NHS Improvement

Development of the Patient Safety Incident Management System (DPSIMS) Project: Alpha phase showcase

April 2018

collaboration trust respect innovation courage compassion

DPSIMS: context

- NHS Improvement has statutory duties to collect patient safety information from all providers of NHS funded care, and to provide advice and guidance on reducing risks to patient safety, supporting the delivery of better outcomes for patients.
- Currently, NHSI relies on old legacy national systems (NRLS – 14 years old, STEIS – 20 years old) to meet the requirement of collecting such information, and extracting information from these systems, which is used alongside other clinical, patient-generated, regulatory and international information sources to develop patient safety advice and guidance.
- Over 98% of the 2m+ incidents collected per year are recorded into local risk management systems (LRMS) and uploaded in batches to NHSI; but this is sourced heavily from larger Acute and Community/Mental Health trusts, with large information gaps about safety in other provider environments.
- NHS organisations are free to adopt whichever LRMS best meets their local needs. Therefore, there is an additional part of the incident recording ecosystem that NHSI does not control, but there remains a business need to avoid disturbing these local arrangements.

Introducing PSIMS

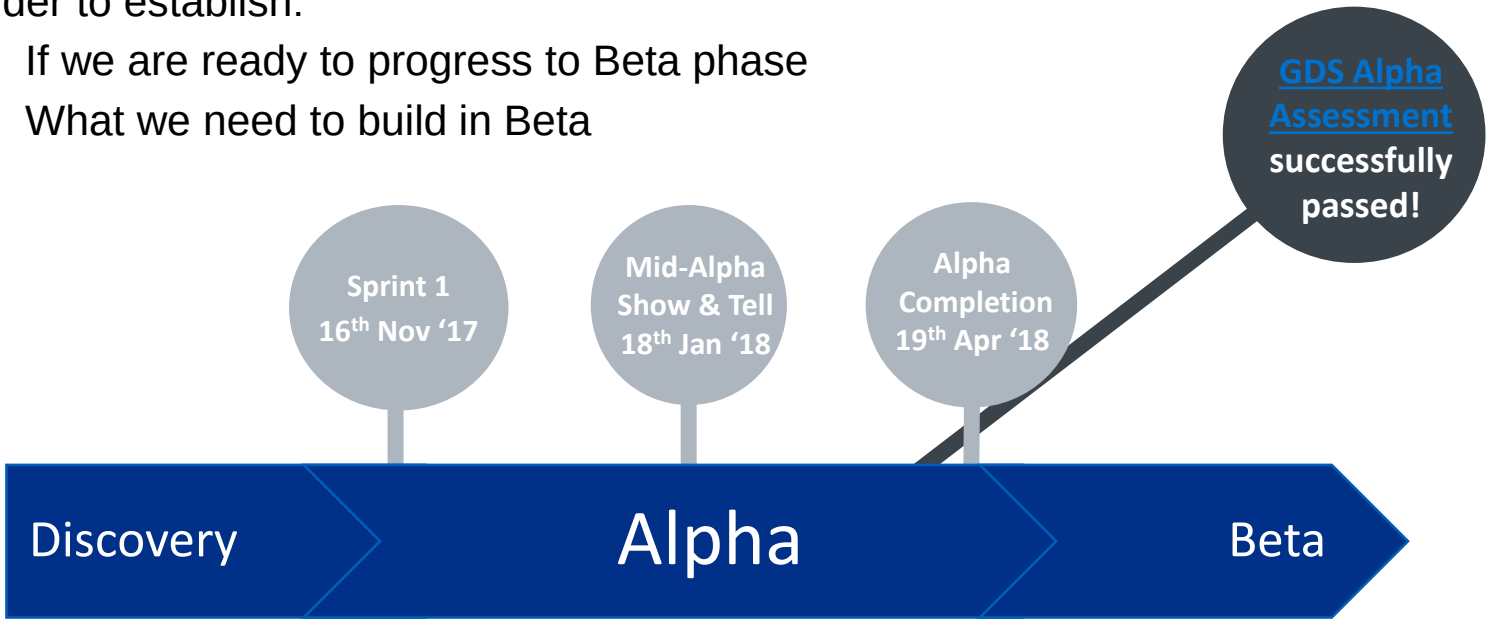
The DPSIMS project offers an opportunity to use modern technology to improve the health service for patients and carers, healthcare staff, NHS organisations, and decision-makers, so that time and energy can be invested in the right things: **working to reduce harm**

DPSIMS' Overarching Vision Statement:

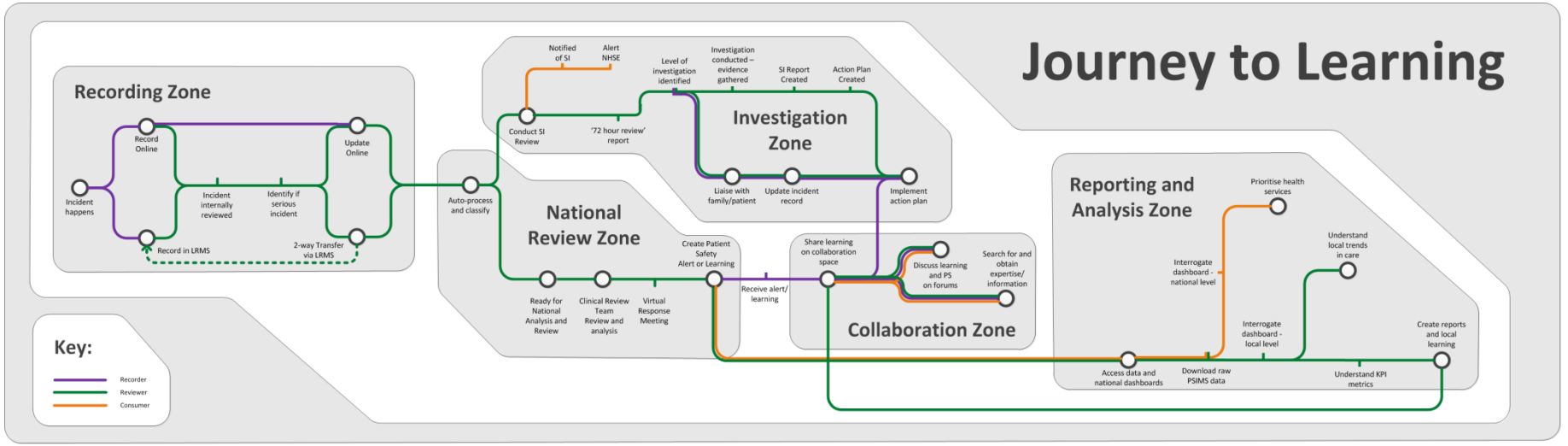
"*a single port of call for recording, accessing, sharing and learning from patient safety incidents, in order to support improvement in the safety of NHS-funded services at all levels of the health system*"

