Battlefield Tactical Communications and Information Systems (BATCIS) Delivery Team

LE TacCIS MORPHEUS

ARCHITECTURE PRINCIPLES

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Revision History

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1	15 Mar 15	Nil	Nil
2	30 Nov 16	New Procurement Strategy and ISS ICT Strategy (DaaP)	Addition of Addition Principle (Security) to maintain alignment with DaaP Refinement of Principle Implications
2-2	16 Dec 16	Removed some unnecessary References	Unnecessary references removed.

Approvals

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List of Abbreviations

Abbreviation	Meaning
ABB	Architecture Building Block
AO	Acquisition Option
AP1	Assessment Phase 1
BATCIS	Bowman and Tactical Communications and Information Systems
BM	Business Model
CIG	Capability Integration Group
CIWG	Capability Integration Working Group
PAO	Physical Architecture Option
PCTR	Performance, Cost, Time , Risk
Pg Bd	Programme Board
SH	System House
SO	Solution Option
TRM	Technology Reference Model
TP	Transition Plan
TRL	Technology Readiness Level
WBS	Work Breakdown Structure
WG	Working Group

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Introduction

Aim

1. The aim of the MORPHEUS Architecture Principles is to foster a clear vision of what the MORPHEUS Programme is trying to achieve, remain aligned and coherent with Defence strategy and be a point of reference to help everyone make the right decision.

Purpose

2. The MORPHEUS Architecture Principles are to be used to inform MORPHEUS development, design, implementation and management decisions and assurance activities throughout the whole of the MORPHEUS Scope and along the entire lifecycles.

3. They state the common intent of the MORPHEUS Programme from a develop, design implementation and management viewpoint and form a common reference of what the MORPHEUS Programme is trying to achieve.

Provenance

4. The MORPHEUS Architecture Principles inherit wider principles from Defence, CDIO ICT Strategy LETacCIS and MORPHEUS Programme business principles[1] and represent a consolidated view for the MORPHEUS Programme.

Direction

5. The signatory directs that everyone should aim to adhere to the MORPHEUS Architecture Principles[2]. Non-adherence should be justified against value for Defence.

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[1] A full list of references is at the Reference section.

[2] There will be exceptions where adherence is not possible – but these cases should be based on defensible rationale.

Context

6. MORPHEUS Architecture is intended to reduce the complexity of interface to the Wider MORPHEUS enterprise and provide a common point of reference for development, design, assurance and dependency management for the MORPHEUS Programme and dependent stakeholders.

7. The Architecture Principles **do not** obviate or circumvent the other principles, policy, criteria, requirements and RAIDO in the MORPHEUS Programme.

8. The MORPHEUS Architecture Principles shape the MORPHEUS Architecture. They therefore help reduce the complexity of the intra and inter influences on the MORPHEUS Programme (Technical Viewpoints) for the purposes of informing development, design, implementation, assurance and dependency management.

Structure of Document

9. The body of the document herein describes the MORPHEUS Architecture Principles.

10. The Principles are structured based on industry best practice[3]. The structure is as follows:

Short Name	How people refer to the principle
Name	Identifies the principle
Statement	Describes the principle
Rationale	Describes the perceived benefit of applying the principle
Implications	Describes the perceived impact of applying the principle
Provenance	A short capture of where the principles are inherited from or derived.

Overview of Principles

11. Table 1 summarises the MORPHEUS Architecture Principles that are defined in more detail in Tables 2 - 6.

Principle 1	Design shall be modular
Principle 2	Enabling interoperability
Principle 3	Use a unified data architecture
Principle 4	Reuse of enterprise resources
Principle 5	Usability – implement a common look and feel and intuitive designs across solutions.
Principle 6	Service Security

Table 1: Summary of Principles

[3] TOGAF V9., http://pubs.opengroup.org/architecture/togaf8-doc/arch/chap29.html, accessed 28 Nov 16.

Principles to Benefits

12. Table 2 shows the anticipated contribution that each of the MORPHEUS Architecture Principles makes towards realising the MORPHEUS benefits (as identified in Ref. B). This table therefore offers a useful reference for the assessment of Solution Options against the Architecture Principles in gauging whether the intended impact on the MORPHEUS benefits will be achieved.

