



Reference	Title	Organization/Author	Date	Status
IC 13/006	The Way Forward	ExCom/PML,	17/05/2013	V4 Issued

## The Way Forward

# Introduction

Since our founding in 1995, buildingSMART International has pursued a goal of supporting better value in buildings and the built environment through SMART information sharing using open international standards.

We are now at a true turning point, for the world has awakened to the promise of openBIM to deliver higher quality, greater certainty and cost reductions of around 20%, and bSI is now referred to as 'The Only Game In Town'.

bSI as an organization is also at a turning point, for to realize our dream of global adoption of openBIM Standards, we must evolve from a mostly voluntary to a professionally led organization.

This paper charts our future course as a global standards organization with emphasis on professionalism, results, and effectiveness.

# Chapters

1. **bSI Today** - Strengths and Weaknesses
2. **bSI Future** - Organize for Success
3. **bSI Organization** - Transition to Professional Leadership
4. **bSI Standards Development** - User Focused and Effective
5. **Appendix** – bSI Projects

# Chapter 1

## bSI Today Strengths and Weaknesses

### Strengths

#### Global

It is remarkable that bSI is truly global. We could have focused on one country or one region. Instead we determined to develop a global chapter structure to address the global nature of the Building Industry. Our global reach is a major asset for governments, sponsors and all who are interested in global solutions.

#### Neutral

At our founding, bSI chose to be commercially neutral to best support development of open data exchange standards. This has helped us to gain the trust of building industry participants.

#### Not-for-profit

We were founded and remain not-for-profit, reinforcing our value as a neutral supporter of open data exchange standards. Non-profit status allows us to offer products and services to support open standards.

#### Harmonious

bSI has always fostered teamwork as an essential factor to our success. bSI people respect, enjoy and appreciate each other. Our participants come from all corners of the globe, and enjoy learning about the culture and customs of different countries. Many of us now count our bSI colleagues as friends around the world, a welcome benefit.

#### ISO

Our ifc and other open exchange standards need maximum credibility and stability for adoption and use by building industry participants. For more than a decade bSI members have participated in ISO Technical Committees for this purpose. The relationship with ISO continues to evolve towards a true partnership as we gain their trust and confidence.

#### Unique

We at bSI are unique--a good French word. As the world awakens to the promise of BIM and openBIM, our reputation grows as "the only game in town".

#### Longevity

bSI has been around a long time--since 1995. A positive effect of this longevity is it shows the world we are serious about our mission and very persistent.

#### Volunteers

Almost all bSI members are volunteers, and are among the brightest, most dedicated people in the building industry. Our volunteers have worked together to accomplish great projects, and we want to stick around for what happens next.

<b>Standards</b>	Our ifc and other standards are the best in the world - sometimes the only standards. They have been created by world-class technical leaders, both volunteer and paid.
<b>Image</b>	Our logo, buildingSMART name, International home of openBIM tagline and general image are positive, graphically distinct, and trademarked for protection. Building Industry participants know of us in part because of our image.
<b>ExCom</b>	The bSI Excom is a great team, works harmoniously and are good friends. bSI has gained better focus on our future through the work of the ExCom. The ExCom are also good ambassadors to governments, institutes and others interested in our work.
<b>Trust</b>	We have gained the trust of the global building industry by being open, neutral, international and not-for-profit. Trust is our most valuable asset.

## **Weaknesses**

<b>Chapter-Based</b>	Our current organizational structure is based on Chapters. The International Council, governance based on representation of each Chapter, is not leading bSI forward. Too many Chapters are poorly supported in their host countries, or do not have a broad base of members. Most Chapters have difficulty meeting a modest \$25k annual payment. Some Chapters are suffering from declining membership, partly due to global economic conditions but mostly due to a lack of clear vision.
<b>Volunteers</b>	Our volunteers are wonderful, dedicated people, but we are at the growth limit for a volunteer-based organization.
<b>Plan</b>	Our goal to transform the global building industry is clear, but our plan to achieve this goal is unclear and without a timetable. As a result fundraising and membership suffer. Lack of a clear plan is the biggest challenge for bSI.
<b>Leadership</b>	bSI leadership has become concentrated in the ExCom, the elected executive body of the International Council. However, new ExCom members have not emerged from the IC, and two current ExCom members have announced plans to step down in 2013.
<b>Money</b>	Lack of adequate funding has been a continuing issue for bSI since the beginning. Potential donors such as The Pankow Foundation have withheld funding due to our lack of a clear plan to transform the industry.

**Website**

The bSI website, while improved, does not impress visitors and donors. Lack of funding prevents professional management of this critical portal into who we are. In addition, we will need web infrastructure to support robust Process and Product Rooms.

**Role**

People outside of bSI do not understand our role in transforming the building industry.

## Chapter 2

### **bSI Future Organize for Success**

**Challenge**

BIM adoption is increasing. Governments are recognizing the benefits of BIM. Open standards are seen as the way forward to deliver the cost reductions they are seeking.