Alpha phase

- In Alpha we set out to:
  - Build prototypes of our service
  - Adopt a User-Centred approach
  - Test our prototypes with users
  - Use an Agile methodology to learn and respond
  - Demonstrate that the service is technically possible
- In order to establish:
  - If we are ready to progress to Beta phase
  - What we need to build in Beta



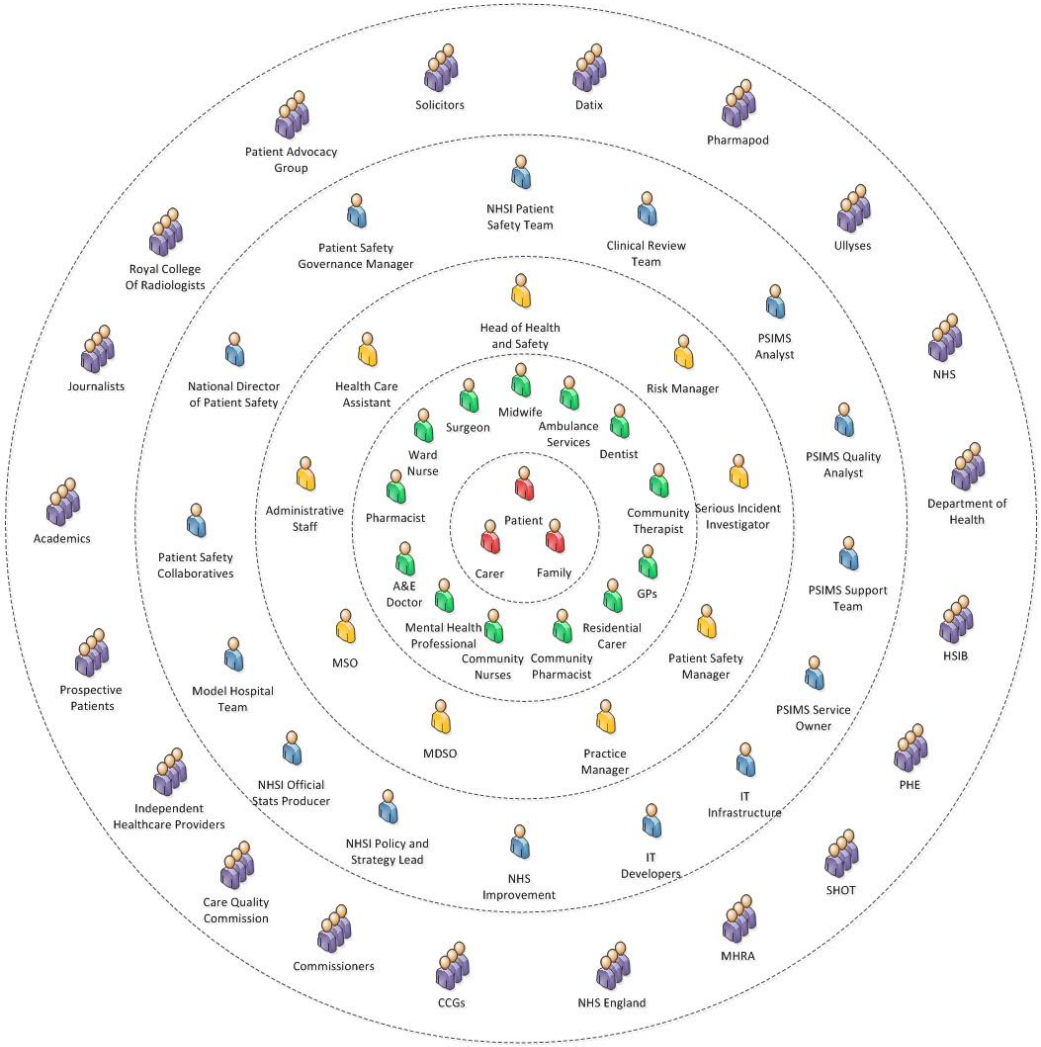
Broad scope for Alpha



- Identified 5 zones of activity for users
- Wanted to understand the user need for each zone
- Build, test and iterate prototypes in key areas to develop a service design

