

# Behavioural Atom Protocol Version 1.0

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### Related work:

This specification is related to:

- *Classification of Everyday Living Version 1.0*. Edited by Joss Langford. Latest version: <http://docs.oasis-open.org/coel/COEL/v1.0/COEL-v1.0.html>.
- *Roles, Principles, and Ecosystem Version 1.0*. Edited by Matthew Reed. Latest version: <http://docs.oasis-open.org/coel/RPE/v1.0/RPE-v1.0.html>.
- *Minimal Management Interface Version 1.0*. Edited by David Snelling. Latest version: <http://docs.oasis-open.org/coel/MMI/v1.0/MMI-v1.0.html>.
- *Identity Authority Interface Version 1.0*. Edited by Paul Bruton. Latest version: <http://docs.oasis-open.org/coel/IDA/v1.0/IDA-v1.0.html>.
- *Public Query Interface Version 1.0*. Edited by David Snelling. Latest version: <http://docs.oasis-open.org/coel/PQI/v1.0/PQI-v1.0.html>.

### Abstract:

This document defines a protocol for data exchanges that are capable of describing, querying and reporting a human activity event (Behavioural Atom) using the COEL model classification, as well as the context in which it took place (e.g. time, location).

**Status:**

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# 1 Introduction

Behavioural Atoms represent distinct human behavioural events. Their granularity has been designed so that they are small in terms of data volume but detailed enough to capture a single human behaviour (e.g. eating egg based noodles or swimming laps of butterfly). The format of the Behavioural Atom allows many aspects of a human activity event to be coded – the type of event, the individual that the event relates to, the time it occurred, how it was recorded, location and context. The coding for the type of event references the hierarchical taxonomy defined in the Classification of Everyday Living [COEL\_COEL-1.0].

This document describes the Behavioural Atom format and protocol for transmitting Atoms in this format to a Data Engine.

## 1.1 Terminology

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in [RFC2119].

## 1.2 Normative References

- [RFC2119] Bradner, S., “Key words for use in RFCs to Indicate Requirement Levels”, BCP 14, RFC 2119, March 1997. <http://www.ietf.org/rfc/rfc2119.txt>.
- [RFC2616] R. Fielding et al, Hypertext Transfer Protocol – HTTP/1.1, <http://www.ietf.org/rfc/rfc2616.txt>.
- [RFC3986] T.Berners-Lee et al, Uniform Resource Identifiers (URI): Generic Syntax, August 1998, <http://www.ietf.org/rfc/rfc3986.txt>.
- [RFC4627] D. Crockford, The application/json Media Type for JavaScript Object Notation (JSON), July 2006, <http://www.ietf.org/rfc/rfc4627.txt>.
- [RFC5246] T. Dierks and E. Rescorla, The Transport Layer Security (TLS) Protocol Version 1.2, <http://www.ietf.org/rfc/rfc5246.txt>.
- [COEL\_RPE-1.0] *Roles, Principles, and Ecosystem Version 1.0*. Latest version: <http://docs.oasis-open.org/coel/RPE/v1.0/RPE-v1.0.docx>
- [COEL\_IDA-1.0] *Identity Authority Interface Version 1.0*. Latest version: <http://docs.oasis-open.org/coel/IDA/v1.0/IDA-v1.0.docx>
- [COEL\_COEL-1.0] *Classification of Everyday Living Version 1.0*. Latest version: <http://docs.oasis-open.org/coel/COEL/v1.0/COEL-v1.0.docx>
- [Weather] *OpenWeatherMap, Weather Condition Codes*. Latest version: <http://openweathermap.org/weather-conditions>.
- [ISO 3166] *ISO 3166 Country codes*. Latest version: [http://www.iso.org/iso/country\\_codes](http://www.iso.org/iso/country_codes)
- [MVCR-v0.7.9] *Kantara CISWG Consent Receipt*. Latest version: <https://kantarainitiative.org/confluence/display/infosharing/Home>

## 1.3 Non-Normative References

- [Data to Life] Reed, M. & Langford, J. (2013). Data to Life. Coalition, London. ISBN 978-0957609402

## 2 HTTP Protocol

All interfaces are designed around the HTTP protocol stack [HTTP] and in particular rely on the REST based operational model. Each message includes one of the HTTP verbs, in particular GET or POST only, and further information depending on the operation being performed. This later information is included in the message body and encoded in JSON format [JSON].

