Airport Room
Roadmap Report

JULY 2018

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Introduction

With nine million people a day using the world's airports, having assets that are designed to maximize performance, are well maintained and operate responsively is fundamental for delivering excellent passenger experience. Having information to enable correct decision making is very desirable. This report explains an essential element of meeting these key airport objectives.

Airport facilities perform in a world where horizontal meets vertical, managing information both above ground and along the surface. Airport Asset Managers and Facility Operators depend on this dual site information to run their facilities in support of the key objective whilst also ensuring security, efficiency and cost-effectiveness. As more organizations become info-centric, having reliable and reusable information becomes paramount in achieving a decision-making process based on verifiable and factual data covering various asset types.

The many current global building standards and codes hardly address standardizing building and asset information. It is with a Building Information Model (BIM)—a virtual shared knowledge digital resource for facility, site and infrastructure information— that Asset and Facility Managers can generate a reliable source for decisions during an asset's lifecycle. However, it is the unification of practical and sustainable horizontal and vertical digital open standards that are missing.

openBIM® offers a universal approach to the collaborative design, realization and operation of buildings based on international open standards and workflows. When executed successfully, openBIM-enabled projects combined with a lean delivery process can deliver facilities with higher levels of quality design, construction and information. The value of openBIM is the seamless sharing of facilities and asset information during post-construction operations, decreasing costly information management redundancies.

Why are openBIM Standards important to Airports?

- **Removes proprietary roadblocks**
  Supports open, transparent workflows between vertical and horizontal projects, allowing project members to take part regardless of their software tools

- **Creates universal, neutral platform**
  An open standard format for model file sharing and archiving, increasing platform interoperability while preserving geometry and maintaining data quality

- **Promotes data repurpose and reuse**
  Sustains data for use throughout the asset lifecycle, avoiding redundant data input and consequential errors

Instead of Airport operators struggling to solve the same problems independently, buildingSMART International would like to offer an alternative: a collective international effort combining Airport leaders with industry experts under one organization.

Problem statement

Over the past 30 years, Airports have evolved from being simply municipal or Government infrastructure providers into sophisticated and business-oriented service providers. As in every industry, the pressure to operate efficiently is constant and arises from customers and stakeholders alike. Stefano Baronci, Airports Council International (ACI), Director, Economics

With passenger growth above 6% for the third consecutive year and well above the average 1.1% per annum over the last two decades*, Airports have developed new business models requiring investment in their facilities to meet the needs of a burgeoning aviation industry. This also impacts the way they are managing their assets.

Asset management involves attaining business goals and objectives by optimizing the cost, performance, and risk of assets over their lifecycle.

As Airports are expanding and upgrading at rapid speed to stay ahead of their competitors, their asset information management tools and practices are not maturing at the same rate. Asset and facility management responsibilities extend beyond tracking, operating, and maintaining Airport assets to space planning and capital project programs, and their program's pain points often go unaddressed.

PAIN POINTS

- Handover Data
- Approval Process
- Adjacent Civil Contracts
- Big Data
- Physical Security
- Space Management
- Operational Expenses
- Building Control Systems
- Construction Costs
- Wayfinding
- Emergency Response
- BIM-GIS

- Inefficient and uncomplete handover information exchange
- Higher construction costs
- Speed up approvals
- Filtering big data
- Comprehensive wayfinding
- Physical security requirements
- Multi-tenant space management
- Critical emergency response
- Long-term planning needs
- Software application interoperability
- Identifying critical assets
- Between adjacent projects
- BIM-GIS collaboration interoperability
- Proprietary building system

A universal plan to strategically develop standardized processes is needed, along with technical tools to provide long-term solutions for Airport Asset Management programs.

*ACI media release, 2/28/18 http://www.aci.aero/News/Releases/Most-Recent/2018/02/28/Airport-passenger-traffic-reaches-new-heights-in-2017-air-freight-posts-heftiest-gain-since-the-recovery-following-the-Great-Recession-

How can bSI deliver better solutions?

buildingSMART International (bSI) is a not-for-profit alliance of organizations from around the world who are committed to improving the built asset economy.