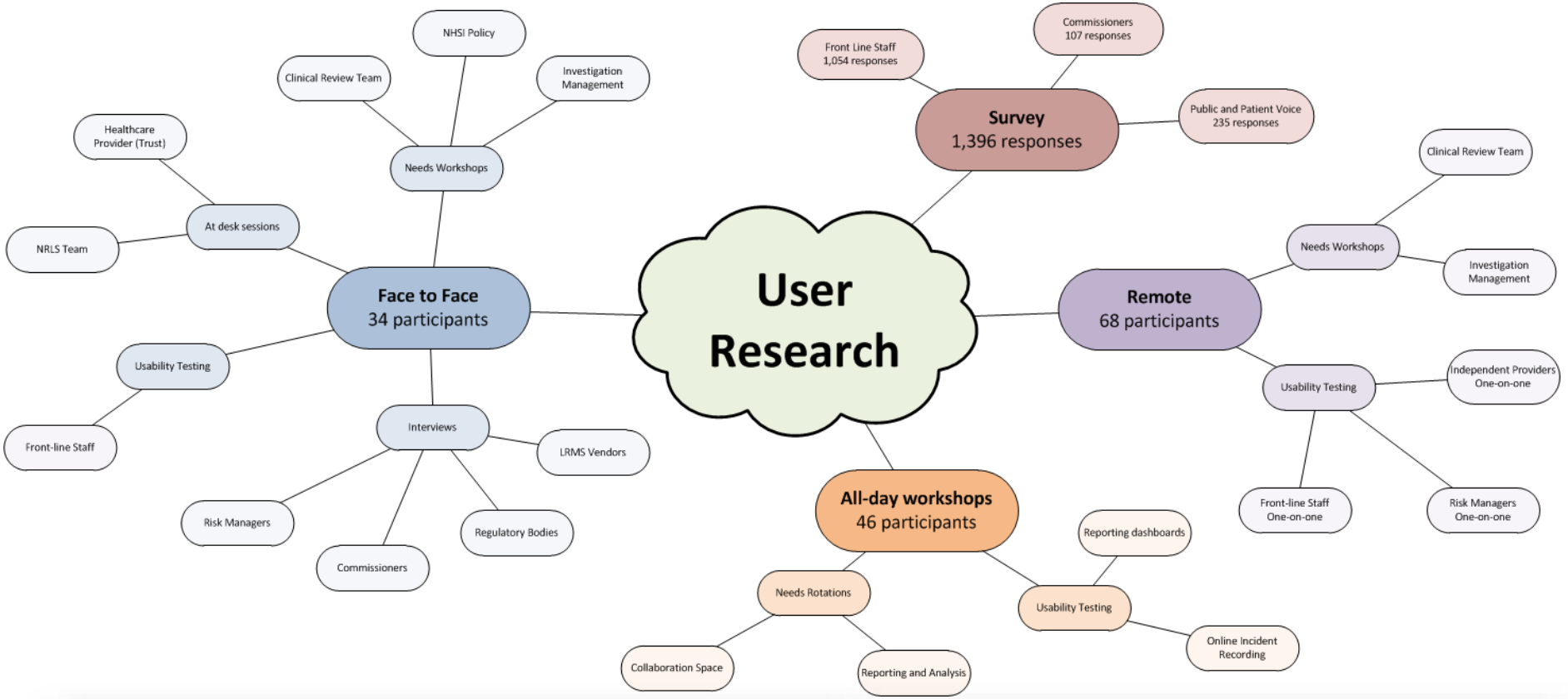
Who are our users?

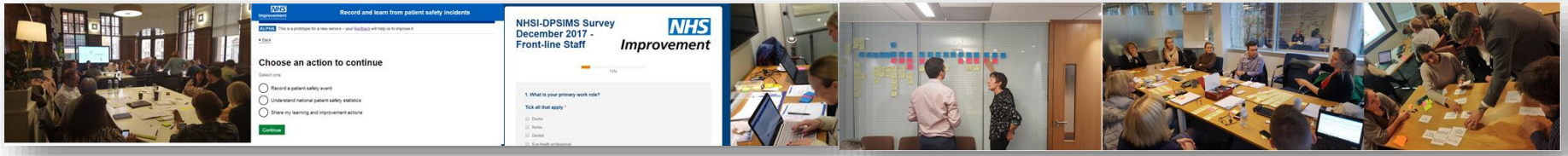
Our stakeholders are many and varied - some of them are represented here:

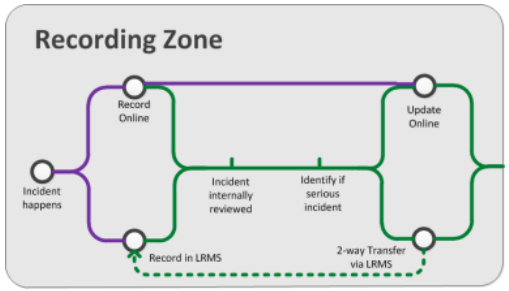


User Engagement

User research in Alpha used a variety of formats, and was very well-attended





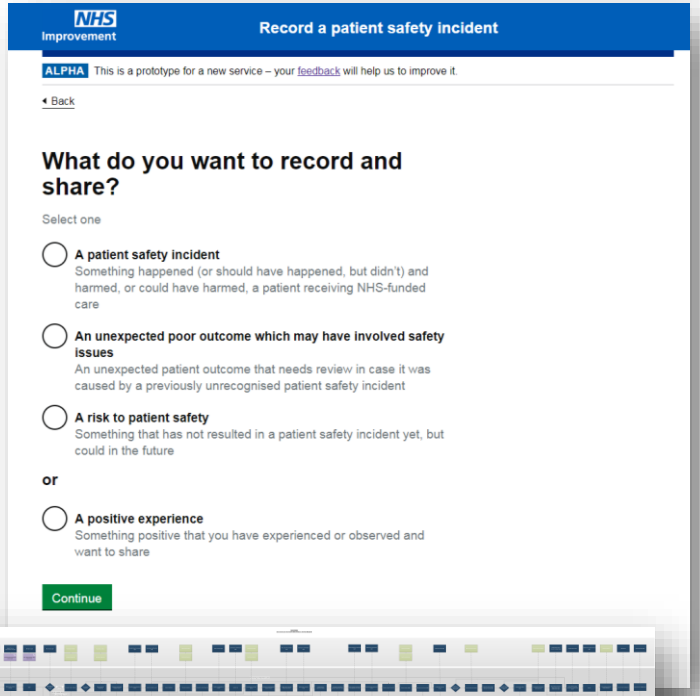


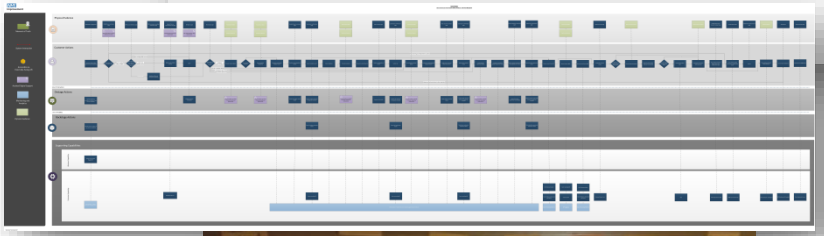
Online recording

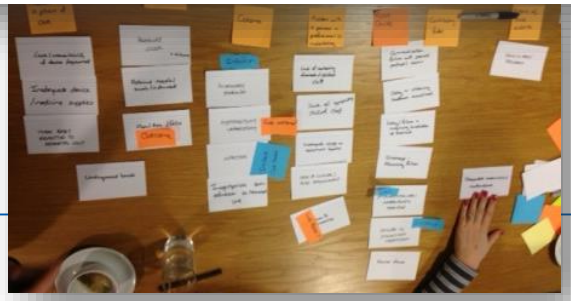
NHS Improvement

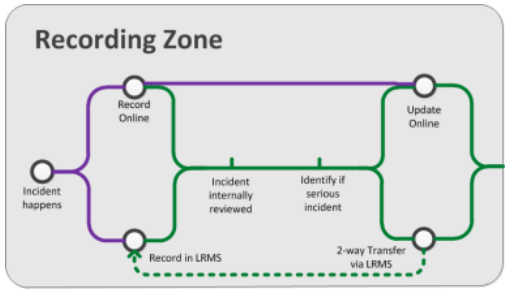
What have we done?

