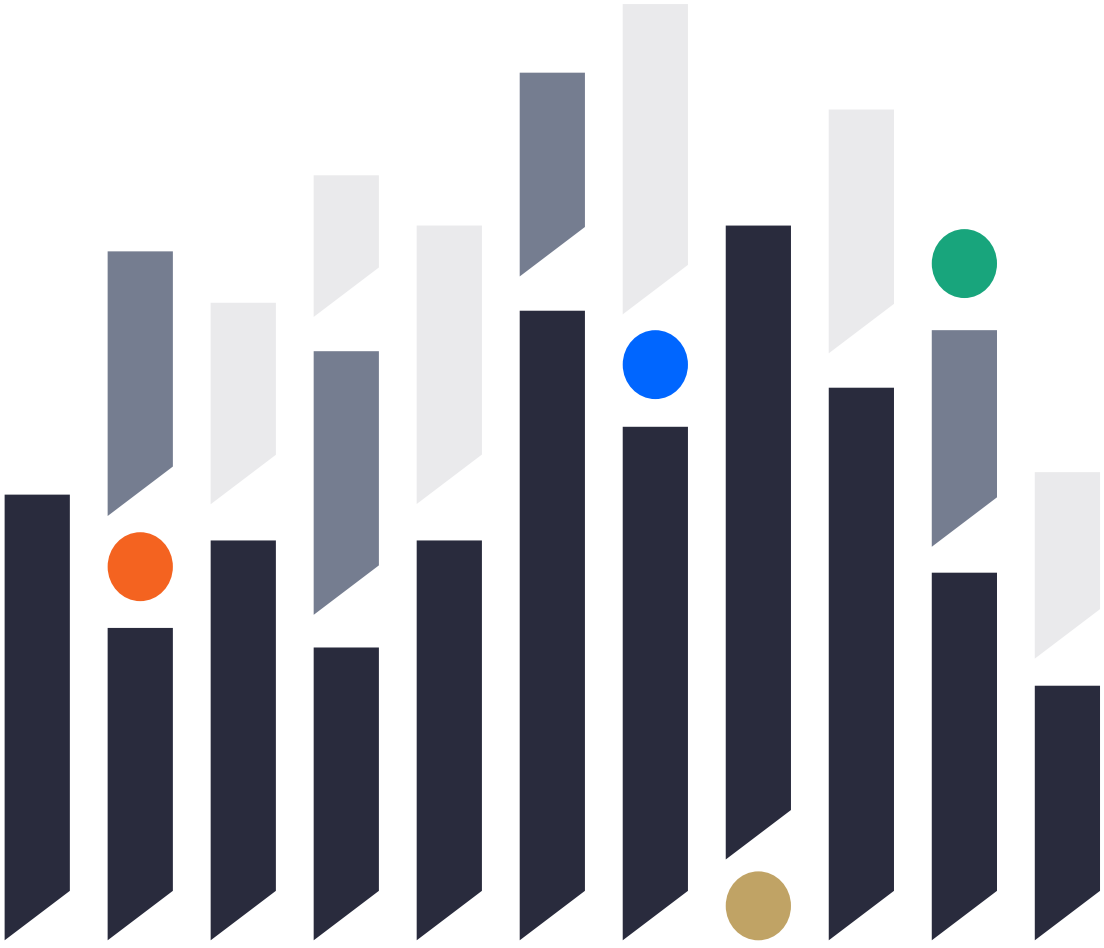
UNIVERSITY OF CAMBRIDGE
Centre for Digital Built Britain

CDBB L2C PROGRAMME

Standards landscape and information management systems



WP5 Recommendations to CDBB for the continued development of standards

urban innovation labs

Executive summary

The original title of this work package was 'Recommendations to National Standards Bodies'. However, through our work it has become apparent that the National Standards Bodies are one of many different groups who are involved in the creation and management of what are generically known as standards. The work in WP1 identified there are number of key stakeholder communities that all fulfil a vital role in the provision of de jure international and national standards, along with de facto guidelines and codes of practice. Therefore, the scope of this work package has been extended to include any organisation that is involved in the development of documents that represent a collective view of informed parties.

This document will not provide a list of clause changes for specific standards; a number have been identified in WP2 for the meta standards. Rather than it being a series of points of detail for inclusion in the next update of a particular standard, there are a number of fundamental aspects for consideration regarding standardisation and the role of CDBB in this process of standardisation.