It has a formal set of programs and governance and delivers open digital workflow standards and solutions. More information about bSI is in the appendices.
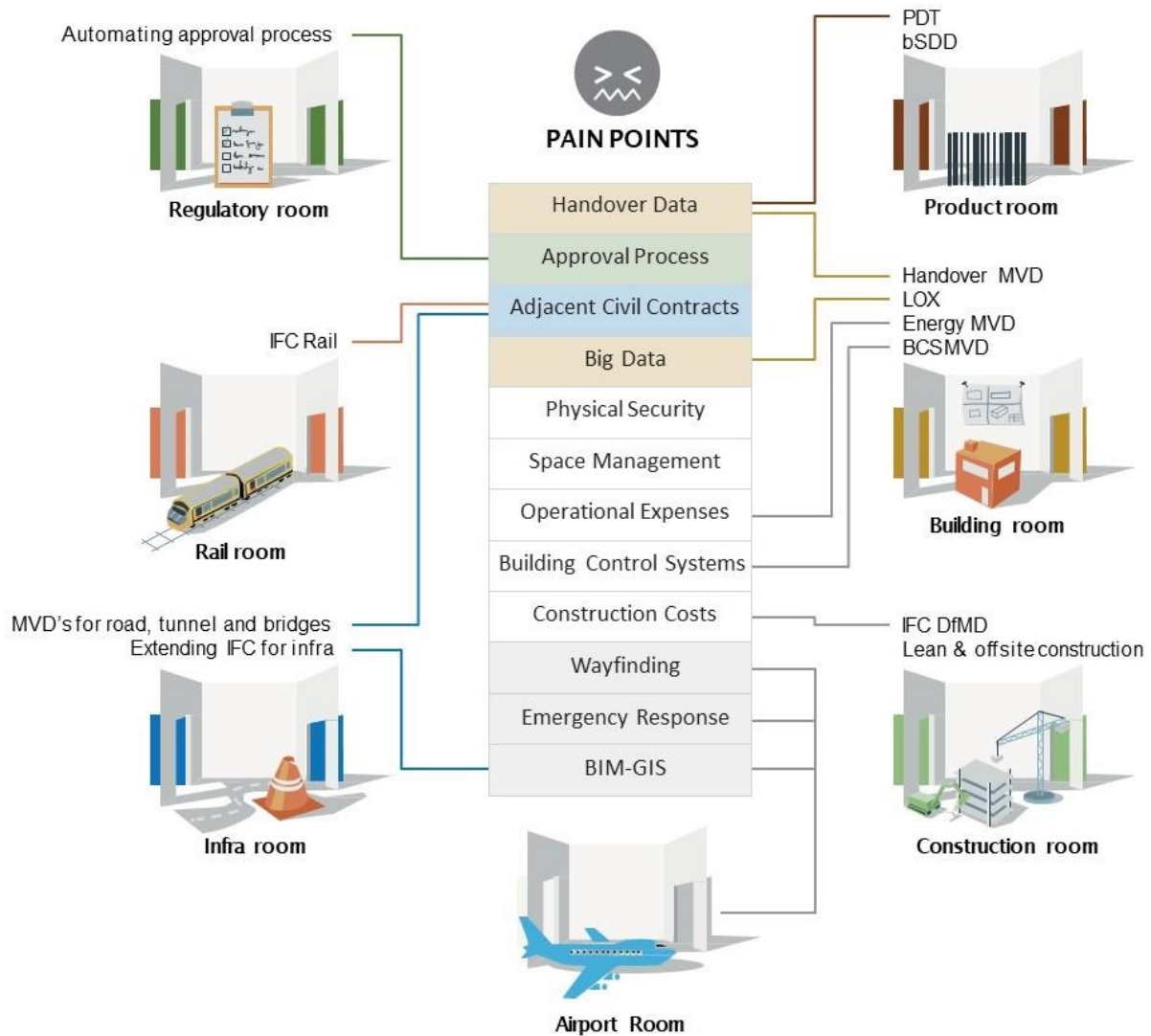
bSI Airport Room (AR)