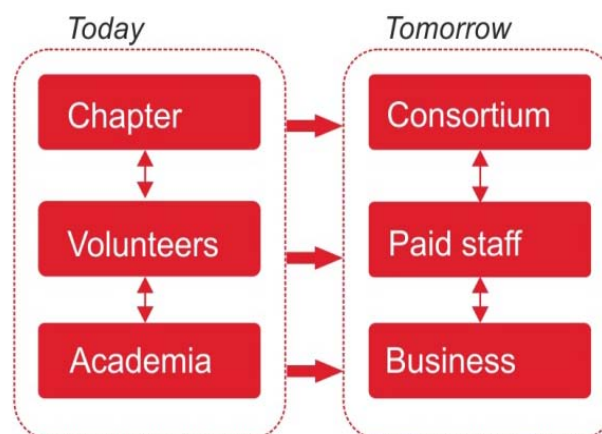
bSI is the only global standards body in a position to support openBIM.

The challenge for bSI is to organize ourselves for a much more demanding pace of standards development.

**Transition**

Until now, bSI has been a mostly voluntary organization, and the pace of standards development has been limited.

To meet the global demand for open standards, bSI must transition from a mostly voluntary organization to a more professionally organized and led standards body as shown below.



## Chapter 3

# bSI Organization

## Transition to Professional Leadership

### Professional Staff

We must have paid professionals to grow beyond our current status and achieve our goals. Professionals in the right positions will transform bSI, our chapters and our effectiveness.

Paid professionals require a bigger budget based on selling our Plan as described above. Early analysis indicates bSI needs about ten paid professionals costing about USD1million per year to manage the Process, Product and Technical Rooms as well as our website.

### IC Membership

Open up IC membership to international sponsors (\$50K+), industry associations (AIMCC), foundations (Pankow) and others. These organizations are our future. They should have great influence over our direction without compromising our not-for-profit, neutral status.

### ExCom

Open up ExCom membership to highly committed individuals from the groups described above. Our ExCom needs new members to replace those who are stepping down in 2013, and needs the fresh thinking new members bring.

### Advisory Board

Some organizations may prefer to support bSI with funding and advice instead of full participation. The consortium of government owners already in existence would be an excellent core group for membership in the ***International Advisory Board:***

1. GSA
2. Statsbygg
3. Senate Properties
4. UK Government
5. Australian Government
6. Others

We should approach this group with a business proposition: bSI can help them save time and money in design and construction of their buildings, and can save BIG money in efficient building operation. Join our International Advisory Board to have a key role in making this a reality.

### Communication

bSI must have a professionally organized website for users as well as technical participants. The website must be robust, up to date, and serve as the virtual portal to bSI.

Social media is another critical tool for discussion forums around Open BIM, and is the second priority after the website.

## **Funding**

Funding is a challenge that must be met. Our future strategy relies on two funding objectives:

First, funding must be secured to operate bSI as an international standards organization. We will fund our organization through a combination of buildingSMART Chapter dues, international sponsors, and with fees for certifying bSI standards compliance.

Second, funding for the technical work must be secured by charging appropriate fees to organizations requesting standards development. Indications are that we can be successful in this effort only if bSI is professionally organized and led.

## **Chapter 4**

### **bSI Standards Development User - Focused and Effective**

#### **Introduction**

Every participant in the building industry uses many processes to accomplish their purpose. For example, architects design and contractors assemble.

Unlike the past, buildings are assembled today from manufactured products.

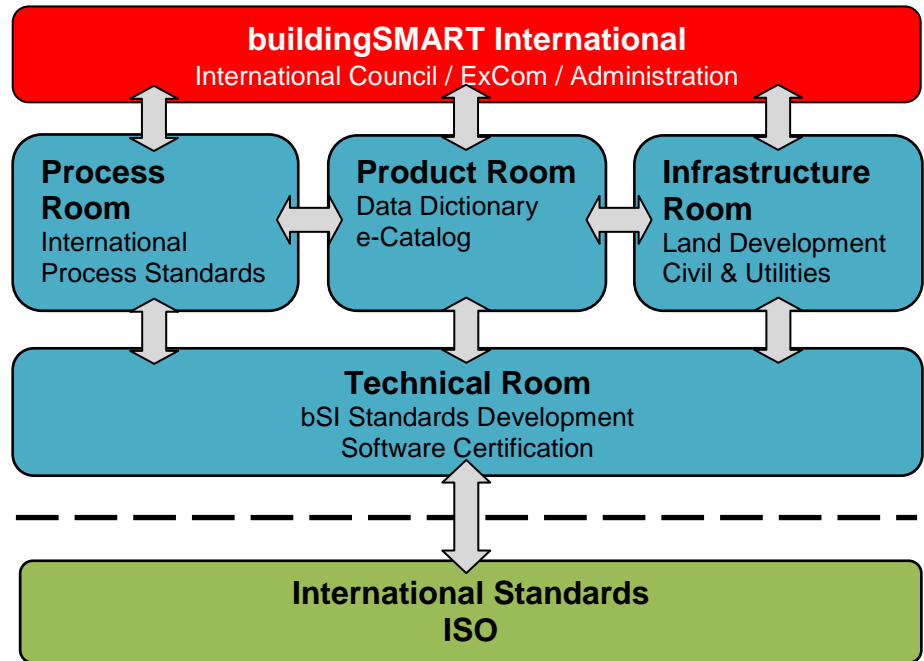
bSI Standards Development has created virtual Rooms to accommodate discussion and coordination of processes and products used by the building industry.

