through these objectives we plan to deliver a range of benefits that will improve the service DefCARS provides to MOD, to industry and for the SSRO.

Easy to use	
	**System based on modern technology**
	We have identified respects in which the system has not kept pace with developments in technology and software, for example in relation to MI reporting. We anticipate that users will find it easier and more intuitive to use latest technology. We aim to place DefCARS on a footing where system users can more readily take advantage of developments in technology and software.
	**Simplified user interface**
	The current user interface is resource intensive and includes many 'pop-ups'. As we have added additional functionality the existing user interface has increased in complexity. This can make interactions with the system slow for some users. We want to develop a user interface that is proportionate to the requirement, giving users access to the information they need while reducing complexity. Design improvements will take into account accessibility requirements and make it simpler for users to access relevant help and reporting guidance.
Flexibility	
	**Simple and cost effective to make changes**
	The SSRO needs to be able to adapt DefCARS in an agile way to changes in requirements driven by legislation, guidance or the MOD's need for management information. We want to ensure that contractors can meet their reporting obligations and DefCARS can deliver relevant information to the MOD for decision making. We aim to establish DefCARS in a way that the data capture and storage structure can all be changed simply and cost effectively. We will look for opportunities to keep the system design simple, for example while we will continue to give users access to previously submitted reports, in future older reports may be available as downloads, rather than viewable in the data entry user interface. We will adopt development processes that make it simple and cost effective to facilitate changes to DefCARS, and support increasing change velocity. For example, we plan to adopt a DevOps approach (this simplifies the planning, collaboration on code development and supports automation of system build and deploy cycles). We will look to simplify quality assurance through testing plans employing automated and manual testing.
	**User roles that better reflect user needs**
	Users want more flexibility in how the system operates user roles. Specific requests have been made for user roles to reflect organisational hierarchies, for example to give 'super users' access across organisations with one user account, or to support use across a business area. We will increase the flexibility of DefCARS to permit different user roles, so that the system can address current and future user requirements.

Efficient capture of reliable data	
	Better data upload
	We will make it easier for contractors to submit reports in DefCARS. Industry users have expressed strong support for the introduction of upload templates. Some already create their own templates which they complete and then type or copy and paste values from these into the DefCARS web-forms. We see merit in building templates that can be completed locally and then uploaded to DefCARS. This can save time in submitting reports and provide another way to prepare reports before a contract has been signed, although we would want to retain the current ability for contractors with potential QDCs/QSCs to register and draft reports in the system. We will continue to explore templates as a way to improve upload. Our work on templates will include looking at whether we can design the data in a way that could support more automated transfer in the future if that became a priority.
	Right first time
	We will use technology to help reduce compliance issues. Users find auto-population helpful and we will expand its use where feasible. There may be instances where other approaches are more efficient, for example copying and pasting locally between versions of reports where upload templates are used. We will look to increase the fields that are auto-populated and develop further automatic field calculation. There is potential for the system to aggregate granular data into totals and avoid unintended errors arising from separate entry.
	Simple and engaging compliance process
	The compliance process in DefCARS works well and we aim to retain and develop its key features. We plan to: • improve data validation, for example by ensuring that data is uploaded in the right format where upload templates are used; • focus the ability for contractors to correct reports, enabling changes to specific cells rather than whole reports and time limiting corrections; • simplify the workflow for compliance and review messaging; and • simplify the capability for industry to make additional comments on fields by reducing reliance on pop-ups. The MOD has committed to reviewing reports to check accuracy and support contract management but currently reviews around a quarter of reports. We aim to improve the visualisation and relevance of information available to support reviews, and make the process simpler and more intuitive. In the longer term, DefCARS should be able to provide more sophisticated analysis in support of the compliance process.

