



ECCA PROJECT - 690364

Adopting Circular Economy for internationalization and global competitiveness of European SMEs in Building and Construction



Partnership agreement

Version number: 2.0



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Article I. ECCA partnership agreement

ECCA partnership agreement is a constitutive document for the European Circular Construction Alliance.

Article II. ECCA - European Strategic Cluster Partnership (ESCP)

European Circular Construction Alliance is a voluntary, open alliance of complementary clusters and supporting organizations (meta cluster) interested for inter- cluster, cross boarder and cross sectoral collaboration adopting circular economy for internationalization and global competitiveness of European SMEs in building and construction.

The alliance has been initiated within the “European Circular Construction Alliance - Adopting Circular Economy for internationalization and global competitiveness of European SMEs in Building and Construction”, EU COSME supported project, Grant Agreement 690364 (short “ECCA COSME project”).

Whereas ECCA COSME project consortium partners have signed the European Strategic Cluster Partnerships – Going International (ESCP-4i) Charter (Annex 1) upon the invitation of the European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROWTH) the ESCP-4i Charter in general terms applies to ECCA partners, with certain criteria defined in this agreement.

Article III. ECCA vision, mission and objectives

ECCA vision is to position European cluster organizations and equivalent network organization and their members in construction sector and related industries as globally competitive actors in innovation, deployment and marketing of circular economy solutions and technologies in European and global markets, and thereby, to contribute to the European Commission's objectives to boost growth, jobs and investment in Europe.

ECCA mission is to develop and implement a joint internationalization strategy in the field of circular construction, fostering EU wide collaboration for innovation and market-uptake, and marketing of competitive products, services and technologies in the field of circular construction and support SMEs in global competition.

ECCA objectives are:

- **To intensify cluster and business network collaboration across borders and sectoral boundaries**

Circular construction aims to adopt principles of the circular economy in the building life cycle and targets beside construction other **traditional and emerging industries (eco-innovations, ICT/BIM/IOT, Industry 4.0, waste management, energy sector, tourism...)**. ECCA will initiate **new cross-sectoral collaborative value proposition schemes** and support across borders innovation project implementation, searching for synergies and best competences of SMEs and other innovation actors. Circularity changes will require new modernization of construction sector.

- **To promote the pan-European Strategic Cluster Partnerships to lead international cluster cooperation in new areas**

Circular construction aims to reduce use of natural and other resources contributing to solving the global issue – limited availability of natural resource and capability of the nature to fight will all kind of waste and pollutions. This is a global challenge and global market opportunity. European cluster organizations and their members can become globally competitive in circular construction but this needs collaborative approach beyond individual cluster. European Strategic Cluster Partnerships are supported by the EU Commission as a tool to support these collaborations. The ECCA will prepare a joint European strategy and common goals, fostering complementarities between partners, and act as EU-wide driver for inter cluster collaboration.

- **To better support SMEs in global competition and internationalization**

Traditionally, SMEs work in limited geographical area and joining innovation clusters and business networks to expand to new markets. ECCA will build on services and activities of the clusters already successfully supporting SMEs` internationalization and engage partners to develop common actions such as common promotion, marketing, joint branding, join participation on international brokerage events, and co-development with clusters and SMEs from third countries.

- **To help SMEs to contribute to the emergence of new value chains and take a leading position globally**

ECCA partnership will be an open alliance for different clusters, their members (mainly SMEs), and other organizations to support their ideas, planned innovation projects or developed technologies in circular construction. Highly innovative projects and solutions based on interdisciplinary knowledge and competences of different sectors, solving the global circular economy challenges, with large market opportunities will attract private and public investments, including strategic foreign direct investment and cooperation partners from Europe and third countries, and/or securing critical imports, knowledge and technologies. Circular economy is an important growth potential and opportunity for European clusters and SMEs to become global leaders in new, circular value chains.