This work package has identified the main of areas of recommendation, as follows:

1. Identify scope of the mission requiring standardisation, the parties currently involved and the parties that should be involved, and develop a roadmap for the standardisation.
2. Continue to support market adoption of current standards through training and masterclasses.
3. Identify a range of demonstrators to illustrate the capability of what can be done using existing approaches and how it has been achieved, particularly around areas where there is a national imperative. This should be completed at the same time as identifying areas for improvement and trying new approaches or developments in a safe environment.
4. Include the development of the existing standards as part of the roadmap for CDBB, to ensure maximum value is extracted.
5. Establish a roadmap for defining or surfacing existing standards in the service provision stage of the lifecycle.
6. Develop business cases for the benefit of standardisation in service provision.
7. Further develop the Capability, Capacity, State and Quality of Service definition for service provision.
8. Develop a service architectural framework with a focus on public services, from which the standards appropriate for that service can be associated or developed.
9. Develop a lifecycle and value chain architectural framework with a focus on public services, from which the standards appropriate for that service can be associated or developed.
10. Test the meta standards developed, and identify further meta standards to be analysed by market feedback.
11. Develop a method of creating semantic standards that can be linked and searched at clausal level as part of smart standards.
12. Develop methods and demonstrate viability for compliance checking of standards, guidance, codes of practice and regulation.
13. Establish a method of including verified de facto standards into the landscape of actionable and smart standards for CDBB.
14. Establish a capability within CDBB or its community for the detailed understanding of how standardisation can be developed and used to drive market change.

Table of Contents

1 Introduction **4**

1.1 Purpose 4

1.2 Methodology 4

2 Recommendations for continued standard development **5**

3 Conclusions **10**

1 Introduction

1.1 Purpose

The purpose of this document is to provide recommendations to CDBB to address the standards associated with the fulfilment of the vision. The original title of this work package was 'Recommendations to National Standards Bodies'. However, through our work it has become apparent that the National Standards Bodies are one of many different groups who are involved in the creation and management of what are generically known as standards. The work in WP1 identified there are number of key stakeholder communities that all fulfil a vital role in the provision of de jure international and national standards, along with de facto guidelines and codes of practice. Therefore, the scope of this work package has been extended to include any organisation that is involved in the development of documents that represent a collective view of informed parties.

This document will not provide a list of clause changes for specific standards; a number have been identified in WP2 for the meta standards. Rather than it being a series of points of detail for inclusion in the next update of a particular standard, there are a number of fundamental aspects for consideration regarding standardisation and the role of CDBB in this process of standardisation.

1.2 Methodology

The recommendations have been identified from the activities conducted in the other work packages and consolidated in this document.

2 Recommendations for continued standard development

There are international and national de jure standards designed to amalgamate experience and codify; publicly available specifications to test the market with a defined way of doing things; and numerous de facto standards, guidelines and codes of practice that exist at a national level, within sectors and for specific organisations. It is worth noting that industry groups like W3C or 3GPP are working in very rapidly developing areas centred around a specific challenge or activity and have not found the need to have their standards translated to National or International standards to achieve the market coalescence or assure adoption. This highlights the important distinction between standardisation and National Standards Bodies and ensuring the correct instrument is selected for the task.

Standardisation is required throughout the innovation cycle and this is particularly important in rapidly evolving or transforming market sectors where interoperability or integration is needed. It is not something done at the end to 'sweep-up' opinion, but something that needs to be contemplated from the start. This development and market dynamic is illustrated in Figure 1.

Standards can play an enabling role in this process, and examples of the types of standards or guidance that can be developed to support progress between pure basic research and oriented basic research, is to develop semantic standards, for instance. Organisations that support this early standardisation are industry bodies, such as the 3GPP, W3C or Building Smart, working with companies and experts in their respective fields and driven by the technology challenges they encounter to deliver new products and services to meet the needs of customers.

