Final Document

LEXiCON Methodology: Creating relevant authorities and achieving consensus

May 2022

CONSTRUCTION INNOVATION HUB

UK Research and Innovation

About the Construction Innovation Hub

Born out of the Construction Sector Deal and the Industrial Strategy Challenge Fund in 2018, the Construction Innovation Hub (the Hub) brings together world-class expertise from BRE, the Centre for Digital Built Britain (CDBB) at the University of Cambridge and the Manufacturing Technology Centre (MTC).

The Hub is working with over 300 public and private sector organisations across the four core themes of Value, Manufacturing, Assurance and Digital, to co-develop solutions which enable better decision-making, drive digital transformation, improve delivery and accelerate sector recovery. The Hub and its partners are committed to fundamentally transforming UK construction so that it delivers better social, environmental and economic outcomes for current and future generations.

www.constructioninnovationhub.org.uk

About the Construction Products Association

The Construction Products Association (CPA) is the leading organisation that represents and champions construction product manufacturers and suppliers. This vital UK industry defines our built environment, providing the products and materials needed for homes, offices, shops, roads, railways, schools and hospitals. Our industry directly provides jobs for 382,500 people across 24,000 companies and has an annual turnover of £63 billion.

One of the CPA's three main objectives is to help drive the adoption of digital technologies and processes to make for a smarter, more efficient construction industry.

www.constructionproducts.org.uk

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Foreword

Dame Judith Hackitt

In the final report of Building a Safer Future published in May 2018, I made it clear that digital methods would be vital to support the aim of creating safe buildings providing an accurate digital record of products used and how the building was built. The system that covers product testing, information and marketing is undoubtedly complex and time did not allow the scope of my review to extend to do the kind of mapping exercise that was required for products, but it was nonetheless clear that radical change was needed for Construction Products.

My review stated clearly that there was a need for action in at least four different areas:

- Establishment of a more transparent and robust specification and testing regime;
- Streamlining and greater clarity on standards to avoid confusion and misinterpretation;
- Improved product information so that the right products are used in the right applications;
- Traceability – with records maintained for product tracing and system assurance.

In the weeks and months since my review was published the extent of the challenge has become even clearer, as more and more evidence emerges of ways in which building safety can be compromised by inappropriate product substitution, poor installation, inadequate classification, identification and guidance on use, and in a myriad of other ways. At the heart of this is a siloed approach that obstructs a truly joined up realisation of safe built environments and buildings.

I therefore commend the work led by the Construction Innovation Hub and the Construction Products Association on the LEXiCON project, a piece that aims to address particularly the third and fourth areas, and I urge the entire construction products industry and those others working in the built environment to embrace and contribute to the consensus processes necessary to create trustworthy and reliable digital structured product information.

Everybody deserves to feel secure in the knowledge that the buildings in which they live, work and play have been built safely and to the appropriate standards. Provision of trusted digital information on the products and systems that have been used is an essential part of providing the Golden Thread which is key to rebuilding confidence and trust in the sector. Those who are ready and willing to collaborate and promote a joined up approach to product information deserve to be recognised to differentiate them from competitors who are reluctant to change.

The challenge now is for product trade associations and manufacturers to begin their journeys to be part of LEXiCON .

Executive summary

The Construction Innovation Hub (Hub) and Construction Products Association (CPA) have partnered to deliver the LEXiCON project.

The construction industry is made up of several sectors, all communicating in different ways, across many subjects. The products sector is not immune to this fragmentation, and despite various initiatives to harmonise product information, it is still displayed and consumed in diverse and unconnected ways. To realise the true benefits of digitisation, product data needs to be integrated, co-ordinated, and made both human-readable and machine-interpretable.

The aim of the LEXiCON project is to support international good practice for the creation and management of product data by standardising the production, use, and management of Product Data Templates. This will be achieved through the development of a consensus process for the collaborative formation of Product Data Templates and a software platform with a free to access portal to facilitate the creation, grouping, filtering and verification of properties to form the Product Data Templates (PDTs). The templates and properties will be made available on a free to access software platform for the built environment, which will be created by BRE as part of the Hub Programme.

Integral to the success of the LEXiCON project is industry engagement incorporating a wide variety of experience and perspectives. In 2016, LEXiCON was conceived as a method to support such ambitions, however it became clear that the task was far more significant and complex than had initially been anticipated. As the project expanded, so did the conversation on the need to consider an ever-increasing amount of data, procedures and standards.

Further work was therefore needed before LEXiCON could proceed, with the present phase of the programme beginning in 2019 with the launch of the Construction Innovation Hub. Subsequently, a voluntary working group from the built environment was convened in February 2020 with the task of delivering the scope of the LEXiCON project, specifically, but not restricted to, defining the concept and consensus methods of 'Relevant Authorities' (RA), and alongside this, identifying system requirements to support the specified RA processes.

Notwithstanding the COVID-19 pandemic and the effects of a largescale furlough scenario throughout the construction industry during a considerable amount of 2020, the working group were able to commence and maintain a three weekly workshop schedule via Microsoft Teams resulting in the publication of this document. In July 2021, the Hub and CPA launched the consultation document of the LEXiCON Methodology: Creating Relevant Authorities and achieving consensus, and sought public comment from the wider industry on the proposals therein. Subsequently the comments from the consultation have been reviewed by the project working group by consensus. The result is this document, an industry agreed process that defines the broad principles necessary to achieve informed and trustworthy PDTs to benefit the entire supply chain.

The next steps of the LEXiCON project will aim to further develop the consensus processes and software platform as described in the body of this document. It has also been identified that Data Templates can play an important role in helping to support a security-minded approach. This document only provides an outline for where these opportunities exist within the LEXiCON process, but like the consensus processes, will need to be refined further.

Consultation

The success of the LEXiCON project is dependent on the processes and structures outlined in this document adequately reflecting the requirements of the built environment, both providers and users of product information.

The public consultation for the original document has now closed A summary of the findings and the results of the consultation can be found at https://constructioninnovationhub.org.uk/wp-content/uploads/2021/11/2021_LEXiCON-Consultation-Summary-Report.pdf.

The Hub and CPA thank everyone who took the time to consult and share their feedback, much of which has been assimilated into this final version.

Next steps

Development of the LEXiCON project and its planned work packages which include:

- Develop and maintain industry engagement in order to ensure a consensus approach;
- Review the complex standards and ontologies landscape to determine a best fit approach to support the digital creation and management of product data;
- Define the required processes for creation and management of RAs; and
- Develop a supporting product templating application to facilitate RA processes.

The project will also create and consider proof-of-concept and demonstrations of hub created exemplar templates and also engage in trials with early adopters.

1. Scope

This document describes and sets out LEXiCON as a process aiming to define the concept and consensus methods of 'Relevant Authorities' (RA) and their Working Groups (WG) and also aiming to identify system requirements to support the specified RA and WG processes.