- **To develop a roadmap for implementation with a long-term cooperation agenda to foster the sustainability of the partnership**

The final aim is to sustain after the end of action ECCA COSME project as EU wide meta cluster as a long term strategic cluster partnerships supporting SMEs in collaboration for innovation, market-uptake, and marketing of competitive products, services and technologies in field of circular construction and to

support SMEs in global competition. Identification of critical success factors, analysis the options for legal body representing the ECCA worldwide and strategy for providing funding –beyond the lifetime of a possible project funded under COSME, will be done.

Article IV. ECCA partners and supporting organizations

ECCA is an open initiative, subject to certain rules and criteria, to the involvement of clusters (ECCA partners), but also to other organisation which can apply for a status of ECCA supporting organization.

ECCA partners are clusters represented through innovation cluster organizations, circular economy related cluster organizations, or similar business network organizations. It is recommended that partners register the cluster on the European Cluster Collaboration Platform (ECCP). ECCA partners should have an own legal entity or can be represented by authorised cluster member.

Accession and withdrawal procedure

Clusters and ECCA partners join the partnership and accept the terms of this agreement by signing the *ECCA partner application form (Annex 2)* to demonstrate their interest to actively contribute to implementation of the ECCA strategy development in its implementation.

ECCA partners can withdraw from the partnership by providing written notice of 30 days to ECCA manager, after implementation and/or transfer of their, ECCA related obligations, tasks, work to be done to other ECCA partners.

ECCA supporting organizations are other organisations and individuals such as R&D organisation, universities, public organisations, policy makers, experts, individual SMEs and large companies which are not members of particular cluster but clearly support the mission and objectives of the alliance.

Other organizations can apply for *ECCA supporting organizations status by signing the Letter of interest (Annex 3)* in order to show they are familiar aims and organisation of ECCA and to demonstrate their interest to support the ECCA with expertise, in terms of policies support, consultancy and other services, and/or to collaborate within ECCA activities and projects.

Article V. Governance structure

The following organisation is foreseen for the initial stage of the ECCA up to end 2017:

- ECCA General Assembly / ECCA GA President
- ECCA manager
- Promotion and internationalization advisory body
- Thematic groups / Leaders of thematic groups
- Task groups for particular challenges
- ECCA office

ECCA General Assembly (ECCA GA) will be formed by authorised representatives of ECCA partners (one for each partner). ECCA GA is authorised to:

- Nominate ECCA GA President, ECCA manager, and leaders of Promotion and internationalization group, leaders of Thematic groups and ECCA office.

- Confirm key documents of ECCA: ECCA partnership agreement, ECCA internationalisation strategy plan, and ECCA joint implementation road map

ECCA General Assembly will be the main decision making body of the alliance. All decisions of the GA will be taken by a simple majority vote. The President will have the casting vote in the event of an equality of votes. A quorum of half of the partners will be required for a decision to be binding. Two ECCA GA meetings are planned on January 2017 and December 2017. ECCA partners will be able to take decision at the GA meeting and by electronic means.

ECCA Supporting partners will be invited to ECCA GA meeting, take part in the general discussion but have no option to take part in the decision-making process.

ECCA manager will be the meta-cluster manager demonstrating needed competences for managing meta-cluster. The ECCA Manager will be responsible for elaboration of documents and organization of the alliance, for coordination and facilitation of communication and collaboration between members, for implementation of the ECCA GA decisions, and for daily management of ECCA activities. Until the 1st GA meeting, ECCA manager will be Mr. Vladimir Gumilar from Construction Cluster of Slovenia, the coordinator of ECCA COSME project (*Vladimir Gumilar CV; Annex 4*).

ECCA Promotion and internationalization advisory body will be composed of representatives from ECCA members and ECCA COSME project partners, experts and active practitioners in communication, promotion, international cooperation, and internationalization of clusters and SMEs.