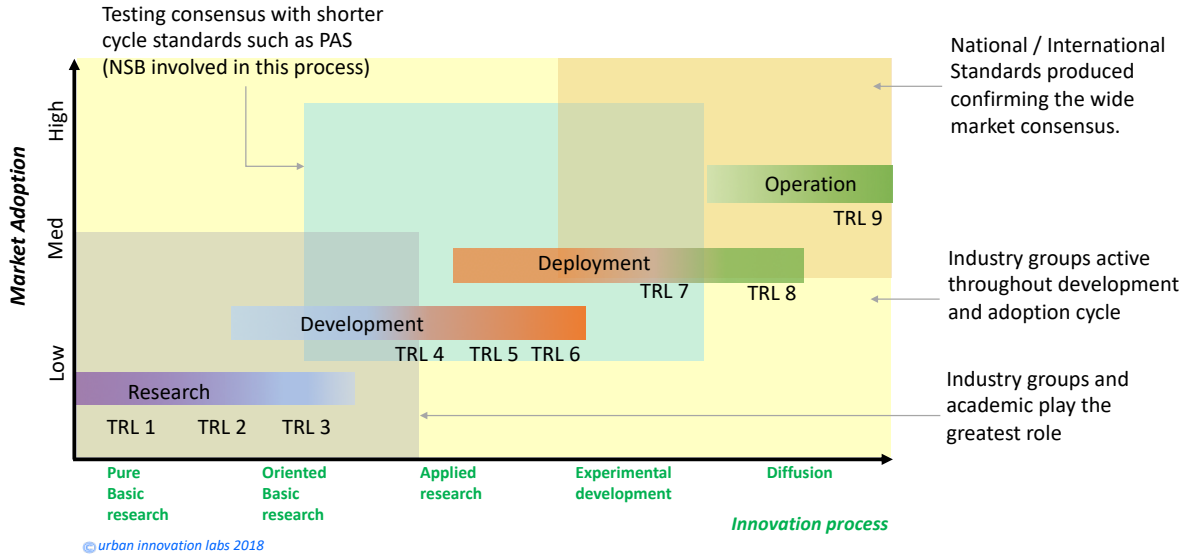


Figure 1 - innovation, market adoption and standards

There are many communities and groups who feel they 'own' space that CDBB will now seek to become a major stakeholder within. This should be noted and the vast number of standards illustrates this. The involvement of the NSB, as well as other industry bodies, needs to be carefully orchestrated by a driving body or consortium of bodies. In this case, this could be coordinated by CDBB, who have the opportunity to utilise the deep domain and technical expertise together with the standardisation

expertise from the standardisation bodies. Relationships with these stakeholder communities needs to be established to ensure the interests of all parties can be fulfilled.

Recommendation 1: Identify scope of the mission requiring standardisation, the parties currently involved, and the parties that should be involved, and develop a roadmap for the standardisation.

Work package 4 brought to life how far the industry has come and we should take time to reflect on the successes. The research as part of this work package gave a flavour for the challenges that exist in market transformation, where new methods require new skills to be learned and do things they may not be familiar with or may be met with resistance for a variety of reasons. The need to support the industry in the adoption of new methods underpinned by standards that require some work to understand and apply, is paramount to build a capacity of capability.

Recommendation 2: Continue to support market adoption of current standards through training and masterclasses.

Giving the opportunity to provide context through using the new skills and learning from examples of others, can help to crystallise the training required. Demonstrators are important tools for innovation and illustration of capability. During innovation they enable testing of new methods, products and services in real world conditions. This gives a unique opportunity to learn in a safe environment and stress test new approaches away from the operational assets. They also provide an opportunity to market test approaches with the most prominent solutions and standards, using NBS tools such as PAS or de facto technical specifications develop by the market. At this stage there is sufficient consensus on the approach. An example of this is Hypercat: initially an industry R&D project, it developed a series of specifications for interoperability for IoT, within a number of different use cases, now recently turned into a PAS (PAS 212).

Recommendation 3: Identify a range of demonstrators to illustrate the capability of what can be done using existing approaches and how it has been achieved, particularly around areas where there is a national imperative. This should be done at the same time as identifying areas for improvement and trying new approaches or developments in a safe environment.

Recommendation 4: Include the development of the existing standards as part of the roadmap for CDBB, to ensure maximum value is extracted.

In the initial standard landscape conducted in WP2, both the broad Asset Lifecycle versus Data Lifecycle and the narrow sector specific landscapes revealed a low number of standards relevant to the asset and asset information in the operational phase where the service is provided. However, this is the phase of the lifecycle where CDBB has identified the biggest potential for value, both economic and societal.

This may be due to a number of reasons. Using the use cases from WP3 as an example: for industries such as Energy, Transport and Health, the majority of the standards relevant to the operation of the asset is contained within the operator's own specific standards and technical guidelines. As we have explored in WP1, an organisation can commission and develop their own standards to be applied specifically for the purpose of their operation. This is because many sectors have developed in siloed isolation from others and there has not been a need identified to share physical or logical asset.

Another reason for the lack of asset data related standards in operations is likely to be the challenges of linking the asset operation to the organisation's operations effectively. This is something we all inherently believe, but the business cases to demonstrate specific causality are limited.

The standard BS 1192 and ISO55001 seek to address this, through the implementation of Asset Management Plans, Organisational Information Requirements (OIR) and Asset Information Requirements (AIR), but there is not sufficient best practice for the assessment of the asset performance linked to organisations. This is particularly prevalent in industries where the asset is not the main vehicle for delivery. This is well illustrated in Healthcare where the assets are often just seen as a shell to host the operation needed to deliver healthcare, while the reality may be very different and is worthy of investigation. By way of example, this is different in the transport sector where the rail infrastructure is central to the delivery of train journeys.

Recommendation 5: Establish a roadmap for defining or surfacing existing standards in the service provision stage of the lifecycle.

Recommendation 6: Develop business cases for the benefit of standardisation in service provision.