Value for money	
	**Capture cost of reporting**
	We want reporting requirements to be proportionate. Information about the costs associated with reporting, collecting and reviewing data can be weighed against benefits to inform policy making. We will use DefCARS to gather information on the time spent completing and reviewing each report, if this can be achieved without placing a burden on contractors.
	**Understand the MOD's data use**
	We want to see reported data utilised in support of better single source procurement, most importantly by the MOD. Information on the use made of the data will help to inform decisions about the proportionality of reporting requirements and whether these should be changed. It can also support developments to guidance, DefCARS and analysis by pinpointing areas of need. We will use DefCARS to gather information on the use made of reports and data by the MOD.
	**Reduce day to day running costs**
	We will continue to seek ways to reduce the day to day running costs of DefCARS. By making the system more cloud-based, it will be easier to purchase only the services we need in a competitive market. To the extent that we can drive down running costs, we will seek to focus available budget on improving the system.
Engaging	
	**Easy to access management information**
	The current DefCARS technology limits the system's ability to provide personalised management information to MOD users. We believe that it will help MOD users to make better use of DefCARS data if we can give them access to analysis and visualisations of management information about the contracts they manage and help them derive commercial insight. We will develop the system to provide more personalised management information to MOD users. We will also look at making this capability available to industry where it benefits the operation of the regulatory framework, for example providing easy access to management information on compliance.
	**Enhanced analytical capability**
	We aim to make it easier to carry out analysis and create reports for MOD users. To achieve this, we will simplify both the structure of the data and the creation of reports in DefCARS. These enhancements will assist MOD analysts and support the SSRO to deliver its functions, including where we are required to provide analysis of reports to the MOD under section 36(3) of the Defence Reform Act.
	**Inter-operability, enriched data**
	Information will be more relevant and enriched for MOD users if it is linked to other MOD data, for example earned value management data and data from MOD systems such as its Contracting, Purchasing and Finance (CP&F) tool. This may sometimes be best delivered within DefCARS (for example, information that supports MOD review of reports) and sometimes by MOD externally to DefCARS supported by a download facility. We will develop DefCARS to support such links, including an automated upload and download facility.

Secure	
	**Maintain security accreditation**
	Security is essential to the on-going operation of the system. For all changes we make we will ensure that the data entrusted to us is held and managed securely and confidentially.

12. Architecture, technology and infrastructure

12.1 Our choices on architecture, technology and infrastructure will be driven by our vision for DefCARS Future, our guiding IT principles and our technology strategy. We described the current state of DefCARS in section 7. The main architectural requirements for the future of DefCARS are explained in Table 4. The proposed changes will allow us to make the improvements set out in the strategic objectives for DefCARS.

Table 4: Architecture requirements for DefCARS

Vision element	Strategic goals	Architectural requirement
Easy to use	System based on modern technology	Host in the public cloud to ensure we can more easily take advantage of updated software. Continue to provide a web-based app to provide users access to DefCARS.
	Simplified user interface	
Flexible	Simple and cost effective to make changes	Capable of supporting a DevOps approach. Data structures that better enable organisational hierarchies and a wider range of user roles.
	User roles that better reflect user needs	
Efficient capture	Better data upload	Continue to support web-based data entry. Introduce upload template capability. Improve the data structure, with master data and granular transactional data. MI capability in the user interface to provide personalised and bespoke summary information to support compliance. Potential for machine learning capability to support compliance activities.
	Right first time	
	Simple and engaging compliance process	
Value for money	Capture cost of reporting	Focus on the customer: capability to capture user feedback. Utilise flexibility of public cloud approach to ensure the services we buy are scaled to what we need.
	Understand the MOD's data use	
	Reduce day to day running costs	
Engaging	Easy to access management information	An additional extract, transform and load process to take data from the application database to an analytical database. Improve the data structure, with master data and transactional data. MI capability in the user interface to provide personalised and bespoke summary information to support data use, and more sophisticated analysis resource available to analytical users. Support data import and export in standard data formats.
	Enhanced analytical capability	
	Inter-operability, enriched data	
Secure	Maintain security accreditation	Access and tailor the latest cloud security features.