Their tasks and responsibilities will be to critically review and update ECCA documents dealing with promotion and internationalization. Optionally and in agreement with ECCA manager they will represent ECCA and/or coordinate ECCA activities on international events such as matchmaking, trade fairs, conferences, and workshops.

ECCA Thematic groups will be working groups in defined thematic areas defined in ECCA COSME project:

1. Raw materials extraction, production and supply of products, components, remanufacturing
2. Building design and urban planning Integrated eco/sustainable design of new and retrofitted buildings
3. Smart building, Smart cities
4. Construction
5. Use, operation, maintenance, retrofitting
6. Demolition and CDW management
7. Horizontal areas

The circular construction topics defined within WP2 of ECCA project are presented in *Annex 5* and will be updated according to needs and interest of participating clusters and supporting organisations. ECCA thematic groups will be coordinated by thematic groups leaders and representatives of the ECCA COSME project partner.

Task groups for particular challenges or action planned will be dynamically organized by Thematic groups or initiated by the ECCA COSME project partners with representatives of interested partners and supporting organizations.

Thematic groups and Task groups will organize their work, communication and decision making by themselves, depending on the number of partners involved, depending on the nature or the work or actions, but assuring openness and fair representation of all partners and supporting organisations involved.

ECCA office will be official legal representative of the alliance. For the duration of ECCA COSME project (until the end 2017) Construction Cluster of Slovenia as a coordinator of the ECCA COSME project will -as a legal body- represent ECCA in any contractual relation with external actors, for example in making international cooperation agreement, agreement on bilateral communication, signing statement of interest etc. Construction cluster of Slovenia will host the ECCA office and manage internal and external communication.

Article VI. Framework modalities of collaboration and communication between ECCA partners and to external partners, stakeholders and audiences

Opportunities and expected performance of ECCA partners are defined as follows.

- to identify authorised cluster representative to sign ECCA partnership agreement and contact person or persons for different thematic areas
- to participate in one or several thematic groups or task group addressing common challenges or activity planned.
- to contribute to ECCA results and documents by implementing surveys, contributing to market reviews, by reviewing of documents,
- to take part ECCA conference and other joint events,
- to promote of ECCA on national markets and relevant third markets/countries
- to take part in initiated ECCA innovation project activity, join promotion or internationalization activity.

Opportunities and expected performance of ECCA supporting organizations are defined as follows.

- to identify a contact person or persons for thematic areas
- to participate in one or several thematic groups or task group addressing common challenges or activity planned.
- to contribute to ECCA results and documents by implementing surveys, contributing to market reviews, by reviewing of documents,
- to take part ECCA conference and other joint events,
- to take part in initiated ECCA innovation project activities.

ECCA partners and supporting organisation are expected to be proactive, to act in good will, on highly professional way and according to cluster excellence good practices.

ECCA office and ECCA COSME project partners will:

- Manage, coordinate and implement activities as set in the ECCA COSME project and described in the next article, including preparation of drafts of relevant documents, and final review and finalization

- Manage and support the activities according to ECCA COSME project objective and work plan, facilitate the work, and set the milestones for the work of Thematic and Task groups, accordingly
- Manage communication and deploy communication means, including external promotion
- Host or help to organize the meetings (electronic ones, face to face), and workshop, and two ECCA conferences
- Harmonize work within and between different working groups, and link this work to other opportunities (for example trade missions in third countries, initiated by European Cluster Collaboration Platform, EU commission or other private and public actors), activities/platforms such as European Construction Technology Platform, Renovate Europe, and ongoing or planned R/D and innovation projects
- Provide options for financing, direct investments
- Facilitate non-disclosure agreement, IPR protection and exploitation (licensing, joint commercial agreement...) management on partners` requests.

Communication

Internal communication between partners and/or within Thematic groups or Task groups will be based on electronic means such as email, e-meetings and e-conferences. Face-to-face meetings will be implemented within different events gathering the majority of partners or hosted by one the partners. Within ECCA COSME project two joint events (ECCA conference, January 2017, December 2017) are planned to host workshops of ECCA thematic groups and/or task groups.