This document begins to explain the process workflows required to create consensus views and tools to support Product Data Templates (PDTs) in the Built Environment.

This document also describes the 'people' element required to create an impartial, yet robust, structure in which LEXiCON can fully operate.

As the ultimate output will be Product Data Templates and the ability to create Product Data Sheets from the templates, this document describes the actors who may be involved in a PDT/PDS workflow and also further explains a range of use cases.

This document has been written for the UK construction industry and may also cover products imported from other countries.

NOTE Whilst the authors have adopted the 'tone' of a Standard, for ease of writing, this document is not a Standard and should not be considered as such.

2. Reference to standards

The following documents are referred to in the text. For dated references, only the edition cited applies.

BS EN ISO 23386:2020	*Building information modelling and other digital processes used in construction — Methodology to describe, author and maintain properties in interconnected data dictionaries*
BS EN ISO 23387:2020	*Building information modelling (BIM) — Data templates for construction objects used in the life cycle of built assets — Concepts and principles*
PAS 14191:2020	*Built environment — Management and operation of interconnected construction data dictionaries — Specification*
BS EN ISO 12006-3:2016	*Building construction — Organisation of information about construction works — Part 3: Framework for object-oriented information*

3. Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1. Consensus

General agreement, characterised by the absence of sustained opposition to substantial issues by any important part of the concerned interests and by a process that involves seeking to take into account the views of all parties concerned and to reconcile any conflicting arguments

NOTE Consensus need not imply unanimity.

[SOURCE: ISO/IEC Guide 2:2004, definition 1.7]

3.2. Construction object

Object of interest in the context of a construction process

EXAMPLE 1 The construction object ‘wall’ is a type of system.

EXAMPLE 2 The construction object ‘calcium silicate masonry unit’ is a type of product.

[SOURCE: BS EN ISO 23387:2020, definition 3.4]

[SOURCE: ISO 12006-2:2015, 3.1.2, modified]

3.3. Data dictionary

Database that contains metadata

[SOURCE: ISO 2382, 2121501, modified - The admitted term “information resource dictionary” has been removed. The notes to entry have been removed.]

Data dictionaries shall implement one of three levels of functionality:

- Properties and grouping of properties only (Type 1);
- Properties and data templates (Type 2); and
- Properties, data templates and data sheets (Type 3).

NOTE A dictionary can contain extra functionality, creation and hosting of data templates and the creation and hosting of completed templates (data sheets).

[SOURCE: PAS 14191:2020, definition 4.1]

3.4. Data sheet

Data template that is populated

[SOURCE: PAS 14191:2020, definition 3.4]

3.5. Data template

Schema providing a data structure used to describe the properties of objects

[SOURCE: PAS 14191:2020, definition 3.5]

3.6. Group of properties

Named collection of properties

3.7. Interested party(ies)

Person(s) or organisation(s) that expresses legitimate interest in properties or groups of properties in a data dictionary

NOTE This term is synonymous with 'Expert', as defined in BS EN ISO 23386:2020

[SOURCE: PAS 14191:2020, definition 3.10]

3.8. LEXiCON Board

It is recommended that a LEXiCON Board be created that will consists of a Chair and a Vice-Chair, alongside incorporating BRE and CPA representation as initial joint programme owners. The Board will also consist of the LEXiCON Steering Group Chair, other members drawn from the LEXiCON Steering Group and a Secretariat.

For the purposes of intelligibility, it is assumed that a LEXiCON board will be created in the future to oversee the LEXiCON Methodology, and therefore the remainder of the document and procedures within have been authored in this context.

3.9. LEXiCON Steering Group

LEXiCON steering group is a group of users made up from the wider user membership creating a broadchurch view to inform LEXiCON Board policy making.

3.10. Product

Construction product

Item manufactured or processed for incorporation in construction works

[SOURCE: BS EN ISO 23387:2020, definition 3.9]

[SOURCE: ISO 6707-1:2017, 3.4.1.3, modified]

3.11. Property

Inherent or acquired feature of an item

NOTE Examples include thermal efficiency, heat flow, sound reduction index, colour, voltage

[SOURCE: ISO 6707-1:2017, 3.7.1.3, modified]

3.12. Relevant Authority

A recognised body with a requisite expertise concerning products included in its area of jurisdiction

NOTE Examples of a Relevant Authority may include; a Trade Association acting within its remit, a group of manufacturers producing similar product types which is assembled ad-hoc, an individual manufacturer making a unique product.

All of the above examples should be the starting point for a Relevant Authority and other interested parties should be invited to join. Acceptance of each Relevant Authority shall be by the LEXiCON Board.

3.13. Secretariat

Body responsible for the secretarial, clerical and administrative affairs

[SOURCE: PAS 14191:2020, definition 3.16]

3.14. Security-minded

Understanding and routinely applying appropriate and proportionate security measures in any business situation so as to deter and/or disrupt hostile, malicious, fraudulent and criminal behaviours or activities

[SOURCE: BS EN ISO 19650-5:2020]

3.15. Working Group

A subdivision of a Relevant Authority, including Interested Parties from outside the RA, tasked with authoring and maintaining one or more PDTs

4. LEXiCON project

The LEXiCON project has been created to facilitate a built environment cross-sector data dictionary and Product Data Template (PDT) initiative and repository which will create common and agreed ways in which to describe common construction products.

The LEXiCON project comprises the process, platform, and people, as described in the sections below, who will work together to provide consensus views and tools to allow as seamless a method as practicable for the exchange of product information between parties.

The LEXiCON project is being delivered in partnership between the Construction Innovation Hub (the Hub), the Construction Products Association (CPA) and the Building Research Establishment (BRE).