In line with REST style protocol conventions, all accessible entities in the system SHALL be identifiable and reachable through dereferencing a URL unique to that entity. Entry to the system as a whole is via a well-known initial URI, known as the Data Engine Home URI.

### 2.1 Media Types for Messages

If the media type is present in the message, it SHALL be "application/json". Atom server implementations SHALL accept message with this media type or none. However, they MAY reject malformed or oversized messages.

### 2.2 Operations

Only two operations are supported by the Behavioural Atom Protocol. The first is a GET operation directed at the Data Engine Home URI, which returns general information about the Data Engine and in particular the URI of the Atom POST operation URI.

#### 2.2.1 Data Engine Information Request

Every Data Engine SHALL publish its Data Engine Home URI. Performing a GET on this URI SHALL return general information about the Data Engine as JSON object.

Method	Request	Response Status	Response Content-Type	Response Body
GET	None	200 (OK)	application/json	JSON object
POST	Any	405 (Method Not Allowed)	None	None

Format for the returned JSON Object:

Name	Value	Description	REQUIRED
AtomsURI	String	The URI of the Atoms service encoded as a string.	Yes
QueryURI	String	The URI of the Query service encoded as a string.	Yes
ManagementURI	String	The URI of the Management service encoded as a string.	Yes
ServerTime	Integer	Current server time in UTC as a Unix timestamp.	Yes
AtomsStatus	String	The current status of the Atoms service encoded as a string. It MUST be one of "Up", "Down", or "Unknown".	Yes
QueryStatus	String	The current status of the Query service encoded as a string. It MUST be one of "Up", "Down", or "Unknown".	Yes

ManagementStatus	String	The current status of the Management service encoded as a string. It MUST be one of "Up", "Down", or "Unknown".	Yes
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The JSON object of the response MAY contain additional fields with information about the Data Engine.

Example request message:

```
GET /home
```

Example response message:

```
HTTP/1.1 200 OK

{"AtomsURI": "https://www.dataengine.com/atoms",
 "QueryURI": "https://www.dataengine.com/query",
 "ManagementURI": "https://www.dataengine.com/management",
 "AtomsStatus": "Up",
 "QueryStatus": "Up",
 "ManagementStatus": "Up",
 "ServerTime": 1470822001}
```

## 2.2.2 Atom POST

To add a Behavioural Atom to the Data Engine, a POST operation SHALL be sent to the Atom POST URI obtained by a preceding GET on the Data Engine Home URI. The POST SHALL include a non-empty body containing either a single JSON Atom Object or a JSON array containing one or more Atom Objects. The Content-Type of the message MUST be 'application/json'.

The operation MUST return a HTTP Status code using Scheme 1, below, as a minimum. The operation MAY return additional HTTP Status codes using Scheme 2, below

Scheme 1:

- 202 (Accepted) and an empty response body if all of the atoms in the request body are accepted.
- 500 (Internal Error) and an empty response body if any error occurs. None of the atoms in the request are accepted. The caller MAY retry the operation in the case of failure.

Scheme 2:

- 202 (Accepted) and an empty response body if all of the atoms in the request body are accepted.
- 400 (Bad Request) if the request body does not contain valid JSON, or if one or more of the Atoms is missing mandatory elements or if mandatory fields are missing from one or more of the Atoms.
- 404 (Not Found) MAY indicate that the Atom POST URI might have changed and the client SHOULD obtain the URI from the Data Engine Home URI.
- 405 (Bad Request) if the request method is not POST.
- 500 (Internal Server Error) if an internal error occurred.

If the status is not 202 (Accepted), the response message MAY contain a JSON object containing a "Reason" field encoded as a string, e.g. {"Reason": "ConsumerID missing"}.

If the status is not 202 (Accepted), none of the Atoms SHALL be accepted by the Data Engine. In this case, the sender MAY make a request to submit each atom individually in order that the well-formed ones can be accepted.