External communication and promotion will deploy communication means and channels set-up within the ECCA COSME project (Communication plan) such as ECCA web page, social networks, ECCA Newsletter, but also through ECCA partners` networks.

Article VII. Work programme, activities and services

Considering ECCA as a sustainable, long term partnership (see article VIII.), and to achieve ECCA vision, the following activities and services will be planed and implemented:

1. Set-up, manage and sustain the ECCA as European Strategic cluster collaboration partnership, including development of a roadmap for implementation with a long-term cooperation agenda to foster the sustainability of the partnership (see Article IX.)
2. Development, implementation, and updates of a joint European strategy for going international beyond Europe
3. Systematic and continuous support for mapping of innovation and market opportunities of the circular construction and its contribution to circular economy and other EU goals
4. Initiating and coordinating of inter cluster collaboration and development of collaboration consortia between European clusters in building and construction sector, and with clusters and SMEs in other industries (cross sectoral collaboration)
5. Development of new value proposition designs and collaborative, cross-sectoral business models and value chain cooperation
6. Set-up and facilitating co-financing of projects and actions implementation by providing information on possible public and private funding, including foreign direct investments
7. Map circular economy opportunities in third countries, and set-up communication and cooperation agreement with organizations supporting international cooperation in these countries and regions (such as ELAN network for Latin America)

8. Plan services such as mentoring, coaching, promotion to advance the most developed and competitive innovations (products, services, solutions, technologies) to international market
9. Planning and implementing of common actions such as international promotion, organization and/or participation on international matchmaking event, trade missions, brokerage events, conferences and workshops.
10. Communication and promotion plan to support development of joint brand and international recognition of competitiveness of European clusters and their members in the field of circular construction
11. IPR support, technology transfer, joint entering to foreign markets, and support to co-development with clusters and SMEs from third countries.

Detailed planning of those activities and services will be done in collaboration with partners and implement in ECCA action plans for particular time frame.

Article VIII. ECCA financing

Each ECCA Partner and ECCA Supporting organisation intends to bear its own costs and expenditures that might be incurred in the course of implementing this agreement, besides possible funding made available under the ECCA COSME project funding ("Cluster Go International" action).

ECCA COSME project funding will be available for a limited number of key partners actively involved in leading and coordinating of ECCA thematic groups, task groups, or for particular actions, agreed with the ECCA COSME project coordinator.

No fees for the ECCA partners and supporting organisation is foreseen up to the end of the COSME project.

ECCA partners and supporting organization can agree on financing of particular action or activity which will be initiated within the ECCA activities within limited numbers of partners. It is recommended that ECCA partners and supporting organizations involved report the financing and cost incurred to ECCA manager for EU reporting purposes.

Information on other funds available for implementation of this agreement and particular actions will be provided as ECCA services. A special attention will be on planning of financing options such as funding provides by EU programmes such as COSME, Cluster go International – Strand 2, H2020 calls addressing circular economy topic and construction, INTERREG programme, and the European Structural and Investment Fund, e.g. in the context of smart specialization strategies, or national funding if available. Options for the, crowd funding, business angels, foreign direct investment will be provided, when appropriate.

Article IX. Long-term cooperation agenda

The final aim is to sustain after the end of action ECCA COSME project as EU wide meta cluster as a long term strategic cluster partnerships supporting SMEs in collaboration for innovation, market-uptake, and marketing of competitive products, services and technologies in field of circular construction and to support SMEs in global competition.

Identification of critical success factors, analysis of options for legal body representing the ECCA worldwide and strategy for providing funding –beyond the lifetime of a possible project funded under COSME, will be done.