The research in WP3 supported our previous work that predominately existing de jure or de facto standards do not describe or provide a framework where a service can be defined or suggest an architectural framework for that service. Our work has suggested the terms capability (what it seeks to do), capacity (how much of it is available), state (the condition) and quality of service (is the performance of service to expected levels) would be the cornerstones for this definition.

The analysis in WP2 also identified the Analysis stage of the data lifecycle has almost no standards at all. This links strongly with the identified lack of guidance around the performance requirements for service delivery and, linked to this, the performance of the asset.

The near absence of architectural frameworks for services results in a major challenge for the majority to understand the components of a service provision, how they interrelate and the applicable standards.

CDBB must identify individual sector approaches to delivery of services and work with different industry groups to develop the necessary standards, which may or may not, be publicly available. This understanding will enable CDBB to work with the operations stakeholders to ensure new ways of data interoperability and feedback relating to the built environment is possible, focusing on measuring performance of the asset and its contribution to the performance of the service overall.

Public services should be a priority to CDBB to support the goals of achieving societal outcomes through a better managed built environment and creating the link to the private world that delivers many of these services.

Recommendation 7: Further develop the Capability, Capacity, State and Quality of Service definition for service provision.

Recommendation 8: Develop a service architectural framework with a focus on public services, from which the standards appropriate for that service can be associated or developed.

Throughout the standards landscape review, only a few standards appeared in more than one stage of the lifecycle. This was the case for all the sectors reviewed: energy, transport and health. Moreover, there is little evidence the standards are signposted across the different communities involved in the lifecycle and the value or supply chain. This results in built asset information at the different stages of the lifecycle being addressed in siloes, duplicating effort and on occasion creating non-interoperable systems.

From our market research and engagement, it is observed the vendors have identified this as an opportunity to add value to clients to create point solutions for aspects of the lifecycle. This opportunist approach is creating new commercial services where the different silos are being brought together, but the solutions we have seen are neither interoperable or integrated at scale. This is because there is little standardisation that provides the broader lifecycle and value chain perspectives enabling more universal and penetrative services to be developed.

Recommendation 9: Develop a lifecycle and value chain architectural framework with a focus on public services, from which the standards appropriate for that service can be associated or developed.

The continued development of the meta standard approach has proven invaluable. It is providing a much-needed perspective to the standards pertinent for a particular actor.

Recommendation 10: Test the meta standards developed, and identify further meta standards to be analysed by market feedback.

The NSB has a number of tools offered to the market. These include access to standards required by individuals or organisations, which can be purchased or licensed individually. An online standards library tool, BSOL, provides access to standards and enables the user to create its own standards library based on the work they carry out. This BSOL tool and the Perinorm database used for the international searches, have provided a service to the market for some years based on the ability to understand the market well enough to either know which standards to use or which key words to search for. They do not provide the frameworks described earlier, nor do they contain clauses within

a standard, nor are these semantically defined or are the different standards linked to a clause level allowing the user to navigate through a complex landscape of instructions needed. Acknowledging the large number of standards involved, it would be expected that methods such as artificial intelligence could be used to help understand and better define the complex relationships with the existing standards.

Recommendation 11: Develop a method of creating semantic standards that can be linked and searched at clausal level as part of smart standards.

The concept of smart standards has been suggested for a number of years, whereby compliance to standards can be established (semi-)autonomously. There are few examples of where this has been successfully deployed, such as including BSIs compliance navigator[1] which provides regulatory compliance verification piloted for healthcare products. This type of tool will help users navigate through the maze of standards and enable a method of on-going verification throughout a project to build confidence, and provide confirmation when all works or services are completed.

Recommendation 12: Develop methods and demonstrate viability for compliance checking of standards, guidance, codes of practice and regulation.

The final recommendations echos back to the original point of this work package. Not all standardisation is done by the national standards bodies and this is particularly prevalent in the service provision stage of the lifecycle. In order to have true sight of the applicable standardisation it will be necessary to establish a way of accessing these de facto industry standards, guidelines and codes of practice. If these de facto standards are to be used as part of the future standards landscape, surety of their quality, review process and verification must be established.

Recommendation 13: Establish a method of including verified de facto standards into the landscape of actionable and smart standards for CDBB.

Recommendation 14: Establish a capability within CDBB or its community for the detailed understanding of how standardisation can be developed and used to drive market change.

[1] https://compliancenavigator.bsigroup.com/

3 Conclusions

This work package has shown there are a series of fundamental decisions and actions required by CDBB in order to leverage the benefit of standardisation. While detailed observations have been made of the different standards considered as part of this activity and included in the relevant sections, it is the establishment of a framework and roadmap for the integration of standardisation that will make the difference, wherever it may originate.

urban innovation labs

Dr. Andrew Robinson
t. +44 7484 214 093
e. arobinson@uil.io

Teresa Gonzalez Rico
t. +44 7487 780 543
e. tgr@uil.io