- Built 5 iterations of the online incident recording prototype, including:
  - Record incident – healthcare professional
  - Record Serious Incident
  - Record incident – patient/carer/public
  - Categorise Patient Safety event
  - A/B testing of level of harm selection
  - Login journey
- Tested with 119 frontline users
- Card sorting to develop incident taxonomy
- Developed and tested a minimum learning dataset
- Developed service blueprint including assisted digital





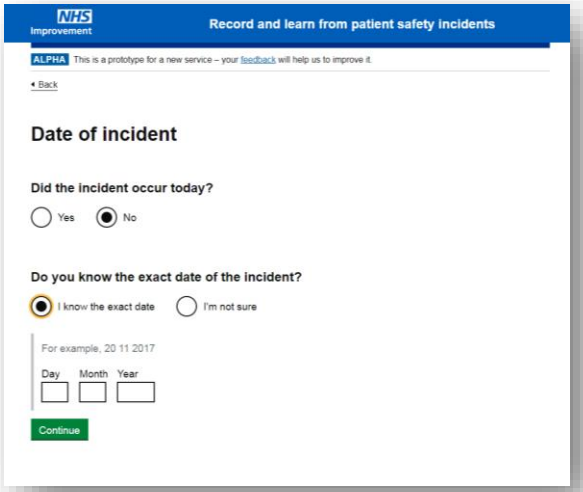


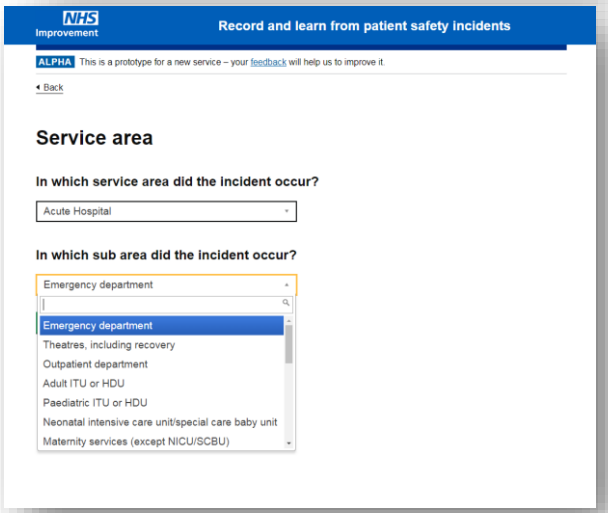


Online recording

What did we learn?

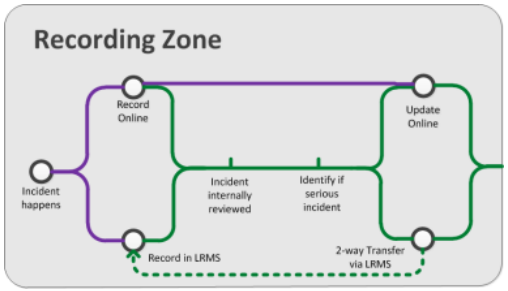
- Users want to record patient safety events in a single place
- There is a need to support consistency in recording (e.g. levels of harm)
- There is a need to record with the data at hand and to update later
- Can simplify recording through user profiles/logins
- Further refinement of event classification is required for front-line staff to intuitively understand these groupings





What does it mean for beta?

- Baseline question set for end-end recording journey that can be taken into Live
- Need to integrate with NHSI identity management and NHSD Organisation Data Service (ODS)