		Modular Design	**Enabling Interoperability**	**Use a Unified Data Architecture**	**Re-use of Enterprise Resources**	**Usability**	***Service Security***
MORPHEUS End Benefits	B-01: Increased operational tempo	W	S	S	S	S	*S*
	B-02: Improved operational agility	W	S	S	S	S	*S*
	B-03: Improved operational effectiveness	W	S	W	S	S	*S*
	B-04: Less fratricide and/or collateral damage	W	W	W	S	W	*S*
	B-05: More efficient force application in a Combined, Joint, Intra-governmental, Inter-agency and Multinational (CJIIM).	W	S	S	S	W	*S*
	B-06: Reduced capital cost	W	S	W	S	W	*W*
	B-07: Reduced system running costs	W	S	W	S	S	*W*
	B-09: Reduced cost of training	N	W	W	S	S	*W*
	I-01: Reduced cognitive burden	N	N	S	W	S	*W*
	I-02: Reduced physical burden	W	W	N	N	S	*N*
	I-03: Increased frequency of capability upgrades	S	S	W	W	N	*W*
	I-04: More capable trained Force Elements	W	S	S	N	S	*W*
	I-05: Improved Logistics	S	W	N	W	N	*W*
	I-06: Reduced spares holdings	S	S	N	N	N	*W*
	I-07: Lower average repair cost	S	W	N	N	N	*W*
	B-10 / I-08: Improved Business Model	N	N	W	S	W	*S*

Key: The Architecture Principle makes a Strong (S), Weak (W) or No (N) anticipated contribution to the realisation of the MORPHEUS End benefit

Table 2: Mapping of Archtiecture Principles to MORPHEUS Benefits

Architecture Principles

Principle 1 - Design shall be modular

Short Name	**Modularity**
Name	1. **Design shall be modular**
Statement	Solutions shall be of modular design, enabling responsiveness to changes in acquisition and operations.
Rationale	• Facilitates technology insertion into existing systems and enables incremental improvement of systems, which reduces the risk of obsolescence issues • Enables what is affordable and available now (from a technological point of view) to be procured now and accommodates evolutionary acquisition • Enables enterprise solutions to be flexible to changing business needs • Reduces 'vendor dependence' • Drives competition into the supply chain • Enables transfer of components (for example transfer between platforms) • Enables interoperability and agility (for example responsiveness to changing operational requirements and coalition partners) • Enables innovation to be exploited through technology insertion • Encapsulates complexity within modules
Implications	**Imp1.** Designs must be modular. Note that this does not necessarily mean that the solution must be modular. **Imp2.** To maximise cost savings, modular designs must also be able to be competed. This requires MOD Governance (and possibly ownership) over architectures that support & implement this. **Imp3.** Modularity must occur at the right level, which must be defined and applied in the same manner e.g. operationally, technically or functionally **Imp4.** Principle requires standards and solutions that support portability e.g. applications should not be platform specific **Imp5.** Interfaces will need to be developed to enable legacy applications to interoperate with inserted modular solutions. **Imp6.** Middleware may be required to decouple applications from specific software solutions. **Imp7.** May increase cost and complexity (both within suppliers and across the DLODs, such as training, manuals/publication, safety cases, supportability etc). **Imp8.** Must deliver net benefit to MOD, not just individual projects
Provenance	Provenance: ICT Strategy, JSP 906, JSP 604

Table 3: Principle 1- Design shall be Modular

Principle 2 - Enabling interoperability

Short Name	**Interoperability**
Name	2. **Enabling interoperability**
Statement	Enterprise solutions are to make use of widely employed, open standards (especially at the interface) to promote interoperability of data, software and hardware.
Rationale	• Avoids solution lock-in and facilitates technology integration • Promotes interoperability with coalition partners with unknown solutions
Implications	**Imp1.** The enterprise must agree on the standard(s) that will be deployed. **Imp2.** Needs a supporting commercial approach and information architecture. **Imp3.** An architecture containing the details of enterprise solutions and associated standards is required to inform acquisition. **Imp4.** A shared model that provides a common language to describe the information products that will be exchanged across the enterprise is required. **Imp5.** Selected standards must enable systems to interoperate as required by the business process they support, especially where integration into a brownfield site it required. **Imp6.** A process for setting standards, reviewing and revising them periodically, and granting exceptions must be established. **Imp7.** Collaboration between the MOD, industry, OGDs, agencies and coalition partners is required to develop an understanding of how this principle can be implemented. **Imp8.** Consideration must be made for the differences in the way different nations implement security policy. It is not enough to consider technical interfaces. **Imp9.** Adopting standards may lead to a sub-optimal solution (the 80% solution) but tailoring of standards must occur on a cost benefit basis **Imp10.** An ISS Design Authority authorised Standards Catalogue highlighting specific standards applicable to EvO and Morpheus must be established.
Provenance	Defence ICT strategy, TOGAF 9.1, LTA Generic Architectures