Each Room is led by a Room Manager responsible for guiding the activities in that room. A Project Director manages projects across various rooms as needed.

Once processes and products are coordinated and approved, bSI converts them to technical standards useable by building industry software developers.

A diagram of bSI organization and detailed Room descriptions are below.





## Process Room

Architects design, contractors build, and owners operate buildings. Designing, building and operating consist of thousands of individual processes. Finally, processes need to be coordinated between participants.

The Process Room accommodates architects, engineers, contractors, owners and other building industry participants working together to describe processes each uses to design, procure, assemble, and operate buildings.

A great deal of this work is focused on how each participant's process must interact with the others.

After processes have been agreed upon by all participants, they move to the Technical Room for conversion to bSI Standards.

## Product Room

Thousands of building products are used today in buildings, creating a complex matrix of choices for architects, engineers and contractors. A great need exists to create naming standards as well as consistent descriptions for each product.

The Product Room accommodates architects, engineers, contractors, building owners, and product manufacturer participants working together to accomplish two goals:

First, develop a universal **data dictionary** to name precisely each part or piece of building products. The dictionary must also accurately translate into all languages.

Second, develop a universal **e-catalog** allowing searches by any building industry participant for any building product by category. The e-catalog will also provide a menu of performance characteristics, price, delivery, maintenance and operation information.

A great deal of this work is focused on how each participant must interact with the others.

After the data dictionary and e-catalog have been agreed upon by all participants, they move to the Technical Room for conversion to bSI Standards.

## **Infrastructure Room**

Infrastructure, including land development, civil work, and utilities, are the greater part of the built environment, and buildings the lesser part. As with buildings, infrastructure consists of Processes and Products in need of documentation and coordination.

The Infrastructure Room accommodates engineers, contractors, owners and other participants working together to describe processes and products each uses to design, procure, assemble, and operate.

Infrastructure is the newest bSI initiative and is being coordinated with the work of the Open Geospatial Consortium (OGC), an open standards organization for land and infrastructure.

A steering committee will be elected in October 2013, at the Munich bSI meetings, and candidates are actively sought at this time.

## **Technical Room**

The Technical Room accommodates highly specialized technical people working together to convert Product Room and Process Room results to bSI standards.

bSI standards are then brought to a Technical Committee of the International Organization for Standardization (ISO) for adoption as ISO Standards.

The Technical Room is led by the bSI International Technical Management Committee (ITM).

# Chapter 5

# Appendix

## bSI Projects

### High-Priority Projects

bSI has identified **high-priority projects** necessary to support openBIM. These are subdivided into *User-Required Projects* as well as *Technical Projects* necessary to extend openBIM standards and work processes. *Certification Projects* for software and individuals completes the list.

### Project Organization

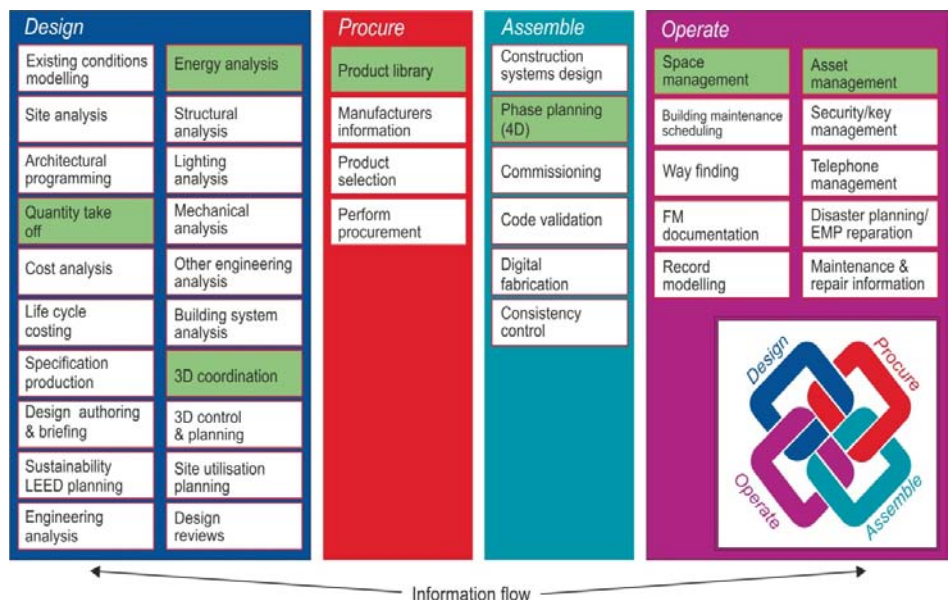
bSI projects are organized as follows:

1. User-Required Projects for Buildings
2. User-Required Projects for Infrastructure
3. Product Room Projects
4. Technical Support Projects
5. Foundational Projects
6. Certification Projects

### User-Required Projects for Buildings

Architects, engineers, contractors, and other building industry participants generate user-required projects to map and coordinate building industry processes.

There are currently eight user-required projects for buildings. This work follows phases in the lifecycle of the built environment, from design to procure, assemble, operate and recycle as shown in the diagram below.



**Diagram of Building Industry Processes by Phase**

- 1. Programming**      The project will create a reference process and the required information transfers to support the activity of building programming. It will collaborate with and add an international perspective to the on-going BPie (Building Programming information exchange) development which is based on Norwegian requirements.
- 2. Asset Management**      Define the processes of Asset Management and the basic information needed to perform this function. Most of the needed information is expected to already exist in the buildingSMART Data Model, but necessary extensions will be made if needed.
- 3. Space Management**      Create an international process of manage building spaces based on existing national initiatives and develop exchange requirements of the basic information needed to perform this function. A technical specification will specify how space management can be improved using the buildingSMART Data Model.
- 4. Product Information and Terminology**      Product libraries are widely required among many different processes. The IUG considered contractor's product procurement the most critical project to initiate. The proposed project will create a reference process of contractor's product procurement and define the data exchange requirements, as well as the scope and characteristics of product templates that will enable product manufacturers to detail their products in a way the users (in this project primarily the procuring contractors) can find and select the right products, and receive the right product information to be embedded in the BIM. In order to execute the projects to support this function, we created the Product Room. This is detailed below.
- 5. 3D Coordination**      Document the required processes and information exchanges, based on IFC4, to support architectural, structural and building services BIM models in the design phases. The scope of this project is the same as the IFC2x3 exchanges to aid the transition process from IFC 2x3 to IFC4. Adding extensions to the IFC4 coordination view will enable the industry to benefit from the extended functionality in IFC4. (please note that this project will provide the user perspectives and input to the technical room project.
- 6. Quantity Take Off**      Define the reference process and create an IDM that enables quantities (of work, resources, products, etc.) to be communicated to the contractor, or contractors. This project will produce a reference process and specifications of the information that is required to perform the task of Quantity Take-off and the technical mapping to the buildingSMART Data Model.