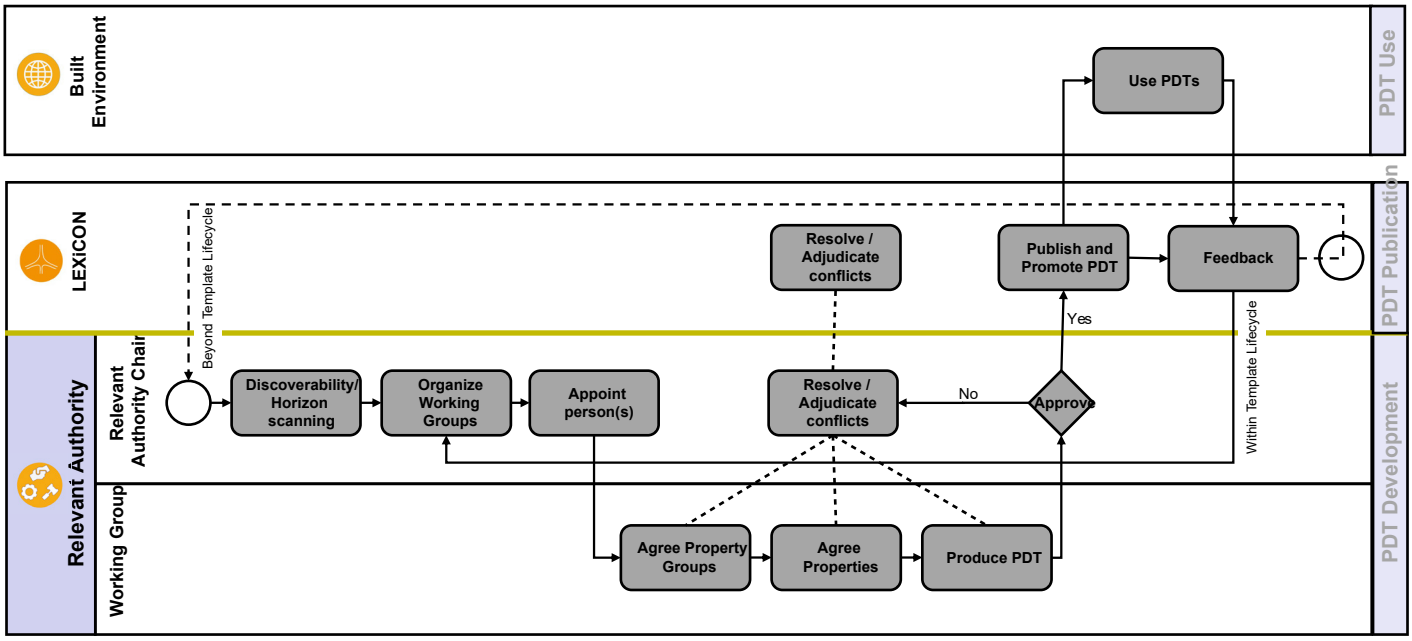

Figure 1 Simple diagram of the LEXiCON project landscape.

5. LEXiCON process

The LEXiCON process is a series of workflows which respond to the need for appropriate product data exchanges in a digital manner. These workflows are a combination of human and platform interactions that identify construction product types and create a set of properties that describe the product type and are of use to recipients of the data.

The overall LEXiCON process can be defined as a series of steps, as shown below in *Figure 2*. Each step will have processes within them to make sure that there is proper oversight and accountability for each decision taken.

Figure 2 LEXiCON process workflow.

5.1. Identify topic

The 'Topic' is synonymous with the title of a Product Data Template (PDT). Topics may be suggested in several different ways, no preference is given to any particular method of suggestion.

Agreement that a topic is relevant and hence an appropriate suggestion, rests ultimately with the LEXiCON Board. This decision should be made using the general consensus principle.

The identification of a topic shall comprise a suggested title for a PDT and a description, which shall be sufficiently robust to describe the breadth of products described and any specific or general exclusions. This title and description may be subject to change during the authoring process.

Titles and descriptions for many construction products may be found in the British, European or International standards that govern the construction and testing of said products. These descriptions should be used, except where there is reasonable cause to alter or amend.

5.1.1. Trade Association or Relevant Authority suggestions

A trade association, which may also be operating as a Relevant Authority, may suggest PDT topics to the LEXiCON Board. It would be generally assumed that the experience of the trade association or RA will be such that the topic will usually be appropriate.

Trade associations commonly have their own internal working groups that cover topics within the remit of the trade association, these groups should be the source of topic suggestions.

Relevant Authority is further described in Section 8.

5.1.2. Consultant or Contractor suggestions

Designers and constructors (consultants and contractors) may suggest topics to the LEXiCON Board. It is not uncommon for these groups to use different language when describing products (e.g., when considering Steel Wire Cable Tray, Cable Basket is the common term used by designers and constructors, whilst Wire Mesh is more often used by manufacturers), the term to be used shall be decided using the following options in the order stated:

- Term used in product and process standards (e.g. BS EN 61537 Cable Ladder and Cable Tray Systems; BS EN ISO 23387 Data Templates for construction objects etc);
  - International;
  - European; and
  - British.
- Term used by trade association or RA;
- Term used by manufacturers; and
- Term used by designers or constructors.

In case of disagreement, the LEXiCON Board shall be the final arbiter.

5.1.3. Manufacturer suggestions

A manufacturer may individually suggest a PDT topic or topics. It may be the case that the manufacturer is not a member of the relevant trade association or that no trade association exists for the topic. The LEXiCON platform will have the functionality to suggest new topics.

5.1.4. Others

There may be many other sources of potential topics. None shall be dismissed arbitrarily. Possible other sources include, but are not limited to:

- Classification systems;
- Academia;
- Built asset owners; and
- Maintainers and Facility Managers.

5.2. Assign Relevant Authorities

The decision to proceed with a topic and create a PDT rests with the LEXiCON Board. This decision shall be taken in consultation with all Relevant Authorities (RAs). Most RAs will not have an opinion on a potential topic, as it falls outside of their remit. If the topic falls within the remit of one or more RA, then said RA(s) shall be considered for leading the authoring process and have the topic assigned to them.

If an RA deems that the suggested topic is already covered by an existing PDT within the LEXiCON platform, or by a PDT in the process of authoring, the suggesting party shall be informed and may be registered as an interested party in the existing PDT working group.

If more than one RA has the topic within their remit, then agreement shall be sought, between the RAs, as to which RA shall take precedence. In cases where agreement cannot be reached, the LEXiCON Board shall be the final arbiter.

Once an RA has been assigned a topic, they shall remain the custodian of that topic until such time as they choose to surrender the topic, or a more suitable RA is found. The decision to move a topic from one RA to another shall, in the first instance, be by agreement between RAs. If agreement cannot be reached, the LEXiCON Board shall be the final arbiter.

If an RA is disbanded, the topic shall be considered orphaned, and a suitable new RA shall be sought by the LEXiCON Board.

5.3. Assign Working Group

The Relevant Authority (RA) shall create a Working Group (WG) for the purpose of creating, authoring, and maintaining a PDT on a topic. The initial members of the WG shall be drawn from members of the RA with knowledge and experience of the topic product type.

Generally, a WG shall be responsible for a single topic. However, if families of products are possible and cannot be described in a single PDT, a WG may take responsibility for the entire family.

Membership of a WG shall not be confined to members of the parent RA. Refer to section 5.4 for further details about identifying interested parties.

At the inception of a WG, a lead shall be appointed using the general consensus principle. If consensus cannot be reached, the RA shall appoint a chair.

For larger WGs, it may also be useful to appoint a deputy lead.

WG leads and deputy leads may remain in post for the life of the WG. It shall be possible to replace the lead and any deputy leads in any of the following circumstances:

- Lead or deputy lead steps down;
- An agreed term of office is expired;
- The WG or RA agree, by general consensus, that the lead or deputy lead(s) step down; or
- Other circumstance that prevents either the lead or deputy lead(s) from carrying out their duties.