There are facility industry organizations continuously developing standards to address overarching industry issues. However, as with Airports, sole-use facilities do not have their unique issues properly addressed in the general standards development process. bSI created the Room concept to allow working groups to address specific user needs and requirements. Formed by industry leaders, the Rooms work to close the gaps and develop not only universal standards, but also standards specific to their operations.

The Airport Room (AR), launched in late 2016, is led by the Asset Management department from Amsterdam Airport Schiphol. As per the AR Charter, the derived benefits include the following:

- Produce unified digital standards
- Enable asset management to justify decisions and more easily repurpose facilities
- Normalize existing Airport standards to create a uniform data exchange format to approach the market for Airport facilities
- Allow the exchange of requirements to be seamless between the multiple numbers of users involved with airport assets
- Enable a longevity of the information
- Leverage the wider buildingSMART standards environment to promote Airport Asset Managers' use of openBIM developments in their portfolio

Current AR work involves the development of a model view definition (MVD) for GIS and identification of Common Database Environment (CDE) functional requirements for Airport facilities. In addition, the AR is pursuing collaboration on openBIM work (Rail, Road, Building, Bridge and Tunnel domains) with other bSI Rooms.

The diagram below illustrates the relationship between the bSI Rooms.

Airport Room Charter

The charter is a document that defines the governance of the Rooms

Further develop and increase the use of openBIM standards for maintaining assets at airports

The Airport Room's objective is to achieve benefits through the following:
- Unification of specified digital open and neutral standards used in the airport industry to enable more efficient and effective practices
  - Enabling economies of scale with the supply chain and maintenance suppliers
  - Linking to the wider buildingSMART environment to allow airport Asset Managers to use the buildingSMART developments in their portfolio
  - Completing the existing standards with airport-specific objects, data and processes
- Integration of these standards to align the building, infrastructure and airport processes, to complete the airport context
- Enabled asset management decisions based on cost, risk and performance derived from BIM for the entire lifecycle of airport facilities
- Innovative solutions decisions designed to reduce disruption at airports and more easily repurpose facilities
- Collaboration with the other Rooms to maximize the efficiency in reuse of existing information

Airport Room Organizational Structure

The main component of the Room's organizational structure is the **Airport Room Steering Committee**, responsible for policy, the Room roadmap and decisions on standards development. The Roadmap is the document that determines which airport-related projects will be delivered.

The Room is an open forum for any interested party to attend. Both user and technical parties are welcome. Committees and project teams are open to all members of bSI.

Meetings and Attendees

Since the Room's inception in 2016, meetings have been held at the bSI Summits occurring twice a year.

The AR participants include representatives from over a dozen countries involved in Airport planning, design, construction, and operations.

The next AR meetings will take place in Tokyo at the bSI Summit October 2018. In preparation for the Summit, the AR will schedule calls every three weeks to work on two

of the work packages defined in the appendix (missing IFC entities (WP03) and CDE functional requirements (WP06)).

The Steering Committee is considering newly identified work items which several are already underway as projects in other Rooms and would only require an AR liaison to represent Airports in these discussions.

- Operational expenses
- Comprehensive wayfinding
- Unique security physical requirements
- Multi-tenant space management
- Critical emergency response
- Long-term planning needs
- BIM to GIS
- Better handover data
- Lowered construction costs
- Faster approvals
- Between adjacent civil projects
- Proprietary building systems

In Tokyo, the AR will look at the properties for the missing entities. The AR is already working on the development of Airport pre-defined exchange requirements with an example of openBIM exchange between BIM and GIS. The target for the next bSI Summit is to have a direct import from BIM to GIS.