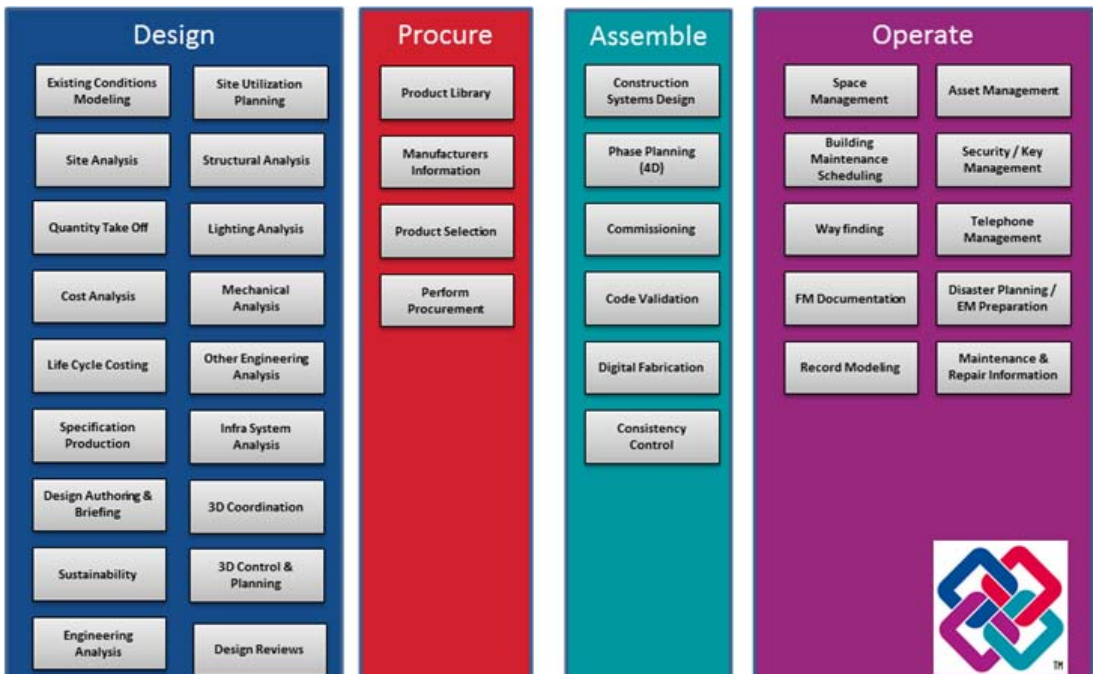
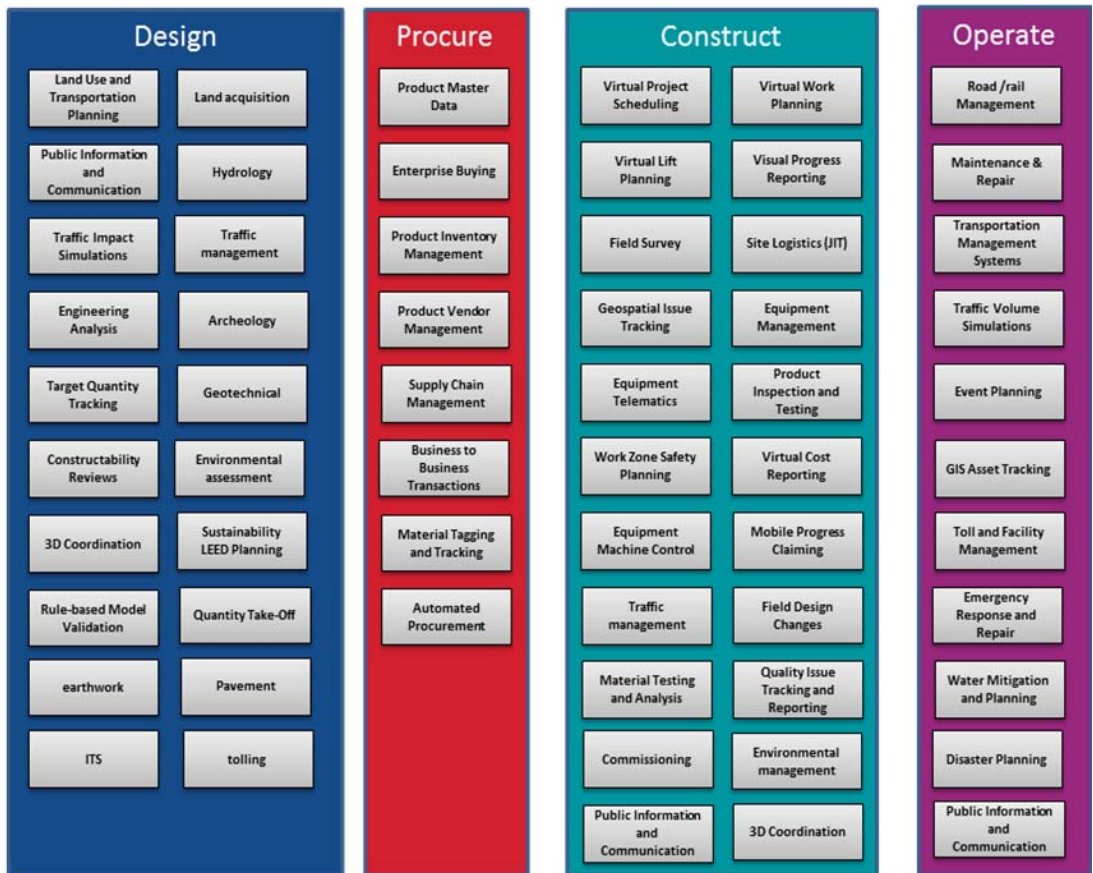
- 7. Phase Planning (4D)** Define the process of phase planning and the required information to exchange to support and increase the efficacy of the contractor's phase planning during the construction phases on site. The primary focus is to support 4D-modelling where building elements are linked to the time schedule. This will be done by linking objects representing building elements to processes. A technical specification will specify how that can be done by the use of the buildingSMART Data Model.
  
- 8. Energy Analysis** Energy Analysis covers a broad area of activities and expertise. This project creates a reference process to define and communicate information on to how specific geometry and properties of thermal models should be represented. The project will review existing national manuals and create international reference process for this activity by harmonizing and defining how to incorporate national requirements. Focus will be on energy analysis during the early design stages.

### **User-Required Projects for Infrastructure**

Civil engineers, developers and other participants generate user-required projects to map and coordinate infrastructure projects.

The infrastructure Room has developed a preliminary use-case matrix similar to the "Buildings". The matrices below show additional infrastructure-unique use-cases in two connected diagrams.

# Infrastructure Engineering Projects



## Road, Rail, Bridge, Tunnel Engineering Project

There are currently twelve User-Required Projects for Infrastructure. Projects appended with (OGC) indicate joint work with The Open Geospatial Consortium (OGC).