5.4. Identify interested parties

Interested parties shall be any person with a legitimate interest in information exchanges related to a product topic. These parties shall be drawn from those who generate or receive the product information.

The initial interested parties in a Working Group (WG) shall be drawn from the parent Relevant Authority (RA). Additional interested parties shall be sought, by the Working Group, in consultation

with other RAs and those that are not associated with any RA. Examples of those not associated with an RA are shown below:

- Appointing parties;
- Designers;
- Constructors;
- Commissioning engineers;
- Operators;
- Maintainers; or
- Facility managers.

NOTE The above list is not exhaustive.

Inclusion of interested parties from outside the RA shall be decided by the WG lead. In case of dispute, this shall be initially elevated to the RA, if no satisfactory resolution is achieved there, then it may be further elevated to the LEXiCON Board. The decision of the LEXiCON Board shall be final.

An interested party may be removed from a WG if they:

- Do not wish to continue in the role;
- Are unable to continue in the role;
- Are asked to leave by general consensus of the WG;
- Are asked to leave by general consensus of the RA; or
- Are asked to leave by general consensus of the LEXiCON Board.

Decisions made by the WG, RA or the LEXiCON Board shall be clearly communicated to the interested party. Disputes may be elevated from the WG to the RA and from the RA to the LEXiCON Board. The decision of the LEXiCON Board shall be final.

All interested parties shall consider a security minded approach to generating a PDT. Some product types will be more sensitive than others, but all product types may have some security implications. It may be useful to include a security specialist as an interested party for some product types.

5.5. Create PDT

A PDT shall be created, in the LEXiCON platform, using a template that shall contain the properties suitable for all PDTs which in simple terms might be referred to as the ‘Master Template’. Properties and groups of properties shall be added as required by discussions with the interested parties assigned to the working group, to adequately describe the product type, which can be viewed and referenced by the built environment industry and any other interested party.

The PDT shall be created so that, as far as is possible, it is suitable for describing products from any manufacturer and shall not be written to favour, or in light of, one manufacturer’s products or product range over another.

Properties for describing the product type shall, in the first instance, be drawn from the data dictionary contained within the LEXiCON platform. If a required property does not exist within the LEXiCON data dictionary, a new property shall be created and added to a suitable group of properties. Product standards and other joint industry documents may be used as reference material.

It may be beneficial, in terms of time taken and consistency, to assign a lead author to write the PDT. This shall be done in consultation with and agreement of the other members of the working group. The decision to assign a lead author shall rest with the lead of the working group.

During the PDT authoring process, the PDT shall be marked as 'Draft' and shall not be available for viewing or editing by any persons other than the members of the working group.

Prior to consultation with other parties on the PDT, general consensus shall be attained within the working group on the completeness of the PDT. When this consensus is reached, the PDT may progress to consultation, see section 5.6.

5.6 Consultation

After a PDT has been through the creation process detailed above, it shall be subject to consultation on the properties used to describe the product type. At this stage, the PDT shall be marked 'Draft for Consultation'.

This consultation shall be open to any user registered within the LEXiCON platform.

All Relevant Authorities (RAs) and Interested Parties, who are not members of the Working Group (WG) shall be notified when a PDT is made available for consultation.

The consultation period shall not be less than two weeks of five clear working days each.

Comments shall be posted against each property that the comment is referring to, with the name of the commenter shown. All comments should state the issue with the property against which it is posted, the reason why it is an issue and should propose a solution to the issue. Comments that do not meet these criteria may be ignored by the WG during comment resolution.

After the consultation period ends, the WG shall convene a comment resolution meeting and assess the merits of each comment. Each comment should be resolved with general consensus and any agreed actions noted and changes made to the PDT.

All comments and decisions taken on a revision of a PDT, by the WG, shall be recorded.

Comments received after the end of the consultation period may not be considered by the WG.

If general consensus cannot be reached, the Relevant Authority (RA) shall be consulted to help reach a conclusion. If the RA cannot reach a conclusion, then the LEXiCON Board shall be consulted. The LEXiCON Board decision shall be final.

It is recommended that LEXiCON develop a security-minded process that occurs prior to template consultation where sensitive properties may be identified and marked as such. The inclusion of such a process will help the supply chain and client organisations recognise where data may be sensitive. As Data Templates are separated from projects, there is a recognition that sensitive properties are to enable downstream use of data templates and data sheets to adequately consider how to handle the

data within its context. It does not serve as a substitute to security-mindedness happening at project level, but as an aid and indicator when applying PDTs. The development of a security minded process is something that will be refined over time and is beyond the scope of what has been set out for Relevant Authorities and Working Groups.

5.7 Publish

After all comments have been resolved and required changes agreed and made, the PDT shall be made available for general use and shall be marked 'Published'.

If a PDT is Published for the first time, it shall be marked 'Revision 1' and 'Version1'.

NOTE Revision denotes major change and Version denotes minor change.

If a minor change is required, for example to correct a typographical error, the Version shall be increased by one, for example, Version 1 has a minor amendment, it shall now be Version 2. No consultation shall be required for Version changes.

If a major change is required, for example an additional property or group of properties is added, the Revision shall be increased by 1, for example, an additional property is added to a PDT at Revision 1, it shall now be Revision 2.

Revisions and Versions may be shown as a concatenated field, i.e. Revision. Version, e.g. 01.02 for Revision 1 and Version 2.

5.8 Review

Product and materials technology is constantly evolving and as such, the information requirements may change. It is therefore necessary to review the product information requirements as shown on a PDT.

All PDTs shall be subject to periodic review to ensure they are current and correct. During the period between reviews, comments may be made by any registered LEXiCON user on a PDT, these comments shall be considered during the review process.

The review shall be carried out by the original Working Group (WG). If the WG is no longer functioning, a new WG shall be formed by the Relevant Authority (RA). If the RA is no longer functioning, a new RA shall be sought by the LEXiCON Board.

The review process shall be conducted in the same manner as a comment resolution meeting, with the additional task of understanding any changes in the product or material technologies, or general product information requirements, that may have changed since the last review.

If any changes are made to the PDT, then the Revision shall be increased by one.

It is suggested that the maximum period between reviews shall be one year. A review process may be carried out before that time is elapsed, if, in the opinion of either the WG, RA or LEXiCON Board, that the PDT requires review and/or updating.

NOTE A review may be required when technical changes to product types or product information

requirements happen, or if a significant error is found in the PDT as Published.

The review process may conclude that the PDT should be withdrawn or fragmented into two or more distinct PDTs.

NOTE It would be generally expected that, in the case of a fragmented PDT, that the same WG would take responsibility for the new PDTs.

