HSCIC IT Hosting Strategy

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Purpose

1. The purpose of this paper is to seek approval of the HSCIC IT Hosting Strategy. The Strategy and Policy sections set out and elaborate upon the key points for approval. This Strategy forms part of the HSCIC Enterprise Architecture (EA) 'horizontals' that span all programmes and projects.

Background and Context

2. HSCIC provide a number of IT systems and services across the NHS and beyond. The systems developed under the National Programme for IT (NPfIT) are fully managed solutions, developed, managed and hosted by third party Systems Integrators.
3. Systems developed in-house by *old-co* IC tend to be managed and hosted by HSCIC ICT using a co-location agreement with HMG Land Registry or on-premise at Trevelyan Square. Similarly, systems developed in-house by SSD (at Exeter) tend to be managed by SSD and hosted either on-premise at Exeter or at HMG Land Registry via the ICT co-location agreement.
4. However, the landscape is changing and many of the large critical national systems such as Spine Core, Identity & Access Management, and the Electronic Referral Service are moving from being wholly outsourced to being redeveloped in-house. These systems, along with refreshed in-house systems, will need to be hosted somewhere and be operated and maintained by someone.

The Problem

5. At present, the choice of what type of hosting service to procure and the choice of vendor is taken on a programme by programme basis. Further, a programme can decide whether to use Technical Operations, ICT, a programme specific team, or a 3rd party to manage the infrastructure components.
6. There is significant duplication of effort and cost in repeating tenders and procurement processes to select, vet and on-board new hosting vendors for each programme. This is accompanied by a lead-time of ~6 months to complete the activity. Adopting a piece-meal approach to hosting will result in a diversity of vendors and solutions making it costly and difficult to manage. It also precludes us from leveraging the benefits of economies of scale.
7. The argument for taking a silo'd approach is that it provides greater control for the programme and that it allows for a programme optimised solution. However this leads to an organisationally wide inefficient approach to hosting. We need to centrally balance the need to realise economies of scale against the need to encourage a diverse market.
8. Further, programmes are typically looking for help and guidance in making hosting decisions and ideally would like this low-level technical burden to be taken away so they can concentrate on delivering systems and business value.

The Vision

9. The goal of the HSCIC hosting strategy is to:-

   a. Simplify the decision making process of where to host systems.

   b. To provide a cost effective, secure and reliable platform(s) to host HSCIC systems and applications, keeping the level of hosting diversity across the organisation manageable.

   c. Remove HSCIC from undertaking the low-level plumbing ('tin and wires') of infrastructure, instead focusing efforts further up the food chain creating Health & Social Care solutions.

   d. Provide agility to rapidly respond to new programmes, initiatives and changing demands.

   e. Minimise vendor lock-in and protect the HSCIC from failing vendors.

   f. Provide a range of 'pre-packaged' HSCIC certified and costed off-the-shelf hosting solutions, based on the G-Cloud pricing and framework.

Hosting Models

10. Before we can describe the strategy for achieving this vision, we need to consider the range of hosting models that are available. These are described below. Each provides increasing levels of outsourced responsibility.

On-Premise	Data Centre facilities are provided in-house along with all the operations and management capabilities.
Co-location	*Colocation* offers the ability to rent space in a 3rd party Data Centre for IT equipment. The vendor provides power, cooling, physical security and network connectivity.
IaaS	*Infrastructure as a Service* - The hosting provider rents the customer raw computing power and storage. Typically virtual machines are provided rather than physical, dedicated machines and may include managed guest operating systems. In addition, managed Firewalls, IDS, Security Monitoring etc. is provided. This model is a type of Cloud Computing.
PaaS	*Platform as a Service* – The hosting provider delivers a computing platform typically including programming language execution environment, database, and web server. This model is a type of Cloud Computing.
SaaS	*Software as a Service* - A SaaS provider installs and operates commonly used applications in the cloud. A user then typically pays to access these applications. An example is Google Docs. This model is a type of Cloud Computing.
Fully Managed	A bespoke system is provided, fully managed and hosted by an out-source partner. An example is Spine 1.

11. IaaS and PaaS can be provided using either a Public Cloud or Dedicated Cloud infrastructure. A Public Cloud is shared across multiple organisations. A Dedicated Cloud is built specifically for an organisation and is not shared with any other organisations.

12. The responsibility for providing each component of the technology solution is summarised in the table below:

Component / Hosting Model	Data Centre	Hardware	Hypervisor	Infrastructure Stack	Application Stack
On-Premise	HSCIC	HSCIC	HSCIC	HSCIC*	HSCIC*
Co-location	Hosting Provider	HSCIC	HSCIC	HSCIC*	HSCIC*
IaaS	Hosting Provider	Hosting Provider	Hosting Provider	HSCIC*	HSCIC*
PaaS	Hosting Provider	Hosting Provider	Hosting Provider	Hosting Provider	HSCIC*
SaaS	3rd Party	3rd Party	3rd Party	3rd Party	3rd Party
Fully Managed	3rd Party	3rd Party	3rd Party	3rd Party	3rd Party

The Hosting Strategy

13. The hosting strategy comprises of a hosting policy, associated governance and implementation approach. In essence it stipulates:-

- Adopting 3rd Party Cloud hosting model for all core business - IaaS, PaaS or SaaS.
- Addressing the business need of security, service and agility/VfM in that order.
- Virtualising by default.
- Partnering with at least two Cloud providers.
- Providing commodity based pricing to programmes.
- Using National Informatics Board Design Authority (NIB DA) via the Architectural Governance Group (AGG) to govern policy adherence and grant exceptions.
- Maintaining a hosting 'heat map' to indicate how systems comply with the strategy and help the Executive Management Team (EMT) to focus re-platforming efforts.