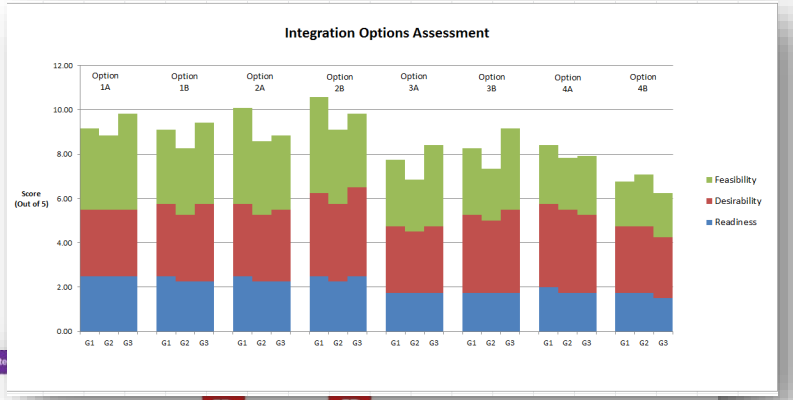


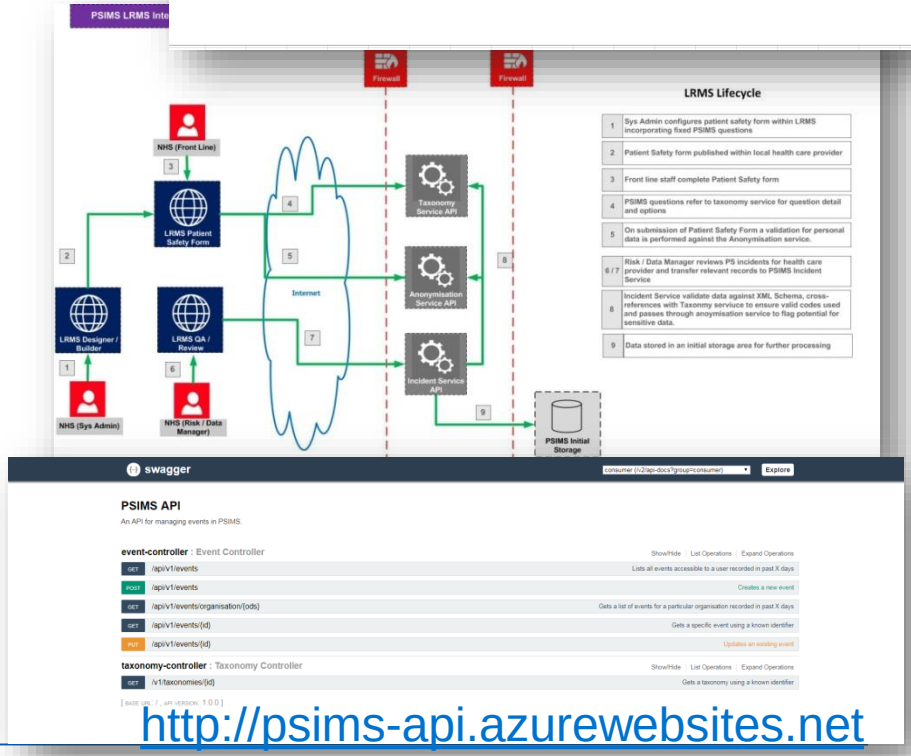
LRMS channel

NHS Improvement

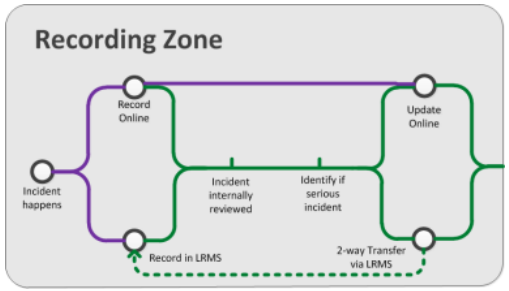
What have we done?

- Engaged with LRMS vendors to understand current landscape.
- Assessed 4 broad integration options.
- Built RESTful API to trial transferring incidents.
- Built RESTful API to trial the management of a taxonomy
- High-level analysis of FHIR standards and how PSIMS data schema could be aligned
- APIs packaged and deployed to Azure
- Security layer added to APIs to trial key based authentication
- Testing of APIs undertaken with LRMS vendors





http://psims-api.azurewebsites.net

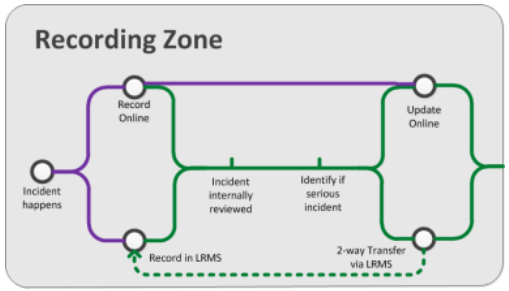


LRMS channel

NHS Improvement

What did we learn (from NRLS integration)?

Current Issue	Impact
Manual of data transfer	Time-consuming, prone to error and lacks an explicit audit trail/history (e.g. organisations unsure of what they have and haven't uploaded).
Maintenance of "Mappings"	A barrier to national recording due to time and cost of set-up. Leads to data quality issues as "Mappings" diverge over time.
Difficulty in introducing change	Inhibits ability to evolve Patient Safety data to continuously meet the user need. Incurs additional cost to providers of care to implement software changes to their systems.
Time lag for reporting	Reducing ability to act as an early warning system and spot national trends early.
Incidents with PII	Increased workload for NHSI to cleanse.
Missing incidents not reported through LRMS	Reduces ability for providers to perform risk management and patient care duties, including for multi-organisation incidents.
User Experience (UX) is reducing data quality	Ambiguous questions and poor user experience leading to data quality issues and complexity for front-line staff, resulting in reduced reporting.



LRMS channel

NHS Improvement

What did we learn (from LRMS Vendor engagement/ testing)?

- All main vendors are on-board with the approach and willing to update their software
- API data transfer straightforward; greater challenges with the taxonomy service and what that means for their products
- Vendors have some preferences about how the transition to the new minimum data set might be managed
- Need to be mindful of potential local (provider) infrastructure limitations (e.g. gaining access to APIs)