12.2 We plan for the next iteration of DefCARS to be hosted in the public cloud in line with the Government 'Cloud First' policy. We anticipate this will utilise a 'platform as a service' approach, with the application and the data managed by the SSRO or the SSRO's external partner, and the platform infrastructure and services provided by a public cloud service provider.

12.3 We plan that the future state of DefCARS includes the following features to facilitate the service it provides, as well as improve data structure and provide the capabilities targeted in the technology strategy:

- Data capture would be via the user interface, supporting web-based data entry and upload templates. Data entered will continue to be initially stored in an application database.
- We are planning to configure an extract, transform and load (ETL) service to transfer the data from the application database to the data warehouse. The transformation processes will be set up to cleanse, align data to applicable standards and deduplicate the data before loading it into a data warehouse.
- A data warehouse service would be configured to store cleansed, de-duplicated master data and transactional data. To facilitate analysis, we expect the data warehouse to be structured so that it separates the data into facts, which hold measurable, quantitative data, and dimensions which are descriptive attributes related to the data. Row level security will also be built into data warehouse.
- Data catalogues or a data dictionary service will be configured to support automatic data transfers and data discovery by analysts, and make data easily understandable for those managing the data.
- To support use of the data, users with appropriate permissions would be able to access personalised management information reports via the user interface, and analysts would have access to more sophisticated analytical tools.

Delivery

13. Delivering the new technology

13.1 The development of DefCARS will take place over time, rather than in a single complete re-development of the system. We expect to deliver the technology strategy over a period of three years, beginning in 2022/2023.

13.2 Our current priorities for change reflect our assessment that use of the data is the most pressing need to address. To achieve our strategic objectives, we need to make some early changes to the technology that will enable us to tackle further changes. We have identified four main priorities:

- **Priority 1:** Safely and securely move the hosting of DefCARS to the public cloud. We consider this is a necessary first step before we can embark on delivering other priority changes.
- **Priority 2:** Improving the analytical capability of DefCARS. We need to improve the technology first before we can provide MI to improve data utilisation and compliance.
- **Priority 3:** Improvements to data upload including upload templates. We consider that this is the biggest improvement we can make to continuing to reduce the cost of reporting and help improve 'right first time'.
- **Priority 4:** Improvements to the data entry user interface. The solution will provide the capability to continuously improve the DefCARS service as a whole (including the GUI) using an agile, DevOps approach and external partners to deliver changes to the GUI. Timing of major changes will depend on the SSRO's corporate plan priorities, but we should have the capacity to continue with minor changes as part of business as usual.
- **Priority 5:** All other changes not initiated under the first four priorities.

13.3 An indicative timetable for implementing our objectives is set out in Table 5. The precise delivery timetable will be subject to further prioritisation as part of our corporate planning process and associated resource allocation.

13.4 The development of DefCARS requires continued investment. We will engage with stakeholders as we consider the priorities for investment, and work with the MOD and industry stakeholders to build a shared understanding of the benefits to be obtained from further investment in the system.

13.5 We will continue to develop the reports within DefCARS to ensure that they meet regulatory requirements. This will involve continued development of reports alongside technology improvements, for example through planned projects such as our work on amendments and variance. We will also continue to develop analytical and management information reports in DefCARS.

Table 5: Indicative timetable

Strategic goals		Priority	Year 1	Year 2	Year 3
	System based on modern technology	1			
	Simplified user interface	4			
	Simple and cost effective to make changes	1			
	User roles that better reflect user needs	5			
	Better data upload	3			
	Right first time	3-5			
	Simple and engaging compliance process	2-5			
	Capture cost of reporting	5			
	Understand the MOD's data use	5			
	Reduce day to day running costs	1			
	Enhanced analytical capability	2			
	Easy to access management information	2			
	Inter-operability, enriched data	5			
	Maintain security accreditation	1			

Planned work
Timing to be determined

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