Any changes made shall be subject to consultation and comment review in the same manner as for a new PDT. All RAs and interested parties shall be notified of the consultation and further notified when the revised PDT has been published.

6. LEXiCON platform

The LEXiCON platform will be an open, free to access and use product data templating application for the construction industry and the wider built environment, that will support the LEXiCON process and demonstrate the coordinating benefits that it should bring.

For many in industry, there is a journey of alignment to the standards that enable interconnection, and that is true also for the many existing solutions that could be deemed as having the qualities of data dictionaries and aiming to become interconnected in some way; either in a consumption capacity or as a contribution to other data dictionary authoring platforms. The LEXiCON process adds a coordinating dimension to this, and is as much about capturing the rich input from knowledge sources and recognising that each perspective co-exists with others as it is about acting as a framework and protocol which lends provenance to what is created.

The application will operate as a Type 2 data dictionary as defined in PAS 14191:2020; that is, a data dictionary that implements the functionality of properties and data templates.

The development of the LEXiCON platform is running in tandem with the creation of the consensus processes as described in this document and further workshops are planned to develop the platform further, incorporating user stories that have been identified in previous workshops using Agile techniques and methods.

6.1. Development methodology

The Construction Innovation Hub Programme have adopted an Agile organisational set-up for the delivery of the individual technical workstreams to best support the innovation management character of the programme, reduce the overall time to market for products and services that are developed within the Hub and integrate continuous stakeholder feedback and improvement cycles.

The agile project approach tailored and implemented for The Hub is based on a ‘Scrum’ approach providing a lightweight framework and delivers usable results at the end of each ‘Sprint’. Technical and user related features of the solutions developed are prioritised according to value and size and are re-assessed continuously throughout the lifetime of the project to ensure potential changes to direction are captured and embedded. This helps the teams to avoid developing features and functionality that have a low value or will potentially not be used by any future client of the solution.

As the construction product data workstream is heading now more towards user related features, the LEXiCON project is capturing and evaluating stakeholder key Ideas and Inputs to develop a customer-centric and user-friendly solution.

NOTE 1 Scrum is a lightweight framework that helps people, teams and organisations generate value through adaptive solutions for complex problems.

NOTE 2 Sprint is a Scrum event, time-boxed to one month or less.

[SOURCE: Scrum Glossary, Scrum.org]

7. LEXiCON people

It is recommended that the LEXiCON people will consist of a LEXiCON Board as set out in Figure 3 below. The Board would then consist of a Chair and a Vice-Chair, alongside BRE and CPA representation as joint programme owners. The Board should also consist of the LEXiCON Steering Group Chair, and other members drawn from the LEXiCON Steering Group and a Secretariat.

The layer beneath the LEXiCON Board should consist of the LEXiCON Steering Group and Relevant Authorities (RA). Relevant Authorities and their Working Groups (WG) are described in sections 8 and 9.

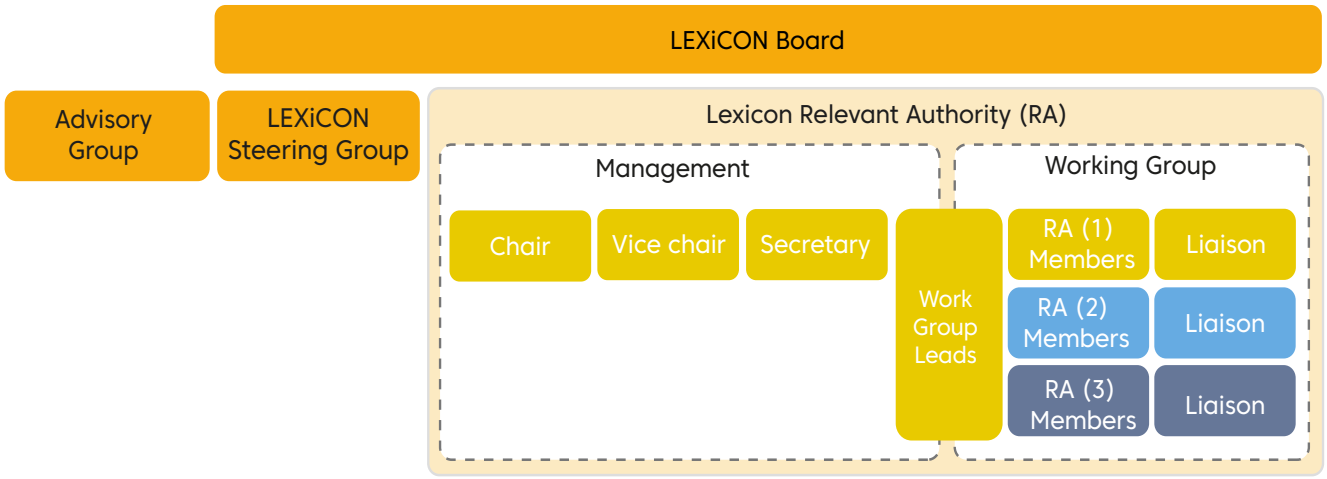

Figure 3 The LEXiCON people.

8. Relevant Authorities

The procedural content of LEXiCON is to be delivered by 'Relevant Authorities' (RA). These should facilitate a mix of built environment and topic driven secretariats organising committees for the creation, verification, and maintenance of Product Data Templates (PDTs) and associated properties.

An RA is a group of interested parties who are an appointed and recognised body for driving and governing the management of PDTs and parameters used in the construction of the PDTs. An RA should set rules and establish their own management procedures around the creation of its PDT requirement and check compliance with these rules during the PDT Working Group (WG) operation.

Ideally, an RA should be formed under, by or from a Trade Association and should be representative of industry. The RA should oversee an approach that is interoperable, non-burdensome and consensus-based in the management and sign-off of PDTs to ensure that they have been created in an integrated, coordinated, human readable and machine interpretable format. An RA should then review the PDTs created by its WG or WGs, thus facilitating the dissemination of structured product data to the marketplace in a free to access format.

In simple terms, an RA can be defined as a recognised body with a requisite expertise concerning products included in its area of jurisdiction.

8.1. Formation of an RA

An RA should be formed from an existing group or organisation that has both a recognised and legitimate interest in a particular area of construction products included in its remit, ideally utilising Trade Associations and/or Technical Committees if Trade Associations do not exist for a particular area.

Where no existing group, individual or organisation is available then a more ad-hoc RA may be formed, remembering that an RA should be formed around objects or products from a common industry.

Once an RA has been formed, there will be a need to appoint people to certain roles required by the LEXiCON project for the management of the RA (see 8.2)

Prospective RAs should identify the need with LEXiCON and then apply and register.

A simple workflow would be as follows:

- Identify the need with LEXiCON;
- Apply to LEXiCON and register the RA;
- Landscape review to check for any overlap or duplication;
- Successful formation and registration of the RA; and
- Begin to assign roles (see 8.2).