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<adverseEvent xmlns="http://hl7.org/fhir">
 <!-- from Resource: id, meta, implicitRules, and language -->
 <!-- from DomainResource: text, contained, extension, and modifierExtension -->
 <identifier><!-- 0..1 Identifier Business identifier for the event --></identifier>
 <category value="[code]"/><!-- 0..1 AE | PAE
An adverse event is an event that caused harm to a patient,  an adverse reaction is a something that is a
 subject-specific event that is a result of an exposure to a medication, food, device or environmental su
bstance, a potential adverse event is something that occurred and that could have caused harm to a patien
t but did not -->
 <type><!-- 0..1 CodeableConcept actual | potential --></type>
 <subject><!-- 0..1 Reference(Patient|ResearchSubject|Medication|Device) Subject or group impacted by eve
nt --></subject>
 <date value="[dateTime]"/><!-- 0..1 When the event occurred -->
 <reaction><!-- 0..* Reference(Condition) Adverse Reaction Events linked to exposure to substance --></re
action>
 <location><!-- 0..1 Reference(Location) Location where adverse event occurred --></location>
 <seriousness><!-- 0..1 CodeableConcept Mild | Moderate | Severe --></seriousness>
 <outcome><!-- 0..1 CodeableConcept resolved | recovering | ongoing | resolvedwithSequelae | fatal | unkn
own --></outcome>
 <recorder><!-- 0..1 Reference(Patient|Practitioner|RelatedPerson) Who recorded the adverse event --></re
corder>
 <eventParticipant><!-- 0..1 Reference(Practitioner|Device) Who  was involved in the adverse event or the
 potential adverse event --></eventParticipant>
 <description value="[string]"/><!-- 0..1 Description of the adverse event -->
 <suspectEntity>  <!-- 0..* The suspected agent causing the adverse event -->
  <instance><!-- 1..1 Reference(Substance|Medication|MedicationAdministration|
    MedicationStatement|Device) Refers to the specific entity that caused the adverse event --></instance
>
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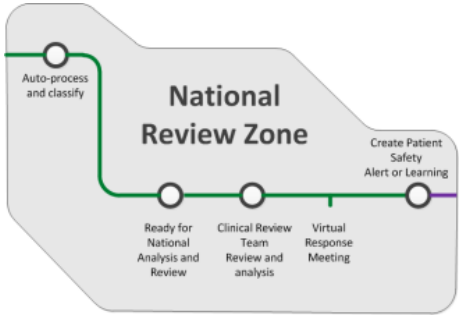
</AdverseEvent>
```

What does it mean for beta?

- Close working with vendors (and strategic selection of private beta participants)
- 3 APIs (data transfer, taxonomy, anonymisation)
- Work with NHSD to mature the AdverseEvent FHIR resource to maximise re-use



National review

What have we done?

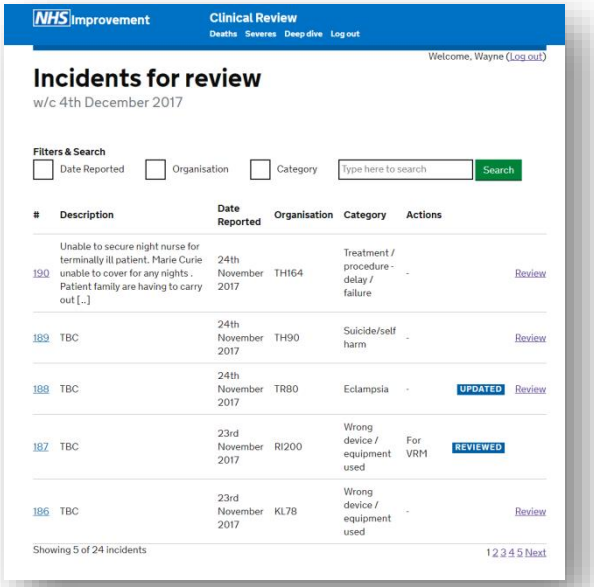
- Designed workflow through storyboard and built initial clinical review prototype
- Ongoing assessment of open-source free text analysis technology for automated classification
- Designed high-level pipeline for handling identifiable information
- Liaison with NHS Digital regarding HES dataset integration