Value Proposition

Together with Airport Asset Managers and Operators, buildingSMART International would like to offer a collective effort to solve common problems. bSI solutions are based on consensus-approved open standards that enable asset lifecycle value, and the Airport Room's focus is no different.

Most of the pain points identified by Airports are shared with other industry domains, as evidenced by other bSI Room work plans.
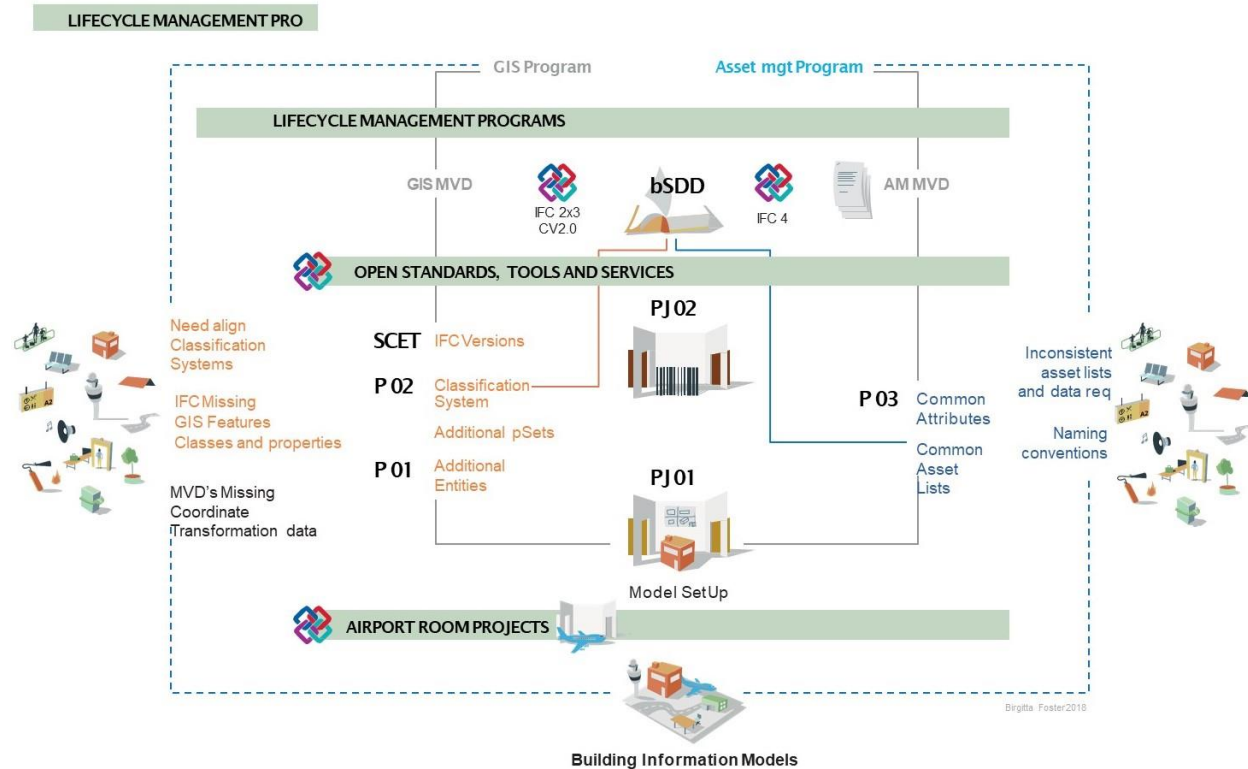
Several issues have been flagged as Airport-specific and would be best handled within the AR. Currently, there is an effort to create fast-track projects to accelerate the solution development process. These projects would deliver useable products that could be implemented today. One such effort in the early pilot stages is to address BIM-to-GIS workflow and remove current roadblocks.