Method	Request Content-Type	Request Body	Atoms accepted by Data Engine	Scheme 1 Response		Scheme 2 Response	
				Status	Body	Status	Body
POST	application/json	Valid JSON Atom(s)	All	202	None	202	None
GET	Any	Any	None	500	None	405	None or JSON Object with a reason
POST	application/json	Invalid JSON				400	
POST	application/json	Malformed Atom(s)				400	
POST	Data Engine encounters internal error.					500	

Example request message:

```
POST /atoms
Content-Type: application/json
Content-Length: nn
{ ... }
```

Example response message:

```
HTTP/1.1 202 OK
```

Example request message with an incorrect content type:

```
POST /atoms
Content-Type: image/png
Content-Length: 2134
{ ... }
```

Example response message:

```
HTTP/1.1 500 Internal Error
```

## 2.3 Security

Atom POST using Scheme 1 SHALL use anonymous TLS only. The Data Engine cannot authenticate the sender, since the Data Engine has no relationship with the consumer. Note that the ConsumerID or DeviceID MUST have been registered by an Operator for the Atom to be accepted.

The Data Engine SHALL require authentication in order to implement Atom POST Scheme 2.

## 2.4 Exceptions

The Data Engine MUST specify (e.g. through contract terms, on a web site, or as additional data in the Information Request response) how it will manage the following exceptional circumstances when receiving data:

- Duplicate Atom posts (e.g. over-write, return error, duplicate created)
- Atoms with invalid or missing ConsumerIDs and DeviceIDs
- Atoms with unallocated ConsumerIDs and DeviceIDs
- Atoms with missing essential fields
- Incorrectly formed Atoms

## 3 Atom Object Definition (JSON)

An atom object SHALL have the following format. The top level JSON SHALL be an object with the elements described below:

### 3.1 Header

Name	Value	Description	REQUIRED
Version	Integer Array [0..3]	Array indicating the model version number used to define this Atom.	Yes
	Index 0	Level 1: Must increment when a non-backwards compatible change is made, e.g. new structure or changing the value of an existing field. MUST run through full OASIS process.	Yes
	Index 1	Level 2: Incremented for any release that is backwards compatible, e.g. only new fields. MUST be agreed by the OASIS Committee.	Yes
	Index 2	Level 3: Experimental – incremented to working draft publications that are for public release.	Yes
	Index 3	Level 4: For developments outside the OASIS TC and will always be “0” in any OASIS version.	Yes

### 3.2 Context

Context of the event:

Name	Value	Description	REQUIRED
Social	Integer, 0-6	Indicates the social context of the activity	No
Weather	Integer, 0-999	Indicates the general weather conditions at the time of the activity	No
ContextTag	Integer	Context provides the ability to encode “Why” information	No
ContextValue	Integer	Value of Context annotation.	Yes if Context Tag present

The enumeration values for Social SHALL be:

- 0: Don't Know
- 1: Family
- 2: Colleagues
- 3: Guests
- 4: Partner
- 5: Myself

## 6: Friends

The enumeration values for Weather SHALL be those of the Open Weather Map weather condition code scheme **[Weather]**.

There are no ContextTags defined in this version of the specification, but these MAY include references to previous Atoms to indicate causality or question / answer pairs to sequence interactions.

## 3.3 When

Time and duration of the event:

Name	Value	Description	REQUIRED
Time	Integer	Seconds since 1970/01/01 00:00Z (Unix timestamp in UTC)	Yes
UTCOffset	Integer	UTC Offset in seconds (e.g. UTC+1h = 3600, UTC-2h = -7200...) for the sender.	No
Accuracy	Integer, 0-14	Indicates accuracy of the time field	No
Duration	Integer	Duration of the activity in seconds	No

The enumeration values for Accuracy SHALL be:

- 0: +/- 1 sec (exact)
- 1: +/- 1 min (default)
- 2: +/- 5 mins
- 3: +/- 15 mins
- 4: +/- 30 mins
- 5: +/- 1 hr
- 6: +/- 2 hrs
- 7: +/- 4 hrs
- 8: +/- 8 hrs
- 9: +/- 12 hrs
- 10: +/- 24 hrs (weekend)
- 11: +/- 72 hrs (week)
- 12: +/- 15 days (month)
- 13: +/- 91 days (season)
- 14: +/- 182 days (year)

This value refers to the accuracy reported and not necessarily the actual accuracy at which the measurement was obtained.

Atoms with duration of zero MAY be used and indicate an instantaneous event (or one where the duration is less than a second). A zero duration Atom MAY also be a marker for the end of a sequence of Atoms such as in a running route, see section 3.6 Where.