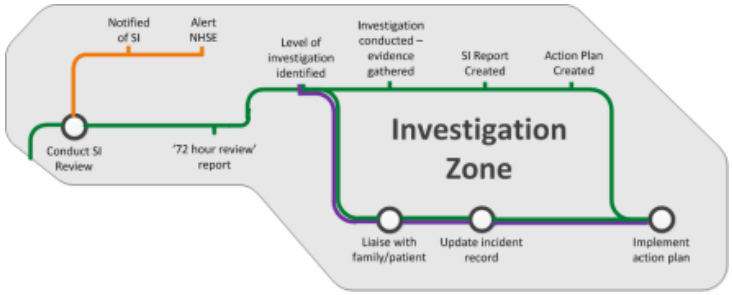
What did we learn?

- Users want a faster and easier way to identify incidents for review
- Need to start integrating review tool into working practices in the national Patient Safety team
- Data needed and high-level approach defined for HES integration

What does it mean for beta?

- Start building live tool for NHS Clinical Review team
- Work with NHSD to provision HES data service



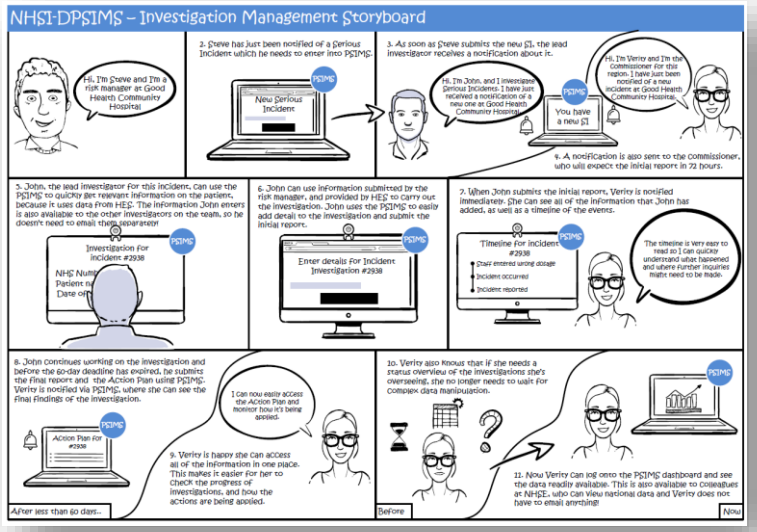


Investigations

NHS Improvement

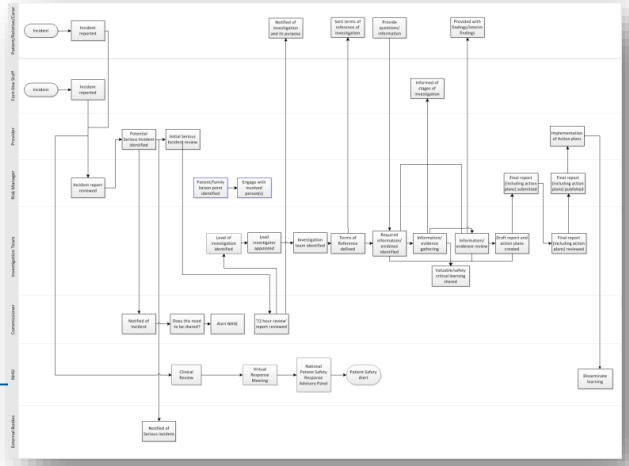
What have we done?

- Small Discovery phase to understand user needs
- Identified information and questions required at initial incident capture to support investigation
- Design for Serious Incident workflow



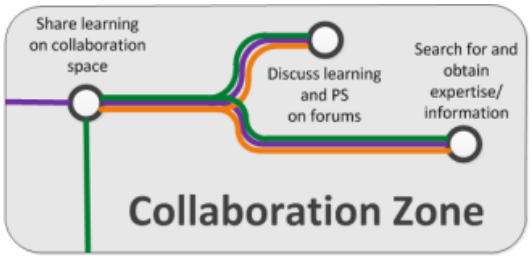
What did we learn?

- Users need 2 capabilities for investigation:
  1. Light-weight incident management capability for non-LRMS users
  2. More structured case management capability for Serious Incident investigation management



What does it mean for beta?

- Next step is to prototype
- Alignment with the evolving SI framework



Learning together

NHS Improvement

What have we done?

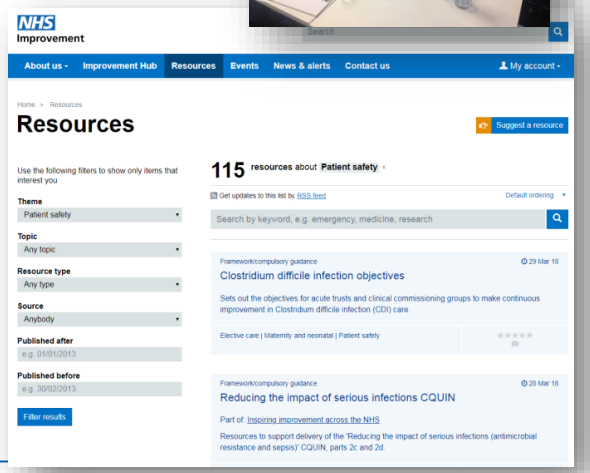
- User needs analysis to understand culture challenges, enablers and barriers
- Assessed different types of collaboration platform

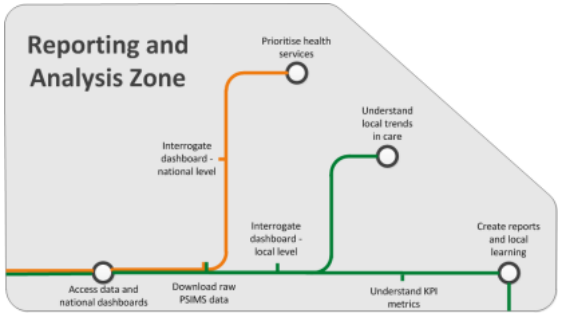
What did we learn?

- Users want better access to national advice and guidance, but challenges to/reluctance around sharing at a local level remains
- There are quick-wins around sharing and better access to outputs from investigations
- Join-up of existing networks and forums (e.g. Patient Safety Collaboratives, Medication/Medical Device Safety Officers)

What does it mean for beta?

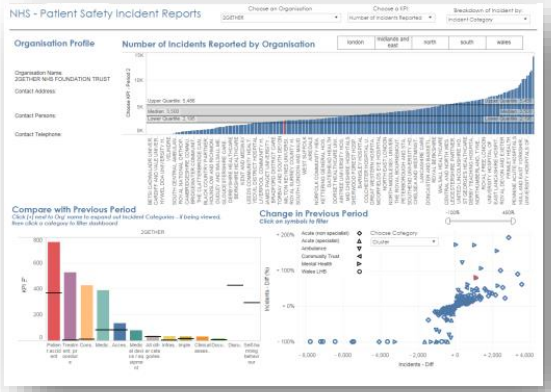
- Work with National Patient Safety team to provide timely advice and guidance following review
- Integrate with NHSI improvement hub to share advice and guidance, and develop culture of collaboration





Accessing data

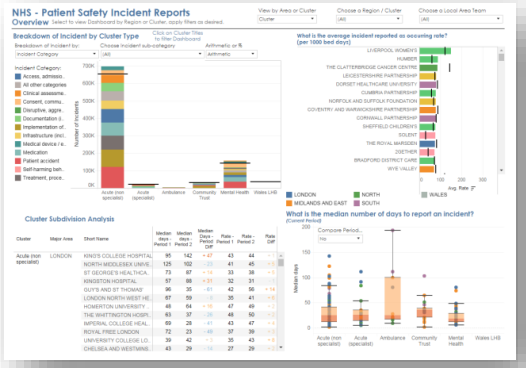
NHS Improvement



What have we done?

- 3 Iterations of a data analytics dashboard (Tableau and Alteryx)
- Using NHSI's existing SIP data infrastructure and 2m+ NRLS data records
- The third iteration (including data-blending for a time series analysis) has been developed and is being tested with users during the final Alpha sprint

What did we learn? (further testing ongoing)



- Users want easier and more timely access to national data to support their local processes
- Users, particularly trust risk managers, want access to raw data