8.2. Parties involved in an RA

RAs should ideally have a structure to their make-up. This would entail a layer of management and a second layer of either a single WG or, in some cases, multiple WGs.

The management layer would consist of:

- Chair;
- Vice-chair;
- Secretary; and
- WG leader or leaders.

The WG layer would consist of:

- WG leaders;
- WG members (interested parties see 5.4);
  - Interested parties drawn from the RA;
  - Additional interested parties drawn from the built environment; and
  - Other parties which may be relevant but not yet considered.

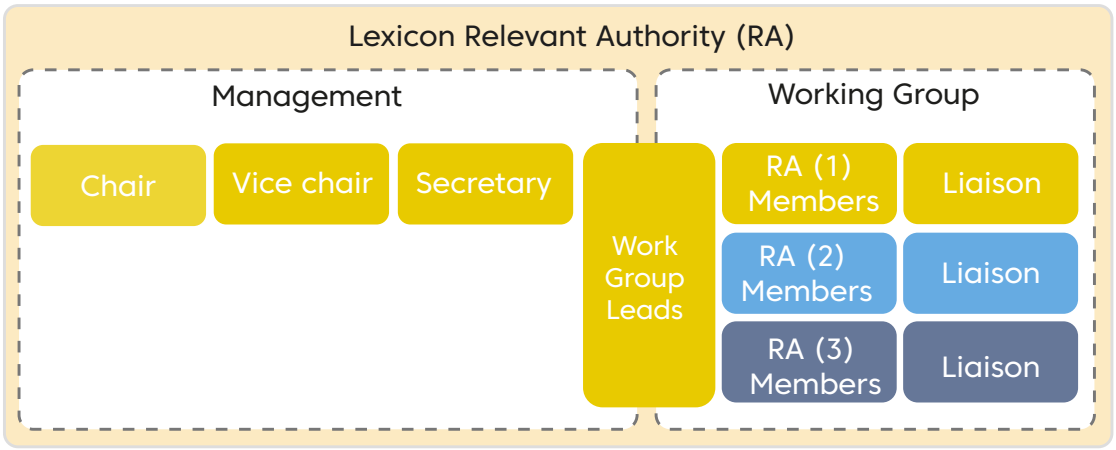

Figure 4 Parties involved in an RA.

8.3. Roles and responsibilities

Each RA will have a number of roles and responsibilities which will allow RAs to function in a structured, uniform way.

8.3.1. Roles

The roles that an RA would be expected to play are listed in the table below. A RACI model has been applied to determine the positioning of each party involved.

Roles	RA Management	RA Chair	LEXiCON Board	WG	WG Lead	Interested parties
Organise groups of people into PDT working group	R	A				
Identify what PDTs are within the remit of the RA & prioritise	A		C			
Manage the processes (consensus) and develop operating procedures	A					
Produce & maintain (including deprecation) PDTs through the organised groups	A			C	R	
Publish and promote the PDTs (including re-publishing)			R,A		C	I
Manage internal governance to assign roles and responsibilities pertaining to LEXiCON	R		A			
Communicate the scope to all relevant stakeholders to aid the creation (writing) of the PDTs	A			I	R	
Approve/ratify the work of interested parties			C	R	A	I

Table 1 Roles appertaining to an RA.

RACI is a responsibility assignment matrix and is used to clarify and define roles and responsibilities in cross-functional processes.

WHO IS **R** ESPONSIBLE
WHO IS **A** CCOUNTABLE
WHO SHOULD BE **C** ONSULTED
WHO NEEDS TO BE **I** NFORMED

It may also be a requirement of an RA to arbitrate and resolve any conflicts that may arise.

Scenarios of conflict could be:

- WG conflict;
- RA conflict;
- Process conflict; or
- Digital conflict.

An RA should also utilise a feedback mechanism to LEXiCON for the purpose of improvements.

Scenarios of improvements could be:

- Process improvements;
- Communication improvements; or
- Bug reporting.

8.3.2. Responsibilities

RAs will also have a set of responsibilities to maintain good practice as follows:

- Respond to the requirements of LEXiCON;
- Be answerable to public comment;
- Oversee any revisions;
- Understand, clarify and declare their remit;
- Engage with associated RAs to ensure alignment across the board;
- To be inclusive, open, ethical, neutral, trustworthy, supportive, value data driven, work for the common good and be independent of software or other commercial bias;
- To maintain templates over time; and
- Champion LEXiCON process

9. Working Groups

Working Groups (WGs) will be the creators of the actual PDTs. A WG is a group of interested parties working to achieve specified goals relating to a PDT or a group of PDTs. WGs may have responsibility for a single PDT or for multiple PDTs as required by the RA. WGs may be formed to create a specific PDT and then disbanded or they may be formed to create multiple PDTs and therefore operate as a WG for an unset period of time. A WG will author and maintain the PDTs which it creates, report back to its governing RA and maintain due diligence and transparency whilst following any rules and requirements set down by the RA and/or the LEXiCON process.

9.1. Formation of a WG

A WG should be formed by a RA due to the requirement(s) of a PDT(s). Ideally, members of the WG would be sourced from the RA itself and from other interested parties outside of the RA. A WG Lead should be assigned which forms the liaison between the WG and its corresponding RA. Other WG roles may also be assigned if required; for example, tasks such as editing.

It should be recognised that not all WGs will be the same size. In some cases, WGs may be considerably larger than others which will be dependent upon the initial size of the RA and the volunteer interested parties.

9.2. Parties involved in a WG

WGs should ideally have a structure to their make-up. WGs will consist of membership drawn from the RA itself with additional support provided by interested parties and, where required, temporary members for the purpose of answering specific questions or providing specific product information relevant to the PDT upon which the WG is working on.

Composition would consist of:

- WG Lead;
- WG members;
  - Drawn from the RA; and
  - Other interested parties drawn from outside of the RA;
- Temporary members as required.

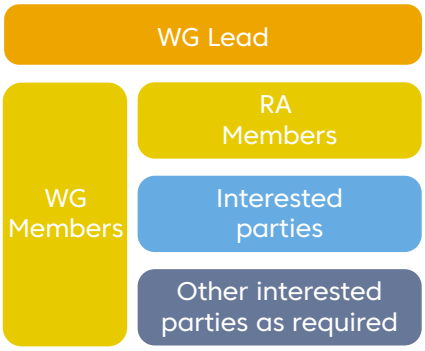

Figure 5 Parties involved in a WG.

9.3. Roles and responsibilities

Each WG will have a number of roles and responsibilities which will allow both WGs and RAs to function in a structured, uniform way.

The roles that a WG would be expected to play are listed in the table below.

A RACI model has been applied to determine the positioning of each party involved, as previously applied to the RA.