- 1. Coordination of LandXML with OGC**

In parallel with the ongoing project based on Landxml schema version 1.2, it is necessary to develop a coordinated project with OGC on LandXML evolution to a real open information modeling standard. The project will determine what is relevant in LandXML, what is missing and what it has to be dropped. The project has to be supported by both BSI and OGC and performed in joint development.
- 2. IFC Bridge**

A pre-integrated IFC Bridge schema already exists which was based on IFC2x2, specifications. This project will enlarge the scope and convert it to IFC4. The project will hold a number of stakeholder workshops to develop a detailed use case based on an existing bridge and stakeholder involvement. The results will include: Updates to existing IFC bridge to IFC4 standard; Use-cases developed exchange requirements; A viewer for IFC bridge; Determine which new objects are needed beyond IFC4 and add them; Verify and complete the complete the updated model IFC4 Bridge. This project should be developed in collaboration with the European project for road modeling V\_CON and other initiatives
- 3. Use Case Definitions**

The Information modeling for buildings has defined the 40 BIM use cases. The proposed project will investigate the relevance of these 40 use cases, the need of extensions for infrastructure regarding to the level of integration in the site, and the number of stakeholders and the cross references between the existing and the extension. The use-case matrix shown here is the starting point to determine the scope, priorities and sequence/interdependencies of projects to elevate Infrastructure to a robust business-driven modeling environment.
- 4. Communication for Urban & Landscape Planning**

Define the requirements to enable communication of data and visuals of data exchanges and decision points in urban and landscape planning. The project will describe the different types of data related to the exchanges, supporting data to take in account regulations in order to be able to display the different options and their consequences (impacts). The project will also develop the data model specification for any spatial checker in order to offer regulators and the public the tools to verify the compliance with the requirements and regulation.
- 5. Scoping the Infrastructure bsDD**

In parallel with the development of the data schema, it is crucial to capture the semantic definition of the data, including attributes and relationships. The proposed project will identify products required for the various infrastructure domains and a roadmap for developing the necessary product templates to enable manufacturers to provide IFC4 compatible product e-catalogues. The bsDD toolkit will be used as the baseline for a collaborative approach for validating the terms and associated semantics by end users.

- 6. Infrastructure Alignment & Spatial Reference System**
- Currently the only way to describe, under national regulations, a linear infrastructure, is by a reference line (center line) from the horizontal alignment and vertical alignment. This project will analyze how the BIM for infrastructure can integrate these description and how, in the future, new specifications could be developed in order to propose model checkers based on BIM solutions and full 3D objects( features).  
The project to be performed with OGC will investigate and develop the way to specify common topology, spatial reference system (chainage/station) and geo-references.
- 7. Linear Infrastructure Construction**
- A linear project is composed of earthwork engineering (around 80% of total works) and civil engineering works (bridges, tunnels...). Concerning excavation and backfilling, the accuracy information of the materials and geological layers is paramount to optimize the earth movement. Additional information, such as the way the bridges or tunnels are constructed (cast in place or prefabricated by segments) and the equipment used are necessary for sizing and dimensioning the works. The project will define the processes and data exchanges to develop the required object definitions taking into consideration temporary works, materials and quantities, construction sequences and erection phases, during the entire life-cycle.
- 8. Environmental Assessment**
- Environmental assessment covers a broad area of activities and expertise. On a large infrastructure projects not less than 30% of the design is dedicated to the environmental issues. The information created at each phase have to be available for the full life cycle of the project. The proposed project creates a reference process to define and communicate information on to how specific geometry and properties of various models ( noise, hydrological, co-visibility, fauna and flora should be cross represented with GIS and others applications. The joint-project between bSI and OGC will review existing models (national or international) by harmonizing and defining how to incorporate national and international requirements.
- 9. Geotechnical Information (OGC)**
- This project will research and develop, jointly OGC, the way to specify the information modeling related to geotechnical information data exchanges. The project will investigate current research, for instance Deep city 3D, research at University of Osaka, etc. and develop process and data exchange requirement to serve the Geotechnical area. Examples of new requirements expected are:
- Geo- layers as 3D object including the relevant geotechnical information.
  - The level of accuracy, confidence and contractual commitment related to data being transferred.



- 10. Spatial View Infrastructure Network (OGC)** Road and highway systems represent large investment affecting numerous aspects of the host communities. All these aspects play a role in the design, construction and operational phases. Good coordination among all the stake-holders and processes require the seamless transfer and display of spatial information, in addition to other data. The proposed project intends to develop the processes and define the objects and their attributes that can exchange this information between purposes such as predicting traffic patterns, producing congestion simulation, road safety analysis, spatial proximity to communities, dynamic networks (corridor) analysis, resource constraints, and economic analysis.
- 11. Safety & Strength Analysis for Constructions** As a result of the load due to traffic, constructions suffer from fatigue. The asset management database should contain files with 3D geometry and specific information in order to make strength calculations and to assess safety. Information that should be available is concerning the dimensions of the structural elements, materials, and the layout, quantities and nature of the reinforcement.
- 12. Delivery of As-Built Data for Asset Management (OGC)** At the completion of infrastructure (roads, constructions, tunnels), the contractor will provide as-built information. This information will be reviewed, approved and merged in an asset management database so that the required information is available for planning and executing maintenance. An Information Delivery Specification is needed to define the process and information involved. Special requirements are involved to assure that IFC files can be merged in the asset management database and life cycle management is supported.