- Many users are still focused on benchmarking, though this has limits on its utility to support improvement

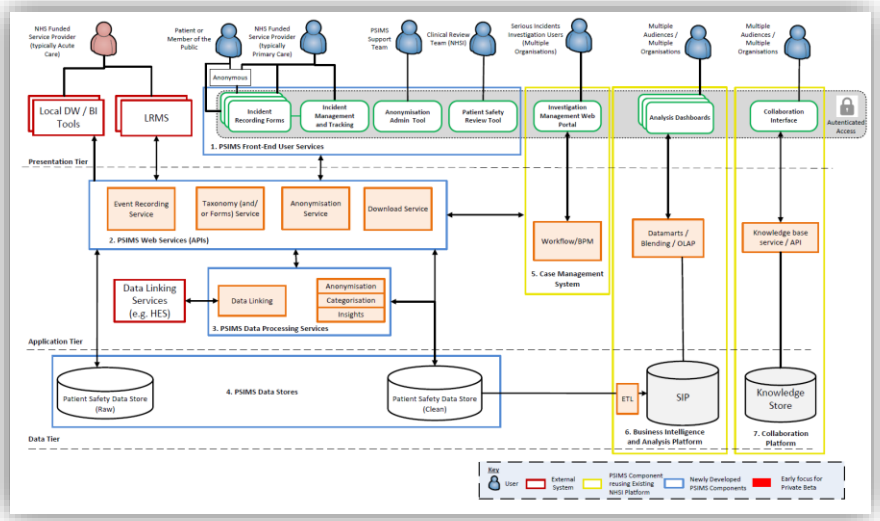
What does it mean for beta?

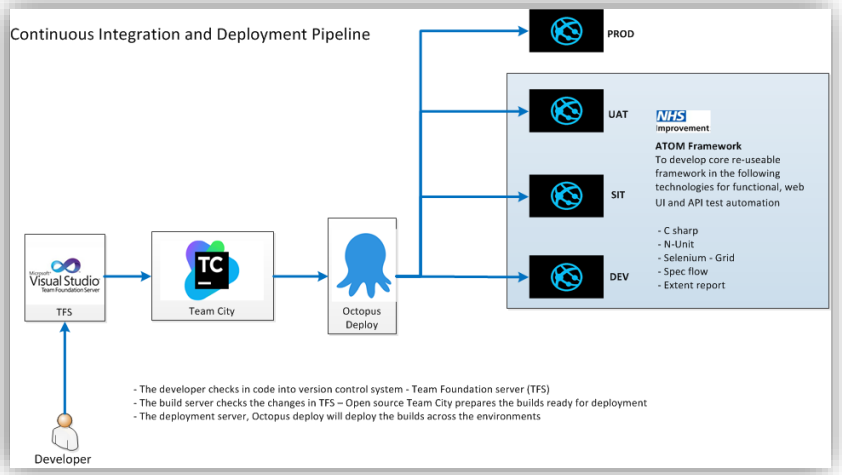
- Need to prioritise data download service
- Operational reports for NHSI to monitor uptake and recording of incidents

Technical Environment

Design Principles and Solution Architecture

- Re-use existing NHSI assets
- Maximise use of Azure cloud services (working assumption PSIMS data can be stored in Cloud)
- Open-source new code
- Provision open standards-based APIs (utilising Fast Health Interoperability Resources – FHIR)
- Extendible data processing pipeline (initial focus on free-text classification and anonymisation)
- Embed Continuous Delivery pipeline (automated build, test and deploy) based on NHSI standard





Technical Environment

Technology baseline

Zone	Technology details
Recording	• Web forms - Python (Django) web app • Recording and Taxonomy API - Microsoft .NET (RESTful) web services, XML (FHIR aligned) Schema
Review	• Clinical Review - Python (Django) web app • Automated Data Processing - Could be a combination of tools, some Open-Source (SpaCy) and Azure Services
Collaboration	• Knowledge Sharing - Python (Wagtail)
Investigation	• Serious Incidents - Microsoft Dynamics • Light-weight incident management - Python (Django) web app
Reporting and Analysis	• Data Download API Microsoft .NET (RESTful) web services • Analytics Platform – Microsoft APS • Visualisation – Tableau and Alteryx
Shared Capabilities	• Data storage – MS SQL • Identity Management - Okta

Moving into Beta

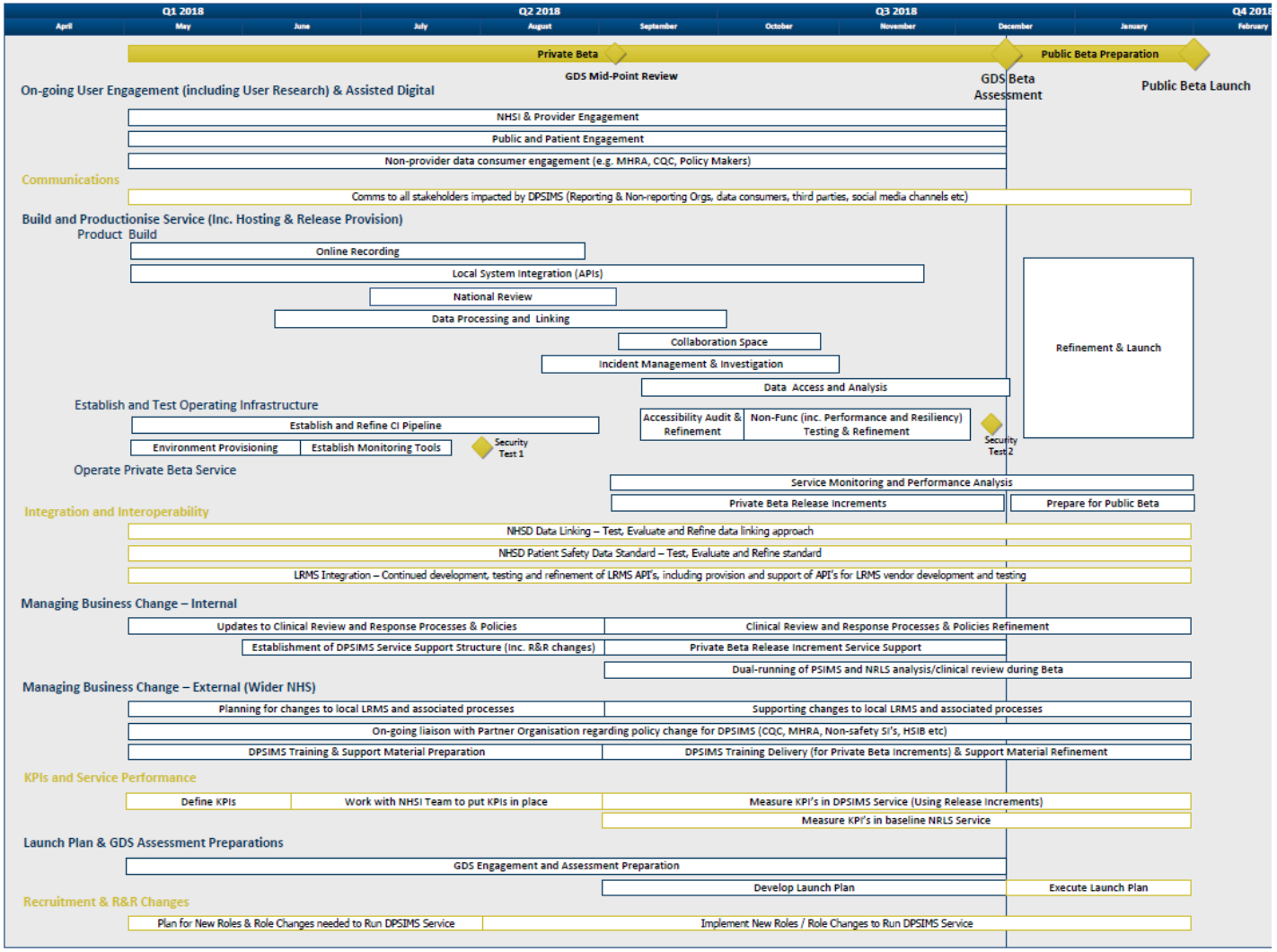
Beta Vision:

"*A single port of call for providers of NHS-funded services to record and access patient safety data, and learning insights from the national team*"

- As per agile methodology, PSIMS will be built incrementally and iteratively, tested with users, and initially focused on core functionality e.g. a 'Minimum Viable Product' (MVP) - Recording Zone with some basic features from the National Review and Collaboration Zones (re-using what we can initially)

- Beyond MVP – later, Beta will build non-core needs (investigation, dashboarding, analysis - secondary uses of the data, patient/public incident recording)

Initial Beta plan



Want to get involved?

If you have further questions, or want to get involved in the DPSIMS user community please email DPSIMS-stakeholders@nhs.net with a line or two about your role, organisation or interest. We can then add you to the contact list to receive email updates, events information, and calls for testing volunteers.

You can also follow @LucieNHSsafety on Twitter for day-to-day project news and progress.