## 3.4 What

Event as defined by the COEL model **[COEL\_COEL-1.0]**:

Name	Value	Description	REQUIRED
Cluster	Integer, 1-99	COEL cluster.	Yes
Class	Integer, 1-99	COEL class, if available omit otherwise.	Only when 'Subclass'

			is also used.
SubClass	Integer, 1-99	COEL subclass, if available omit otherwise.	Only when 'Element' is also used.
Element	Integer, 1-99	COEL element, if available omit otherwise.	No

When appropriate event descriptions are not available in the latest version of the COEL model, development codes MAY be used for new applications. These codes SHALL use the format 1xxxx (i.e. integers in the range 10000 to 19999. These codes MAY be used at any level of the COEL model.

### 3.5 How

How the event was measured:

Name	Value	Description	REQUIRED
How	Integer, 0-11	An enumerated value describing how the information was provided	No
Certainty	Integer, 0-100	Percentage, certainty that this Atom is associated with the individual indicated in the Who field	No
Reliability	Integer, 0-100	Percentage, reliability of this atom as a whole. The default SHALL be 50, with 100 only being used for correction atoms.	No

The enumeration values for How SHALL be:

- 0: Don't Know
- 1: Observed
- 2: Objectively Measured: Public Infrastructure
- 3: Objectively Measured: Private Infrastructure
- 4: Objectively Measured: Fixed Computing Device
- 5: Objectively Measured: Portable Computer
- 6: Objectively Measured: Phones and Pocket Device
- 7: Objectively Measured: Wearables
- 8: Objectively Measured: Implants
- 9: Self-Reported
- 10: Remembered
- 11: Computationally derived from other Atoms

### 3.6 Where

Where the event occurred:

Name	Value	Description	REQUIRED
Exactness	Integer, 0-14	Format and precision of where fields	No
Latitude	Double	GPS location	No
Longitude	Double	GPS location	No
W3W	String	what3words code (word.word.word)	No
Place	Integer, 0-2	Profane location code	No
Postcode	String	Postcode	No

The enumeration values for Exactness SHALL be:

- 0: Unknown.
- 1: Postcode or Zip code very long form.
- 2: Postcode or Zip code long form.
- 3: Postcode or Zip code short form
- 4: Place
- 5: GPS with accuracy between 0m and 1m.
- 6: GPS with accuracy between 1m and 5m.
- 7: GPS with accuracy between 5m and 10m.
- 8: GPS with accuracy between 10m and 15m.
- 9: GPS with accuracy between 15m and 20m.
- 10: GPS with accuracy between 20m and 25m.
- 11: GPS with accuracy between 25m and 30m.
- 12: GPS with accuracy between 30m and 50m.
- 13: GPS with accuracy between 50m and 100m.
- 14: GPS with accuracy worse than 100m.

The enumeration values for Place SHALL be:

- 0: Home
- 1: Work
- 2: School

When appropriate enumerated values for Place are not available in the specification, development codes MAY be used for new applications. These codes SHALL use the format 1xxxx (i.e. integers in the range 10000 to 19999).

Where journeys are being recorded the location in this field SHALL be the starting location. The displacement of the journey can be recorded in an extension field and/or the final location MAY be recorded in a subsequent Atom.

### 3.7 Who

Who the event relates to:

Name	Value	Description	REQUIRED
DeviceID	String	Pseudonymous Key of the device that MUST be registered with a Consumer ID	Yes if Consumer ID is not present
ConsumerID	String	Pseudonymous Key for the consumer, subject, user or patient.	Yes if Device ID is not present

The format of valid strings for ConsumerID and DeviceID are defined in **[COEL\_IDA-1.0]**.

### 3.8 Consent

A summary of the consent given by the Consumer for management purposes:

Name	Value	Description	REQUIRED
Jurisdiction	Two letter country code	The jurisdiction in which consent was given. Alpha-2 representation as defined in <b>[ISO 3166]</b> .	No
ConsentDate	Integer	The date of the consent last explicit consent – nominally, the atom’s time plus the retention period. Seconds since 1970/01/01 00:00Z (Unix timestamp in UTC).	Yes, if the parent element (Consent) is present.
RetentionPeriod	Integer	The number of days stated in the consent for retention or review of retention.	Yes, if the parent element (Consent) is present.
Purpose	Bit vector (Integer)	Purposes for which consent has been given. Enumerated field defined in Appendix B of <b>[MVCR-v0.7.9]</b> . Valid bits are 1 through 16.	Yes, if the parent element (Consent) is present.
PolicyURL	String, HTTP URL	The privacy policy and notice of the original consent agreement.	No
WebTokenID	String	The unique Identifier for JSON Web Token representing the consent receipt.	Yes, if Receipt Service element is present.
ReceiptService	String, HTTP URL	The URL of the processing service providing the consent receipt.	Yes, if the Web TokenID element is present.