## **Product Room Projects**

Users identify Product and terminology as one of these most important opportunities in working with BIM. The User-Required *Product Information and Terminology* describes this use-case area in general. This area is so important that the Product Room is devoted to executing projects related to product information and terminology.

- 1. Upgrade bSDD Technology** As the bSDD is increasingly considered for deployment by organizations worldwide, a scalable infrastructure that is not tied to any one location and is extendable with widely available development resources is important to providing open access. To address these requirements, the bSDD API and database are being moved to the cloud and to open source development tools. This is a foundational project that is critical to support of all of the bSI projects across the roadmap of required exchanges by providing them with a readily accessible and

extendable resource for shared terminology libraries to connect information developers with information providers.

- 2. Content Access & Management Tool**

With the transition to the new cloud-based open source platform for the bSDD, a tool to search for, connect to and add content is needed to facilitate use of the bSDD. Because the tool will be open source, it will be available for other organizations to extend for their own more specialized purposes. The tool will also provide bSI with the ability to perform administrative level content management on the bSDD. The availability of the tool is critical to the release of the new API.
- 3. Make IFC4 content available in bSDD**

The IFC model includes many terms identifying subjects and their properties and the relationships between subjects and properties. This project will develop consensus procedures and then upload all of the 2x4 data types (subjects and properties) with their definitions and relationships along with tools for managing the data and translate the IFC model data. This project is joint with the Technical Project 7. Having the 2x4 terminology in bSDD will support all exchange projects and the development of product libraries in multiple languages.
- 4. Product data content development plan**

This project would develop a plan in conjunction with Technical Support Project 5 to guide content development work in bSDD that incorporates work done on relevant projects as well as evaluating the content that is already part of bSDD to develop templates and establish requirements for building and product data.
- 5. Develop content for UK market**

Following on the plan identified in project 4, this project will create the UK built asset data dictionary using the buildingSMART Data Dictionary (bSDD) web service to store and make the UK content available. The availability of the UK data will facilitate the connection of openBIM models to all types of content across the UK and its trading partners. For the information to be useful it needs to reflect current practice and be up to date. This project will maintain the UK content for a period of 5 years after launch and will establish a self-sustaining approach to maintenance by industry to ensure its long term success.
- 6. bSDD Librarian function**

With expanded use anticipated from the transition to the new platform and the increasing movement to openBIM organizations around the world are starting to use the bSDD. To assist in the coordination and management of the content creation, utilization and maintenance efforts, a librarian to provide a point of contact for content management procedures is needed. The position is anticipated to begin as a part time position and grow to full time within 3 years.

## Technical Support Projects

User-driven projects require technical work to support user needs. There are currently ten technical support projects.

- 1. Coordination View for IFC4**

This work will use the input from the IDMs developed in the Process Room projects and develop a comprehensive bSI Data Model sub-view to support the processes and information, in architectural, structural and building services BIM models in the design phases. This Coordination View will enable large BIM software developer to make available to their user the enhanced capabilities of IFC4. The Coordination View will be structured in a modular manner, so that other software could support other purposes by selectively implementing smaller sub-sets.
- 2. IFC4 Primer**

After six years of intensive schema development work, IFC4 offers many potential advantages for Open BIM. This project will kick-start the IFC4 user awareness program (jointly with the project room) to demonstrate the enhanced support for BIM use cases and an early implementation support action to develop the follow-on model view definitions to update the current IFC2x3 implementations to enable the additional IFC4 functionality.

Objective: "What's in for me" for construction professionals and "what should I do and when to start" for software developers.
- 3. IDM-Based Validation**

Enhancing current ifcDoc / MVD framework to support direct data validation (joint project with process room) for use case specific exchange requirements. The project shall establish a framework for open business rule declarations, a prototypical data validation tool, and the framework to set up a service for accrediting 3rd parties to offer validation.

Objective: Enable validation against exchange requirements developed in IDM projects to secure a trusted exchange of data.
- 4. MVD Tool Development**

Provide the necessary infrastructure for an open source development for IFC specification and MVD definition, included is the maintenance of the open source platform and co-ordination of activities.

Objective: Answer to requests about sharing and contributing to the current ifcDoc / MVD tool development and this project would provide the means to leverage from volunteer contributions.