Proposed Roadmap
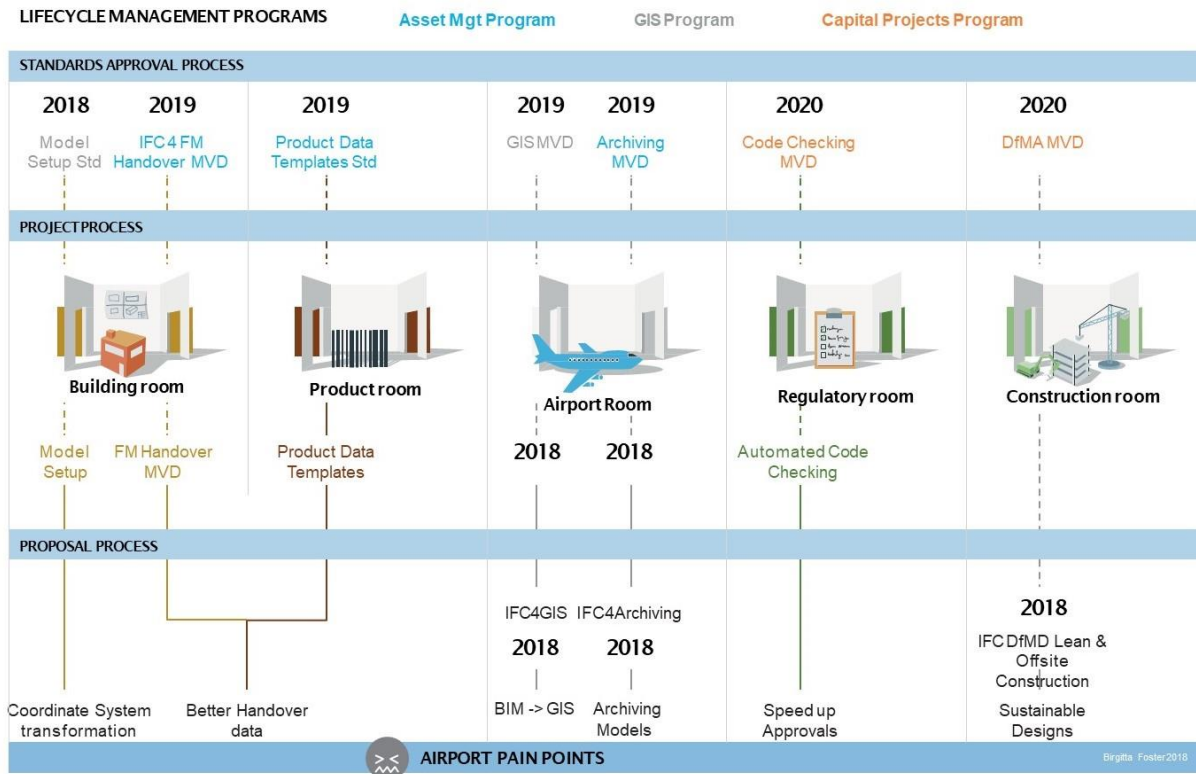
A proposed Roadmap is currently being reviewed by the AR Steering Committee. It lays out the timing of standards development for the Airport Room as well as projects and resulting standards from other Rooms.

Each project in the roadmap produces a standard to be vetted by bSI's Standards Approval Process and identifies, with a color code, the Lifecycle Management Program it will support.

How to get involved?