The object names and format are defined to be compatible with **[MVCR-v0.7.9]** where possible. The use of a consent receipt as defined by **[MVCR-v0.7.9]** is also possible by generating a “Service/Legal/Consent/Granting consent” atom at the point of original consent agreement and including the WebTokenID and ReceiptService fields.

The standard Purposes are defined in **[MVCR-v0.7.9]** but are reproduced below in COEL nomenclature for convenience only:

1. *Core Function* : To enable the Operator & Service Provider to carry out the core functions of its site/app/services.
2. *Contracted Service* : To provide contracted or requested services to the Consumer.
3. *Delivery*: To deliver contracted or requested services to the Consumer.
4. *Contact Requested* : Communicating with the Consumer about information or services the Consumer specifically request.
5. *Personalized Experience* : Providing the Consumer with a personalised experience of the site/app/service.
6. *Marketing* : Communicating with the Consumer about our other services they may be interested in.
7. *Marketing Third Parties* : Communicating with the Consumer about the services of third parties they may be interested in.
8. *Disclosure for Delivery* : Providing the information to third parties to deliver services on the Operator’s & Service Provider’s behalf.

9. *Disclosure for Marketing* : Providing the information to third parties to enable them to communicate with the Consumer about their services that the Consumer may be interested in.
10. *3rd Party Disclosure for Core Function* : Providing the information to third parties to enable them to deliver or improve their own services to the Consumer.
11. *3rd Party Disclosure to Improve Performance* : Providing the information to third parties to enable them to deliver or improve their own services to others.
12. *Legally Required Data Retention* : Complying with legal obligations for record keeping.
13. *Required by Law Enforcement or Government* : Complying with legal obligations to provide the information to law enforcement or other regulatory/government bodies.
14. *Protecting Health* : Protecting the Consumer's vital and health interests.
15. *Protecting Interests* : Protecting the Operator's & Service Provider's legitimate interests, the Consumer's or those of a third party.
16. *Improve Performance* : Measure or improve Operator & Service Provider performance or the delivery of services.

### 3.9 Extension

Additional information about the event:

Name	Value	Description	REQUIRED
ExtIntTag	Integer	Extension tag for integer extension	No
ExtIntValue	Integer	Value of extension annotation	Yes, if ExtIntTag present
ExtFltTag	Integer	Extension tag for float extension	No
ExtFltValue	Float	Value of extension annotation	Yes if ExtFltTag present
ExtStrTag	Integer	Extension tag for string extension	No
ExtStrValue	String	Value of extension annotation	Yes if ExtStrTag present

Some proposed tags and values SHALL be (values can be either integer or float depending on the precision available/needed):

1001	Resting heart rate	bpm
1002	Average heart rate	bpm
1003	Maximum heart rate	bpm
1004	Blood pressure	Encoded (SSSDDD)
1005	Weight	kg
1006	Respiratory rate	bpm
1007	Lung capacity	cl
1008	Temperature	C
1009	Oxygen saturation	%
1010	Calories ingested	kcal
1011	Calories burned	kcal
1012	Steps taken	count
1013	Distance	km
1014	Climb	m

1015	Body fat	%
1016	Metabolic equivalent	MET
1017	Water intake	cl

When appropriate Extension tags are not available in the specification, development codes MAY be used for new applications. These codes SHALL use the format 1xxxx (i.e. integers in the range 10000 to 19999).