Roles	LEXiCON	RA	WG	WG Lead	WG members	Interested parties
Demonstrate due diligence and transparency			R	A		
Produce and maintain, including deprecation, PDTs through the organised group		A	C	R	I	
Agree property groups and their constituent properties including any units/enumerations		A	C	R	I	
Publish and promote the PDTs to the RA	R,A		I	C		
Communicate the scope to all relevant stakeholders to aid the creation of the PDTs		A	I	R		
Appoint persons with relevant expertise as interested parties				R		
Approve/ratify the work of the interested parties	C		R	A		I

Table 2 Roles appertaining to a WG.

A simple PDT creation process within a WG should follow the basic outline steps as shown below:

Figure 6 Example PDT creation process.

It may also be a requirement of a WG to arbitrate and resolve any conflicts that may arise.

Scenarios of conflict could be:

- WG conflict.

A WG should also utilise a feedback mechanism to the RA for the purpose of improvements.

Scenarios of improvements could be:

- Process improvements;
- Communication improvements; or
- Bug reporting.

10. Product Data Templates

The output from the RAs and their corresponding WGs will be the creation of Product Data Templates (PDTs).

The purpose of a PDT is to be a cross-industry standard for data on a product type which asks questions relevant for all products within the product type.

PDTs within the LEXiCON platform will be owned by LEXiCON, who will provide a no derivations use of the PDT for manufacturers to create PDSs, which they in turn will own.

Other PDT providers should be working together as per PAS 14191:2020.

As well as 'Product' Data Templates there are other types of Data Templates used in the built environment. The relevant scope of the data template should be used together with the term 'data template'. For example, a data template for a product is named 'product data template'. A data template for a system should be named 'system data template', and a data template for a space should be named 'space data template', etc.

Full descriptions from BS EN ISO 23387:2020 and PAS 14191:2020 should clarify the concept of a PDT.

EXAMPLE 1 A data template can be used in an information exchange for a specific purpose for a construction object in the inception, brief, design, production, operation and demolition of facilities.

EXAMPLE 2 A data template provides manufacturers a standardized data structure that can be applied to any internal system and/or process of handling product data.

11. Product Data Sheets

A Product Data Sheet (PDS) is a version of a PDT with the values for a specific product or product range added by the manufacturer.

When a manufacturer completes a PDT it becomes a PDS – a 'digital' description of the product. PDSs are owned by those that complete them.

The standard format of the PDS enables the user to automate their data operations. A PDS is product specific as opposed to project specific.

PDSs should be hosted by the manufacturer on their own website and/or within a data dictionary with the correct functionality (see PAS 14191:2020).

12. PDT/PDS Users and Use Cases

The PDT provides the consistent data structure whilst the PDS provides the actual useable data for the product.

12.1. Actors

The Actors in a PDT/PDS workflow are those that have an interest, input, or use for a PDT or PDS. It may be that they wish to have input into the questions a PDT asks, have a purpose for the output data, or just have an interface with the overall data management process.

This list is not exhaustive and is in alphabetical order.

12.1.1. Appointing party

An appointing party (may also be known as Client or Employer) will have some input into what is required of the product data, as it is harvested from the products selected for the project. This should be part of the Exchange Information Requirements (EIR) and/or Asset Information Requirements (AIR). It may not be driven by the appointing party directly, but they should be the conduit through which the requests come.

A completed PDT (PDS) will usually cover most of the product data requirements generated by the appointing party.

NOTE See BS EN ISO 19650-1 for terms and definitions ie: Client/Employer/Appointing Party

12.1.2. Chartered Institutions

The chartered institutions are generally the professional bodies for those requesting product information via the use of PDTs, be they designers, constructors, commissioning engineers or facility managers.

Chartered institutions may help channel the collected requirements of a market sector, such as structural engineering, architecture, building services engineering or landscape architecture.

Chartered institutions could be considered as a Relevant Authority for the receipt of product information (as opposed to a Relevant Authority as described here as the providers of product information).

12.1.3. Designers

Designers be they Architects (and Technologists), consultant Engineers, Landscape Architects or other, will have use for the PDS when selecting products that will fulfil the needs of their designs.
This may be the first time that actual products are considered for the project and the Designer's ability to compare like with like will help them make the appropriate decision.

A Designer may use the Product Data Sheets programmatically to embed data into the design model, to drive geometry or performance criteria, or it could be used in a more simplistic way to compare product information side by side.

12.1.4. Manufacturers

Manufacturers are the most important of groups within the PDT arena. They supply the majority of the technical expertise to write the PDTs and the product data to turn the PDTs into PDSs.

The PDT mission is seen as helping the manufacturer in that it should help to remove the on-going requirement of completing product information requests from consultants and contractors alike on a project-by-project basis, repeating the task of filling in equipment data sheets in a variety of formats.

It is essentially only catalogue (published) information that the PDT seeks to answer, so the majority of the product data should already exist with manufacturer organisations. The PDTs seek to provide this existing product information in a standardised way.

12.1.5. Suppliers, wholesalers, merchants and resellers

Suppliers and resellers are seen as data aggregators, bringing together the product information from various manufacturers whose equipment they supply to contractors. Where a manufacturer is based abroad and may not have a set of PDSs, the suppliers and resellers can prompt them to supply product data by sending PDTs to them.

12.1.6. Tier 1 Contractors

The tier 1 contractor may use the PDS data to assist in the procurement, comparison and analysis of suppliers' products to ensure that the design is made reality in as accurate a way as possible. This product data can then be used again to provide operations and maintenance schedules and models and pre-load the Facilities Management systems.

Supply of these PDSs will usually be via the lower tier contractors who will be responsible for aggregating data for their speciality and passing it up to the tier 1 contractor, along with the project specific data that they will be generating.

As the format of the PDSs will be predictable, the contractor will be able to programmatically input this into various databases to assist in their work.

NOTE A tier 1 contractor is the main or principal contractor

12.1.7. Tier n Contractor

The contractors working for the tier 1 contractor will be the main aggregators of the product data harvested from the PDSs for their design, procurement, and construction work. How the PDS data is applied to the project is a matter for each project team, but the consistency of format will allow this to be flexible and not a prescriptive approach.

Suppliers and manufacturers who have not yet completed their PDSs can be prompted by the specialist contractor to do so, by providing them with the PDT for them to complete. This work will then be done ready for the next time data is requested on this product.

NOTE A tier n contractor is any sub-contractor to the tier 1 contractor

12.1.8. Trade Associations

Trade Associations have been critical to the success of the PDT mission to date. They have acted as neutral arbiters, allowing competing manufacturers to come together and agree the fields that go to make up a PDT. They provide the technical expertise for ranges of product types, bringing collective experience to cover the entirety of their market sectors.