Contact Airport@buildingsmart.org

Appendix 1: Activities to-date

At the October 2017 meeting in London, the participants identified 10 work packages (WPs)—which are focused tasks—for the AR to tackle:

WP01 AR Governance Document
- Action – COMPLETE

WP02 AR Standards Roadmap
- Pain Point – Need to add more Airport representatives and vision of AR to bring new members aboard
- Solution – Propose Roadmap for consideration by AR Steering Committee
- Action – IN PROGRESS

WP03 Missing IFC assets classes
- Pain Point – Currently, the IFC schema does not contain every Airport object class (entity), and instead uses a generic (proxy) object for missing entities. This temporary substitution is causing standardization issues for the receiver of an exported IFC file from a BIM software application (important to Airports today and must be addressed to expand the use of IFC)
- Solution – Identify the list of desired entities to be added to the IFC schema and submit to the Implementors Support Group to add in the next IFC update
- Action – IN PROGRESS

WP04 Simple Guidelines / Lessons learned
- Pain Point –   No central location to find lessons learned or published Airport developed standards or industry use case documents
- Solution – TBD
- Action – TBD

WP05 Plain Language Questions
- Pain Point –   No central location to find answers to FAQ on IFC Standards
- Solution – Add questions/answers to the International User Group FAQ webpage, consider bSI recently launched an online forum (could look at adding a domain forum)
- Action – TBD

WP06 Common Data Environment (CDE) Functional Requirements
- Pain Point – Filtering Big Data: Airport stakeholders are concerned that current information is being stored and managed in disparate application databases—limiting access to vital data for decision making, increasing reaction time to emergency situations, impeding cost control measures, and hindering the display of basic wayfinding information (important to Airports today and must be addressed to expand the use of IFC)

- Solution – Centralized Airport data in common database location and accessed by all stakeholders based on permissions
- Action – During the Spring 2018 Paris meeting, the AR team gathered a list of desired CDE requirements, regardless of current software solutions deemed important. All 24 requirements were captured on a flip board, with open standards at the top of the list. The next step is to condense this "wish list" to 10 primary CDE functional requirements for Airport operations.

WP07 Define Airport BIM Use Cases
- Pain Point – Identify Airport-specific use cases
- Solution – Consider use cases developed by bSI International User Group for bSI Awards
- Action – TBD

WP08 Model Maintenance
- Pain Point – Future management of BIM deliverables / how monitor on-going changes
- Solution – TBD
- Action – TBD

WP09 Product Data Templates (PDT)
- Pain Point – Need standardize product data
- Solution – Product Room (PR) has a project underway to develop PTDs
- Action – Provide AR liaison to PR

WP10 Open Export & Import
- Pain Point – Open-round tripping of IFC files
- Solution – TBD
- Action - TBD

Appendix 2: The Airport Room Steering Committee – role and responsibility

The Airport Room Steering Committee is led by the Room Leader (Chair) who is appointed by the SCE in collaboration with the Steering Committee.

The Airport Room Steering Committee consists of 3 – 8 endorsed representatives from the buildingSMART Member Organizations and the Chapters, who are appointed on a 2-year voting cycle (half the members being replaced every two years to maintain some continuity).

The Airport Room Steering Committee is responsible for:

- policy and decisions on standards development in airport asset management
- approval of results;
- raise sponsorship income
- establish projects and project leads
- establish working groups to address identified work items
- oversight management of the Airport Room and its working groups and projects.

A member of the Steering Committee is expected to take an active part in the Room Steering Committee, and contribute with knowledge and engagement in the Rooms ongoing activities and ensure the Room delivers value and benefits to the industry, by;

- contribute actively to the strategic work of the Room (by creating a Roadmap for the Room to ensure the strategic)
- identify, evaluate and forward project proposals to the Standards Process
- manage the projects according to the project plan/scope

Key qualities of a Steering Committee Member include:

- willingness to **contribute quality time** to the work of the Steering Committee (estimated at 6 hours per month) taking on appropriate tasks to share the workload of the Committee;
- required to have an **appropriate background** in the domain, such as, client/operator, designer/planner/engineering consultant, construction manager, asset manager, specialist BIM/IT consultant, supply chain contractor or service provider;
- **strategic and forward-looking** commitment to the development of bSI standards
- **proactive engagement** with the work of the Room, **providing leadership and direction** for the wider Room community;
- Commitment to **regular and constructive participation** in Steering Committee meetings

The Steering Committees must ensure collaboration and communication with the rest of the bSI Community (other Rooms, working groups bSI Management etc.) and

the industry and Chapters. Therefore, the Steering Committee should also appoint members to maintain various responsibilities on this.