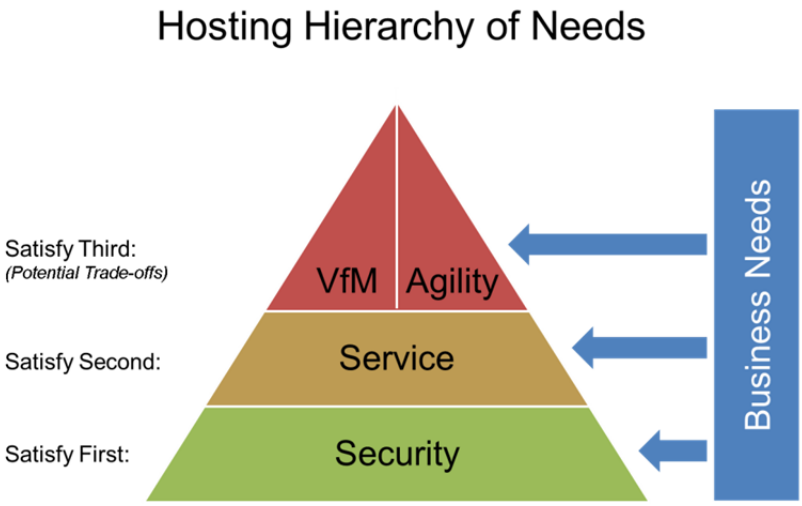
The Hosting Policy

14. ***Virtualise First***
All systems should be virtualised and hosted on virtual server farm by default. However, physical servers can be used for specific workloads. i.e. where the workload scale or licensing complexities aggregate against the server virtualisation default. This approach facilitates agility and allows for rapid scaling up (or down). It also helps avoid vendor lock-in by easing the burden of moving systems between suppliers as only the Virtual Machines need to be moved (rather than physical hardware).

15. ***Host in accordance with the hosting model***
Addressing business needs is the primary motivation of the hosting strategy. Fulfilling security requirements is the most fundamental need and must be satisfied first. Following

* Or 3rd Party organisation.

this is service availability requirements. Only once these two needs are taken into account can VfM and Agility be considered. This concept is represented in the model below.



The mandated hosting solution is specified in the matrix below as a product of these security (data confidentiality) and service (system criticality) requirements:-

HSCIC Hosting Model

System Criticality →

Typical BIL characteristics, as per the Service characteristics, will be defined by the Infrastructure Security Team.

Security Level (Confidentiality) →

	Bronze Service	Silver Service	Gold Service	Platinum Service
BIL4+	3rd Party Dedicated Cloud	3rd Party Dedicated Cloud	3rd Party Dedicated Cloud	3rd Party Dedicated Cloud
BIL3	SSD/ICT with Co-Location	3rd Party Dedicated Cloud	3rd Party Dedicated Cloud	3rd Party Dedicated Cloud
BIL2	SSD/ICT with Co-Location	3rd Party Public (or Dedicated) Cloud	3rd Party Public (or Dedicated) Cloud	3rd Party Dedicated Cloud
BIL1	SSD/ICT with Co-Location	3rd Party Public (or Dedicated) Cloud	3rd Party Public (or Dedicated) Cloud	3rd Party Dedicated Cloud
BIL0	SSD/ICT with Co-Location	3rd Party Public (or Dedicated) Cloud	3rd Party Public (or Dedicated) Cloud	3rd Party Dedicated Cloud

The Business obtains a BIL assessment via the Infrastructure Security Team.

The Business along side Service Management agree on the Category of a Service / System.

Typical Characteristics:

Bronze Service
- HSCIC Internal Systems
- Business hours operation
- < 2,500 users
- Failure = Minimal Reputational Damage

Silver Service
- Local or National Systems
- Extended hours of operation
- <20,000 users
- Failure = Some Reputational Damage

Gold Service
- National Systems
- 24/7 operation
- <100,000 users
- Failure = Significant Reputational Damage
- Have time sensitive statutory obligations.

Platinum Service
- Critical National Systems
- 24/7 operation
- > 100,000 users
- Failure = Severe Reputational Damage
- Have time sensitive statutory obligations.