### 3.10 Examples

The following is an example Behavioural Atom for the activity: 'Housework', 'Dishes', 'Loading and unloading the dishwasher', 'Load the dishwasher'; the time is accurate to +/- 1 minute; it took place at a given postcode, it was reported by the user with a 100% certainty of the 'Who' field and a general 'Reliability' of 70%, the social context was with a partner.

```
{
  "Header":{"Version":4},
  "Who":{"ConsumerID":"5a702670-ff63-4d1d-ba9d-077dd345ab62"}
  "What":{"Cluster":4,"Class":4,"SubClass":1,"Element":4},
  "When":{"Accuracy":1,"Time":1423515660,"Duration":437},
  "Where":{"Postcode":"UB4 8FE"},
  "How":{"How":9,"Certainty":100,"Reliability":70},
  "Context":{"Social":4},
}
```

The following is an example Behavioural Atom for the activity: 'Travel', 'Non Powered', 'Travelling by bicycle', 'Racing bike'; the time is exact; it started at the given latitude and longitude, it was reported by the user, and an application specific extension indicated that 26.2 km had been travelled.

```
{
  "Header":{"Version":4},
  "Who":{"ConsumerID":"5a702670-ff63-4d1d-ba9d-077dd345ab62"}
  "What":{"Cluster":22,"Class":1,"SubClass":1,"Element":2},
  "When":{"Timezone":"-01:00","Accuracy":0,"Time":1433397180,"Duration":3903},
  "Where":{"Exactness":6,"Latitude":51.53118159161092,"Longitude":-0.4319647327069491},
  "How":{"How":9},
  "Extension":{"ExtFitTag":10003,"ExtFitValue":26.2},
}
```

---

## 4 Conformance

A Data Engine interface for receiving Behavioural Atoms conforms if it meets the conditions set out in Section 2 of this document AND the conformance criteria in **[COEL\_RPE-1.0]**

A Behavioural Atom is correctly formatted if it conforms to the conditions set out in Section 3.

---

## Appendix A. Acknowledgments

The following individuals have participated in the creation of this specification and are gratefully acknowledged:

**Participants:**

Paul Bruton, Individual Member  
Joss Langford, Activinsights  
Matthew Reed, Coalition  
David Snelling, Fujitsu

## Appendix B. Revision History

Revision	Date	Editor	Changes Made
1	22/9/2015	Joss Langford	First full version
2	25/9/2015	Joss Langford	Correction of basic mistakes and omissions.
3	13/10/2015	Paul Bruton	Conformance includes reference to RPE document.
4	19/10/2015	David Snelling	Dealt with SHALL, MAY, and MUST and added examples.
5	26/10/2015	David Snelling	Minor updates to examples.
6	31/10/2015	Joss Langford	Accept all changes, track changes off, check references and style consistency.
7	31/10/2015	Joss Langford	Change history corrected.
8	02/11/2015	David Snelling	Final date change
9	03/11/2015	Paul Bruton	Typographic change following review.
10	25/11/2015	Joss Langford	Fix issue COEL-51: contingent requirements added to use of COEL layers in 3.4.
11	25/11/2015	David Snelling	Set date for CD publication
12	07/01/2016	Paul Bruton	COEL-42 clarification of response codes and updated to WD02
13	21/01/2016	David Snelling	Checked Paul's edits and accepted changes.
14	02/01/2016	Joss Langford	Development field options added for COEL model, place & extension tags (COEL-50).
15	02/01/2016	Paul Bruton	Minor typographic corrections. Clarified that scheme 1 is minimum required and made authentication with scheme 2 mandatory.
16	21/02/2016	Joss Langford	Checked Paul's edits and accepted changes.
17	21/02/2016	Joss Langford	Consent fields added (COEL-54).
18	16/05/2016	David Snelling	Revised consent section (COEL-54)
19	27/05/2016	Paul Bruton	Comments/questions on consent (COEL-54)
20	27/05/2016	David Snelling	Tidying requires fields for consent element.
21	17/06/2016	David Snelling	Removed change tracking.
22	5/07/2016	Joss Langford	Version numbering updated (COEL-57) Consent field updated (COEL-67) Mobile cell removed from where (COEL-69) what3words code added to where (COEL-65)

23	09/08/2016	David Snelling	Accepted some change tracking and made a few other changes.
24	10/08/2016	David Snelling	Added status field to Data Engine information request, COEL-68.
25	14/08/2016	Joss Langford	Cluster range extended (COEL-72). Checked and changes accepted.
26	27/09/2016	David Snelling	Final review: Corrected spelling on artefact and behaviour, missing plural in 3.3, updated the ToC, fixed formatting in table 3.1, deleted 'between' in Exactness value 14, fixed format of extension code in second example, and accepted all tracked changes.  Substantive change: Exactness value 0 was mobile phone tower attached to device. Replaced with unknown.