12.2. Uses and Purposes

There are many uses and purposes to which PDTs and PDSs can be put; the following is a series of examples but any time that data relating to Products is used in a construction project, the PDTs and PDSs may have a role to play. Where properties on the completed PDT/PDS have been identified as sensitive, a security-minded approach should be adopted by all parties in their use.

This list is not exhaustive and is in alphabetical order.

NOTE The inclusion of a security-minded process in LEXiCON could help promote the adoption of security-mindedness in a PDT's usage. Where properties on the completed PDS have been identified as sensitive, a security-minded approach should be adopted by all parties in their use, in addition to any context sensitive data identified by following BS EN ISO 19650-5 at the project level.

12.2.1. Catalogues

As a PDT is always consistently formatted, a catalogue of items from a single Manufacturer can easily be sorted and searched by applying their PDS data to a database. Equally, if an Appointing Party has a preferred list of Suppliers, all their data can be held centrally, to allow quick and easy comparisons between similar products for varying situations.

As the data is machine-interpretable, it removes the need for Appointed Parties to manually copy product information from a PDF catalogue or website, reducing the chance of error and dramatically reducing the time required for such operations.

12.2.2. COBie

One of the reasons that a formal schema for PDTs was developed was to make supplying information for COBie a simpler process for Manufacturers. As a data sheet for a facility, COBie datasets can readily synthesise information from a PDS as well as other data sheets provided that it has been populated using a compatible PDT.

As the relevant product information will exist in a PDS, the Manufacturer can dispense their duty to provide this information by supplying said PDS.

Further to this, the PDS itself can be a linked document within the COBie dataset. Doing so may provide better and more complete information than relying on COBie and its structure alone during an information exchange.

12.2.3. Demolition and Recycling

Understanding the bulk materials, components and their constituents is a key part of the planned demolition and recycling of a built asset. The demolition contractor can understand by interrogating a set of PDSs what materials they can expect when deconstructing something. The model could provide the quantities but may not have the major materials embedded so this is where some simple maths and the data from a PDS can complete the picture.

12.2.4. Embodied Carbon and Circular Economy

Understanding the bulk materials, components and their constituents is a key part of the embodied carbon story and should help facilitate the circular economy aspects of construction products. The PDTs can help with simple reporting of embodied carbon for products, possibly using Environmental Product Declarations (EPD) or embodied carbon analysis according to available tools and industry recognised standards.

12.2.5. Models

The everyday working interface for Designers is usually the digital model and PDTs and PDSs can assist here too in providing a consistent data structure. Providing overall dimensional data, along with performance criteria, can help the Designer use actual examples, rather than generic data to design buildings, systems, and infrastructure and identify replacement parts.

As the product data can be accessed programmatically, testing of varying solutions can be carried out, finding the best possible product for a given situation.

12.2.6. Operations and Maintenance

PDTs and PDSs have the ability to provide data for planned maintenance schedules, understanding the specific requirements for that product. A PDS can also demonstrate all the options that are available for the particular product type if it is re-used elsewhere in a site. PDSs can also negate the need for physical or purely PDF based O&M requirements.

12.2.7. O&M Manuals

In an effort to reduce the reliance on O&M manuals constructed of loose papers, PDF submissions have become common, but have only resolved this to an extent. They are still difficult to search and read and product data is not presented in a consistent manner. Using a PDT and PDS based system instead could simplify this process and increase usability.

As maintenance data specific to the product is also supplied, the maintenance checklists can be tailored to suit the actual installed item, rather than the industry average regime. This could reduce unnecessary spares replacement and ensure that the care that the Manufacturer recommends can be communicated to the maintenance team.

12.2.8. Procurement

If PDSs have been used in the design process, far more product information is available to the Contractor in terms of what things need to be procured to complete the project. For example, a product may be specified for procurement, but is discontinued prior to the required purchase date. The PDS data may then be used to find a suitable replacement.

12.2.9. Properties

The means of describing an essential or distinctive attribute or quality of a thing is a fundamental part of the LEXiCON project. The act of agreeing which words describe the characteristics of a product will assist in the understanding the construction industry has of the information exchanged as part of the PDT process.

12.2.10. Schedules

One of the key deliverables for an Appointed Party are the equipment schedules. Each of these must contain consistent and accurate data for the products described in the design.

As a PDS has data in a consistent and structured format, they can be used to populate a schedule quickly and simply.

12.2.11. Specifications

Often aspects of a product are described in specifications, supplied by the Appointed Party. Historically it has been a laborious task to copy product information from a plethora of Manufacturers' information into the specification. As this data can now be supplied in an accessible format, much of this effort may be streamlined.

12.2.12. Technical Submissions

A technical submission could be checked for suitability by asking the question of the Manufacturer in a PDT format. Then the PDS response can easily be checked by comparing side by side or programmatically. This will simplify the process and ensure better accuracy.

13. Symbology Legend

Roles

- Approver
- Arbiter
- Built Environment
- Interested Parties
- LEXiCON Board
- LEXiCON People
- LEXiCON Process
- LEXiCON Project
- Organisation
- Relevant Authority
- Secretariat
- Steering Group
- Trade Association
- User
- Working Group
- Relevant Authority Chair
- Work Group Lead

Entities and LEXiCON Outputs

- Data Dictionary
- Data Dictionary Type 1
- Data Dictionary Type 2
- Templater Platform
- Data Template
- LEXiCON Template
- Data Sheet
- Object Classification
- Product
- Unit Type
- Data Type
- Group of Properties
- Property

Activities

- Adding/Assigning
- Adjudicating
- Due diligence
- Editing
- Identifying
- Managing
- Organising
- Promoting
- Reviewing
- Security-mindedness

Stages

- Creation
- Consultation
- Publication/ Implementation
- Curation/Preservation
- Revision

Acknowledgements

We are grateful for the contributions of the many individuals and organisations that have shared knowledge, developed ideas, and built consensus on a direction of travel for the Lexicon project.

Lead Authors

Acknowledgement is given to Matt Crunden, Legrand Electric Ltd and Carl Collins, CIBSE, as the technical authors of this document.

Contributors

We want to thank all the organisations and individuals who also contributed to this document as members of the LEXiCON Steering Group:

- CPA;
- Construction Innovation Hub;
- BRE;
- Transport for London;
- Bryden Wood;
- Electrium Sales Limited;
- Tata Steel Europe;
- British Standards Institution;
- BIM4Water;
- Guild of Architectural Ironmongers;
- L&Q;
- Kingspan Insulation Ltd.

The Construction Innovation Hub is funded by UK Research and Innovation through the Industrial Strategy Challenge Fund

UK Research and Innovation

The Construction Innovation Hub is a partnership between:

mtc Manufacturing Technology Centre

cdbb Centre for Digital Built Britain

bre

constructioninnovationhub.org.uk
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