Hosting Service:

Bronze Service
- >= 99.00% Availability
- Biz hours monitoring
- <= 480 mins Sev 1 Incident Resolution
- Min One DC Operation

Silver Service
- >=99.50% Availability
- Biz hours monitoring
- <=360 mins Sev 1 Incident Resolution
- Min One DC Operation

Gold Service
- >= 99.90% Availability
- 24/7 Bridge Monitoring
- <= 240 mins Sev 1 Incident Resolution
- Dual DC Operation (e.g. Live + DR, Active-Active)

Platinum Service
- >= 99.99% Availability
- 24/7 Bridge Monitoring
- <= 120 mins Sev 1 Incident Resolution
- Dual DC Operation (e.g. Live + DR, Active-Active)

a. The Business obtains a Business Impact Level[†] (BIL) assessment for Confidentiality via the Infrastructure Security Team.

b. The Business alongside Service Management agree on the Service Category of the system – Bronze, Silver, Gold or Platinum. Each Service Category lists typical, not absolute characteristics, so a best fit approach should be used.

c. The Security / Service intersection details which hosting solution to use:-

   i. ***3rd Party Dedicated Cloud*** is a Cloud infrastructure ring-fenced for HSCIC use only. The hosting provider is responsible for providing managed (virtual) servers and associated networking in a secure and resilient data centre.

   ii. ***3rd Party Public Cloud*** is a multi-tenanted. i.e. the Cloud infrastructure shared with other organisations. The hosting provider is responsible for providing managed (virtual) servers and associated networking in a secure and resilient data centre.

   iii. ***Co-Location plus SSD/ICT*** is where space is rented at HMLR and IT assets are provided and managed by SSD/ICT. HMLR are responsible for providing accommodation, power, cooling and physical security for HSCIC owned and managed IT assets.

16. ***Utilise the HSCIC specified Hosting Partners***

All systems should be hosted with an HSCIC specified hosting partner.

Each of these vendors will have already been vetted, their data centre and operational procedures checked, SLAs defined, pricing confirmed and a contract in place. The pricing will include volume discounts with a number of thresholds which activate greater discounts to allow us to leverage economies of scale. Hosting demand will be balanced out between multiple vendors.

17. ***Utilise the HSCIC pre-defined and costed Hosting Components***

All systems should use HSCIC certified Cloud Building Blocks to construct all hosting solutions. These building blocks will have already been costed by vendors and certified as being suitable for use by the HSCIC and are designed to accelerate the design and deployment of the solution.

Scope

18. All HSCIC IT systems are covered by this hosting strategy, including all environments such as Live, DR, Reference, Path-to-Live, Development and Training.

Governance

19. In-line with EA strategy, the hosting policy will apply HSCIC wide and be enforced by the Architectural Governance Group (AGG) and where necessary the NIB DA. It will be used to govern programme hosting choices, adherence to policy and the granting of exceptions.

[†] Business Impact Levels (BIL), often shortened to Impact Levels (IL) is a classification system used to guide discussions of risk in government projects. Within the hosting model, we are focusing on confidentiality - the potential impact if the information is seen by those who should not see it.

Implementation

20. The hosting policy is designed to answer the question of ***'where to host'*** when a programme / system is ready to be (re-)hosted.

21. The decision of ***when*** to (re-)host existing system is outside the scope of the strategy and is likely to be based on a number of factors including present hardware location, age of hardware and supportability of the technical stack, political sensitivity, etc.

22. It is proposed that a Heat Map is produced for all HSCIC Systems to describe compliance with the policy. This will be completed as an EA activity and reported to the EMT along with recommendations within 3 months and be regularly maintained. The associated migration cost to make a system policy compliant is system dependent.

Cost and Value for Money

23. Whilst security, followed by service, is the fundamental driver in the creation of the strategy, cost / value for money has also been considered.

24. The G-Cloud framework was used to select and procure our first Cloud Provider, InTechnology. They were the best match for our requirements and also submitted the lowest cost pricing.

25. A cost comparison with internal SSD/ICT managed service versus 3rd Party Provider has been investigated with costs being the same order of magnitude. The complexity, size and lifespan of each system determine whether the 3rd party or SSD/ICT is the lowest cost provider. Further, in most cases a direct cost comparison cannot be made – the internal offering cannot host BIL4 systems and cannot match the required service levels.

26. The EA team have already constructed an *IaaS Project Cost Calculator* using the agreed IaaS building blocks and InTechnology pricing. This allows our Architects to model different solutions and configurations to optimise VfM.

Making the Strategy a Reality

In order for the strategy to become active and provide value to the organisation a number of activities must take place:-

27. Provide a call-off contract with at least two Cloud Hosting providers.
An HSCIC-wide IaaS G-Cloud 'tender' has already been executed and InTechnology was selected. A contract is in place and is being drawn down from. However, in order to manage service risk and provide commercial tension, HSCIC need to contract with another supplier. The EA Team are currently working with Procurement to select another vendor.

28. The Hosting Model will be augmented with guidance on BIL classifications to enable programmes to understand where their systems are likely to reside on the BIL scale. The EA Team are currently working with the Infrastructure Security Team to provide this guidance and typical characteristics.

29. The production of the Heat Map to describe compliance with the policy is underway. Once assessed and priorities agreed with the EMT, a change programme will be created.