- 5. Enable publication of Manufacturers Product Data**

Establish a framework for manufacturers to publish Open BIM data (joint project with product and process room). Develop the MVD for product libraries (take-up of initial simple ifcXML prototype) and further develop a framework to validate product libraries against exchange requirements for product data, including a link to buildingSMART Data Dictionary (bsDD) for product property terms and language translations.

Objective: Have a template and a certification program for manufacturers and information service provided to publish product data the open BIM way.
- 6. IFC Extension For Parametrics**

Development of IFC4 extension to support parametrics for manufacturer library data and to support a parametric level that is required for phase 2 of the "manufacturer data" project in the Product Room.

Objective: High-level support for product libraries and to contribute to TC59/SC13 ISO16757 (Product data for building services systems model) to avoid having different technical solutions in ISO and buildingSMART.
- 7. IFC and bsDD Linkages**

Make the IFC terms (properties and elements) a true context within IFD and with bi-directional updates of IFC and IFD, including the major task to harmonize IFC and IFD content (currently there are numerous duplicates). Jointly carried out with the product room.

Objective: Reflecting all IFC definitions without duplicates and ambiguities within the IFD dictionary and enable multi-lingual content with bi-directional linkage.
- 8. IFC Baseline for Infrastructure**

Development of a common IFC-infrastructure layer for shared definitions (common to several use cases). It establishes a "stub" to define the necessary basis for the extension schemas (bridge, road, rail, soil strata, and utilities).

Objective: enable the cross infrastructure and building to infrastructure common layer for the buildingSMART data model.
- 9. Evaluate Move to UML/XML**

Evaluate the move of the IFC development from current EXPRESS to an UML-based environment and assess the potentials and ramifications of such a move. The project shall prepare the future bSI data schema environment and evaluate new schema development tools and look into how it might support the infrastructure development projects.

Objective: Be more aligned to other OGC and other mainstream data schema development work and accelerate the schema development for the infrastructure domains.

**10. Roadmap for Collaboration With OGC**

Technical roadmap for work with OGC, Fiatch and other local standardization organizations, including solution to modularize and bridge all the data models in common.

Objective: Maximize the potential of coordinated developments preventing duplicated work. This project is preliminary to the project “Harmonization of Data Models.”

**Foundational Projects**

Highly technical, foundational work is necessary to update bSI standards on an on-going basis. There are currently seven foundational projects.

**1. Harmonization of Data Models**

This project will research and develop practical solutions to transferring information between BIM, GIS and Infrastructure software. Each of these domains use native data models which serve the particular domain best, but users wish to conduct their work without having to know in which format the underlying data is stored. The project will provide transparent mechanisms to translate between the various data models.

**2. Owner Requirements and Data-drops**

The delivery of electronic asset information requires standardized information format, content and classification systems. This task will enable efficient support of the documentation of client requirements and the comparison between the requirements, design solutions, the delivered facility and subsequent operations, at defined data-drop points during the facility life-cycle.

**3. BIM Archiving**

Contractual, legal and operational management requires that specific data must be stored during the life-cycle of a building. This project will develop an archival Model View which will prescribe which data must be preserved at which state of project development and/or building life, so the prescribed data can be preserved in the BIM. This will make subsequent retrieval of any archived data possible, reliable, easy and much less expensive.

**4. Tool for BIM Validation**

Simple-to-use but robust testing and validation of production BIMs are needed by users. This project will develop the required framework for web-based tools and a prototype.

**5. Tools for Project-Specific Data Exchanges**

Tools will be developed to enable project teams to define custom project-specific data exchanges (MVDs) to support custom workflows. It includes the capabilities to define new workflows and exchange requirements on an as-needed basis to support enhanced project collaboration, and transferring data to existing corporate computing systems.

6. **BIM Data Ownership and Tracking** This project will add the concept of data ownership to the various data and data sets in a BIM. It will assist in identifying authorship and ownership of a particular building datum and/or component at that point in time as well as the rights to modify.
7. **Enable Workflow Control in BIM** A format supporting workflows between project participants with information regarding object-related issues linked to the design, construction or maintenance phases, will improve the overall efficiency of project collaboration. This project will enable a transparent and traceable workflow of robust business information, a prerequisite for automated processes in the construction domain.

## **Certification Projects**

Certification has become increasingly important as more software developers desire to comply with bSI Standards. In response, bSI has developed certification process for software.

Certification for individuals has become necessary, and bSI will develop a certification process for this purpose. There are currently two Certification Projects.

1. **Software Certification**

bSI has established a methodology and a system to certify the IFC-compliance of software data interfaces, based on automated and manual detailed checking.

A web application supports the preparation of certification, the monitoring of certification progress and a database for detailed documentation of results.
2. **Certification for Individuals**

Certification of individuals must be based on clearly defined standardized training, education and goals.

bSI is developing a training and testing program to certify individuals for different levels of BIM processes. The content of certification and training needs to be localized to different languages and building cultures.

Finally, trainers need to be educated and certified at the highest level.