To ensure that the Rooms activities and projects are aligned with the buildingSMART technical strategy, the Room also needs to appoint a technical leader. Whether this will be an elected member of the Steering Committee, or a resource appointed by the SCE have to be considered

Appendix 3: buildingSMART history, suite of standards, governance

First established in 1995, buildingSMART International (bSI) is an open, neutral and not-for-profit international standards organization. bSI is the international authority on a set of standards known as the Industry Foundation Class (IFC) family (ISO 16739).

These standards deal with process, data, terms and change coordination for the specification, management and effective utilization of complex geometric assets in the built environment. With its ISO status achieved in 2013, the IFC open standards that bSI has created and maintained are recognized and becoming widely used in the built asset industry and already embedded in many software tools.

The international open standards developed by bSI members are user-driven and industry focused. They support an openBIM approach to the collaborative design, realization and operation of buildings. Membership can be achieved by either joining a local Chapter, becoming an individual International corporate member or participating in the highest level on the Strategic Advisory Council (SAC). bSI's core membership comes from Chapters, membership organizations in specific countries principally concerned with the local implementation of open BIM.

International membership is designed for individual organizations who are active in multiple countries and want to take part in Chapter activities in a number of countries as well as standards program. SAC members are from leading multinational enterprises who believe in the strategic importance of full implementation and adoption of openBIM in the built environment sector and their own enterprise. As advisors to bSI Board, they hold a critical role in shaping bSI's strategy and helping to determine priorities and focus.

Rooms

bSI created the Room concept for assembling domain-specific users (member and non-member) to focus on the identification, development and deployment of open digital standards that address particular needs and requirements. Rooms are sanctioned to facilitate the development of standards and any required or associated tools or infrastructure for interoperable working within the built environment.

Rooms may comprise both user and technical parties and are formed by interested parties to promote the resolution of particular interoperability problems.

Each Room must have a written charter developed by elected Steering Committee members. Rooms then form working groups to support projects that tackle issues unique to their domain environment. The project's intent is the delivery of standards ready to be put through the Standards approval process.

The final approval of bSI Standards is performed by the Standard Committee composed of the voting members from each Chapter, the International organization, and the SAC.

Strategic Solutions – Core Standards

Now for the first time in many years, a technical revolution is taking place within the facilities domain that could drastically change asset management. bSI is uniquely placed to define open international standards and working procedures to allow information sharing throughout the lifecycle of built environment assets, between all participants regardless of the software application.
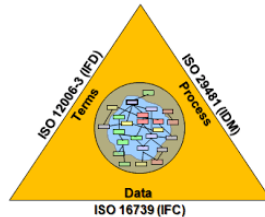
Industry Foundation Classes IFC – Data Standard
Data interoperability is a key enabler to achieving the goal of a buildingSMART process. IFC is all about the sharing of information between project team members and across the software applications they commonly used for design, construction, procurement, maintenance and operations. IFC is a common data schema that makes it possible to hold and exchange relevant data between different software applications. IFC Standards allow for specific "views" of models to be created with well-defined geometry and data requirements to support the specific information exchange needed for a use case during a building's lifecycle.

International Framework for Dictionaries IFD – Mapping of Terms
The buildingSMART Data Dictionary (bSDD) is one of the core components of the buildingSMART technology. The bSDD is a reference library based on the IFD standard, intended to support improved interoperability in the building and construction industry. The bSDD provides a flexible and robust method of linking existing databases with construction information to a buildingSMART-based BIM.

Information Delivery Manual IDM – Process Standard
IDMs capture (and progressively integrate) business processes while providing detailed specifications of the information that a user would need to provide at a particular point during project delivery. To further support the user information exchange requirements specification, IDMs also propose a set of modular model functions that can be reused.