Table 4: Principle 2 - Enabling interoperability

Principle 3 - Use a unified information architecture

Short name	**Unified Information**
Name	3. **Use a unified information architecture**
Statement	Information is defined consistently throughout the enterprise, is shared, available to those who need it and is owned by trustees who are accountable for its quality.
Rationale	• Wide access to information leads to efficiency and effectiveness in decision-making, and affords timely response to information requests and service delivery • A common vocabulary will facilitate communications and enable dialog to be effective. In addition, it is required to interface systems and exchange data
Implications	**Imp1.** Each information element throughout the enterprise requires an owner who will assure its quality **Imp2.** Information elements throughout the enterprise must be defined and those definitions published and available to the whole enterprise. Definitions need to be maintained in a corporate 'glossary' **Imp3.** As a result of sharing data across the enterprise, the owner must be made accountable and responsible for the accuracy and currency of their designated data element(s) and, subsequently, must then recognise the importance of this responsibility **Imp4.** The risk must be mitigated of obsolete, incorrect or inconsistent data being passed to enterprise personnel and adversely affect decisions across the enterprise. **Imp5.** It may be technically & commercially difficult to migrate data from extant isolated or technology specific sources (tight coupling between the application and associated data). **Imp6.** Data sharing may require a significant cultural change, consider the enterprise's appetite for risk concerning data aggregation for example **Imp7.** A compromise must be made between data sharing and data security **Imp8.** Care must be taken to apply this principle at the right level, encapsulated systems should be able to use their own data models. **Imp9.** Requires collaboration across MOD and with Coalition partners **Imp10.** Requires an owner for the information architecture, maintenance (which is likely to be significant).
Provenance	Provenance: Defence ICT strategy, TOGAF 9.1, LTA Generic Architectures

Table 5: Principle 3 - Use a unified information architecture

Principle 4 - Reuse of enterprise resources

Short name	**Reuse**
Name	4. **Reuse - Reuse of enterprise resources**
Statement	Commonality and reuse of extant, enterprise solutions, information and contractual arrangements shall take priority over the procurement of new.
Rationale	• Limits the number of supported solutions and therefore the through-life costs of the system (including cross DLOD efficiencies) • Maximise the benefit of previous MOD investment • Reduces the proliferation of conflicting data (where ICT solutions are concerned) • Reduces integration complexity • Enables greater staff mobility where a business process / activity is supported by the same solution across the enterprise • Reduces risk in delivery • Does not stifle innovation, but controls its implementation
Implications	**Imp1.** Policies, standards, and procedures that govern acquisition of technology must prioritise reuse over procurement of new designs if this principle is to be implemented. **Imp2.** Technology choices will be constrained by the choices available within the MODs technology blueprint. Procedures for augmenting the acceptable technology set to meet evolving requirements will have to be developed and put in place. **Imp3.** Compromises on capability (the 80% solution) will need to be carefully considered; the needs of the wider enterprise must come first. Programmes will need to share requirements for a capability. **Imp4.** Rationalisation of solutions will be required for parts of the enterprise using solutions that do not serve the wider enterprise. This may have cost implications. **Imp5.** Niche solutions will not be procured which are similar / duplicative of enterprise-wide capabilities. **Imp6.** Some existing business processes may need to be modified to adjust to enterprise wide solutions. **Imp7.** Collaboration between MOD, industry, OGDs, agencies and coalition partners is required to understand how solutions can support this principle. **Imp8.** Maintenance of a catalogue of MOD services and solutions with associated description of their performance and function is required (the Defence Applications Register is an example of this for Applications) **Imp9.** Strict governance of this principle is required **Imp10.** The principle may stifle innovation. **Imp11.** Technical, commercial and business resources are required to be in alignment for this to really work and so may include the reuse of existing commercial arrangements and a mechanism for achieving this.
Provenance	Provenance: JSP 604, JSP 906

Table 6: Principle 4 - Reuse of enterprise resources

Principle 5 - Usability – Implement a common look and feel and intuitive designs across solutions