Model View Definition MVD – Process Translation
MVD defines the subset of the IFC data model necessary to support the specific data exchange requirements of the AEC industry during the lifecycle of a construction project. An MVD provides implementation guidance (or implementation agreements) for all IFC concepts (classes, attributes, relationships, property sets, quantity definitions, etc.) used within a particular subset.

Standards Development Projects Process

Once an issue is identified, solutions can be developed as a project adhering to bSI's project process. A new project begins when the Room identifies a Work Item and forms a Working Group (WG).

The WG develops a Project Plan, including a budget; proposes a Project Leader; and submits the plan to the Room Steering Committee for approval, which then goes through a two-stage process.

Where the project results in a proposed new bSI standard, the Room Steering Committee formally submits the proposal to the Standards Committee Executive for another round of approvals.
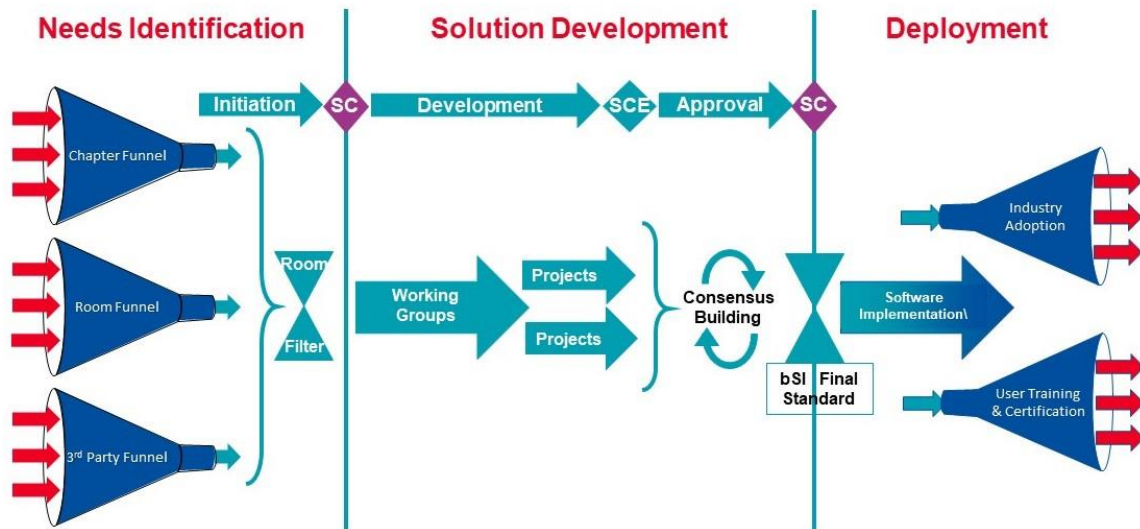
All projects that aim to develop a bSI standard must conform to the bSI standard approval process.

Standards Approval Process

buildingSMART has a formal process for the development of consensus-based standards and solutions. bSI Standards Development process defines the following stages:

- Stage 1: Initiation
- Stage 2: Solution Development
- Stage 3: Approval

bSI's proven process of standards development has produced the following:

buildingSMART International Standards

These standards have been voted by the Standards Committee as being Final Standards

Title	Ref	Link
IFC Base Standards		ISO IFC
IFC Specification & Tools		bSI Tech
IFC4 Specialist Site		IFC4
BIM Collaboration Format XML	S1005	BCF-XML
BIM Collaboration Format API version 2.1	S1006	BCF-API
IFD: Framework for object orientated information		ISO-IFD
IFC4 Design Transfer View	S1001	MVD
IFC4 Reference View	S1002	MVD
IFC Infrastructure Alignment	S1004	superseded by IFC4.1
Trust in BIM deliverables	S1015	mvdXML
IFC4.1 Infrastructure alignment	S1016	IFC4.1

There are over 25 projects undergoing standards development.

Proposal Team

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