Short Name	**Usability**
Name	5. **Usability implement a common look and feel and intuitive designs across solutions**.
Statement	Solutions are quick to learn and not cumbersome to use or manage in their intended environment.
Rationale	• Reduces the training burden • Improves the MODs ability to move users around the enterprise and maintain familiarity with solutions • Increases user willingness to use solutions • Increases productivity of users as there is a reduced need to understand underlying technology in solutions • Risk of using a solution improperly is reduced • Leads to more rapid deployment of equipment • Hides the complexity from the user
Implications	**Imp1.** Must use common user interfaces that aid user familiarisation and support ergonomic requirements across enterprise solutions. **Imp2.** The use of common interfaces may have legal and commercial implication such as IPR and copyright. **Imp3.** Usability test criteria must be developed. **Imp4.** Requires collaboration between MOD and industry to agree on interface standards. **Imp5.** Consideration for all HFI factors must be made, not merely visual interfaces. **Imp6.** A process is required to enable changes to usability standards as business needs change. The enterprise must not lock into rules and policies that describe what good looked like years ago. Technology watch is required to keep usability standards up to date.
Provenance	JSP 604, TOGAF 9.1

Table 7: Principle 5 - Usability – implement a common look and feel and intuitive designs across solutions

Principle 6 - Service Security

Short Name	**Security**
Name	**6. Service Security**
Description / Statement	The deployment and delivery of services use defined security components (themselves core platform services) that determine the level of service exposure to users depending on the request channel, deployment environment and user profile.
Rationale / Motivation	Exposure of services and information must be dependent of user role and environment. Services should be presented in a way that limits the potential for mal-use and release of inappropriate information.
Implication	**Imp1.** The application of security controls to a service should be based on the Service Risk Profile. **Imp2.** The Service Risk Profile should state the anticipated user base and data requirements, stating if either have enhanced classifications. **Imp3.** Service security controls may be enhanced or relaxed subject to the Posture in which the service is operating. **Imp4.** Service composition will require component authentication prior to presentation that may alter depending on the environment. **Imp5.** Authentication should make use of core security components/services, including IDAM, PKI, and Gateway services. This should be input at the service design and planning stages.
Provenance	DaaP MORPHEUS, CR #XXX

Table 8: Principle 6 – Service Security

Using Principles – Recommendations

13. The principles should fulfil their purpose throughout the MORPHEUS Programme. They do not do this as mere information on a page; they must be part of the vocabulary and consciousness of the MORPHEUS Programme its Suppliers and dependents.

14. To enable the principles to take effect the following recommendation are offered to the MORPHEUS Programme Senior Management:

a. Principles are made available online from MOSS electronically (and other electronic ICT digital access such as the pending MODNet).

b. The Principles are quoted overtly frequently by senior mgt (questions like 'how does this adhere the principles' should be asked openly).

c. The Principles are quoted overtly and frequently by all.

d. The Principles become common parlance for the MORPHEUS team (need to consider other business change techniques to embed the principles in the mental models/parlance of people in the MORPHEUS Programme).

e. MORPHEUS suppliers are made aware of the Principles and observe the MORPHEUS Programme using and referring to the Principles.

MORPHEUS Principle Implications

15. The 'implications' of the MORPHEUS Principles' are wide ranging and have real impact on the MORPHEUS Programme and stakeholders. However, the level to which the implications are being met is uncertain. It is recommended that:

a. The MORPHEUS Architecture overtly provides trace to the Principles and the implications and include a simple assessment as to the level of adherence.

b. A simple assessment as to the level of adherence to the MORPHEUS Principles is conducted against Supplier responses to requirements.

c. A simple assessment as to the level of adherence to the MORPHEUS Principles is conducted against MORPHEUS dependent stakeholders.

References

Ref.	Description	Version	Date
A	Report title: “The role of the Systems House in MORPHEUS”	N/A	N/A
B	MORPHEUS TOM (Inc MORPHEUS Business Benefits)	1.0	2nd March 2015
C	Defence Information and Communications Technology Strategy	1.0	October 2013
D	Joint Service Publication 906, Design Principles for Coherent Capability	1.0	November 2011
E	JSP 604 Leaflet, Part 1 Volume 1, Section 7 Principles	1.1	22nd Sept 2014
F	Generic Base Architecture, Interim Defence Standard 23-13	1.0	21st Sept 2012
G	Generic Soldier Architecture Defence Standard 23-12	1.0	14th June 2013
H	Generic Vehicle Architecture, Defence Standard 23-09	3.0	22nd March 2013
I	LE TacCIS Decision Support WP01 Report – Programme Boundary Review	1.0	14th November 2014
J	LETacCIS MORPHEUS Baseline System Requirements Document Annex B – Technical Framework report	1.0	27th January 2015