A strong, well organized and developed team of people should lead the ECCA as any excellent cluster. A roadmap for implementation with a long-term cooperation agenda to foster the sustainability of the partnership will define the strategy for assuring sustainability of the alliance with clear description of critical success factors, and especially with strategy for providing funding –beyond the lifetime of a possible project funded under COSME.

Article X. Settlement of disputes

Disputes that may arise concerning the application or the interpretation of this agreement or between two or more partners relating to the interpretation or implementation of this agreement. The partners concerned shall consult together with a view to the expeditious settlement of the dispute by negotiation or by other peaceful means of the partners' choice, including recourse to appropriate bodies to be agreed by all partners involved in disputes.

Article XI. Entry into force

ECCA will be established and will start operating when 10 partners from 5 European countries - all established in EU Member States or countries participating in the COSME programme under Article 6 of the COSME Regulation - sign the application form. The official set-up of the ECCA will be promoted at the 1st ECCA conference in January 2017.

Annex 1: European Strategic Cluster Partnerships – Going International (ESCP-4i) Charter



European Strategic Cluster Partnerships – Going International (ESCP-4i) Charter

We, the undersigned, have agreed to establish a **European Strategic Cluster Partnership – Going International (ESCP-4i)** called, **European Circular Construction Alliance (ECCA)** upon the invitation of the European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROWTH).

We, hereby, commit to work on a joint cooperation agenda with the aim to support the internationalization of our SME members towards third countries beyond Europe and thereby, to contribute to the European Commission's objectives to boost growth, jobs and investment in Europe.

As partners of a **European Strategic Cluster Partnership – Going International (ESCP-4i)**, we confirm that we subscribe to the following partnership's principles:

Being **European**, meaning

- *composed of partners, all established in EU Member States or countries participating in the COSME programme under Article 6 of the COSME Regulation and in minimum three different countries;*

Being **Strategic**, meaning by

- *developing and implementing a joint 'European' strategy with common goals and fostering complementarities between partners;*
- *promoting cooperation across related industries and sectoral boundaries in support of industrial modernization / emerging industries;*

Representing **Cluster(s)** through

- *innovation cluster organizations or equivalent business network organizations that have an own legal entity, are registered on the European Cluster Collaboration Platform (ECCP) with a new complete profile and will post regularly information on the Partnership activities on the ECCP platform;*

Forming a **Partnership** with the aim

- *to set-up a partnership agreement engaging the partners to develop common actions and setting out the modalities of cooperation between them;*
- *to develop a roadmap for implementation with a long-term cooperation agenda to foster the sustainability of the partnership;*
- *to provide information upon European Commission's request on the partnership activities and achievements;*

Working towards **Going International** by

- *developing and implementing a joint 'European' strategy for going international beyond Europe; and*
- *striving to successfully support the internationalization of our SME members towards specific third countries, and/or attracting strategic foreign direct investment and cooperation partners and/or securing critical imports, knowledge and technologies with a view to support growth, jobs and investment in Europe.*

Other provisions

This ESCP-4i Charter is not intended to be binding or create any legal rights or financial obligations under EU or national law.

This ESCP-4i Charter may be modified at any time by the Partners in writing and upon acceptance by DG GROWTH. Partners may wish to withdraw from or discontinue the Partnership, endeavouring if doing so to provide prior written notice of 60 days to the other Partners and DG GROWTH.

The ESCP-4i Label, to be awarded upon reception of this signed Charter, will be valid until its possible renewal following the outcome of the next COSME call "Cluster Go International" and/or upon reception of information at DG GROWTH's request to decide upon its prolongation.

Each Partner intends to bear its own costs and expenditures that might be incurred in the course of implementing this ESCP-4i Charter, besides possible funding made available under the COSME "Cluster Go International" action.

Signatures

Date: 17.2.2016.....

ESCP-4i Coordinator

Organisation name: **SLOVENSKI GRADBENI GROZD, GOSPODARSKO INTERESNO ZDRUŽENJE** Signature:

Organisation acronym: **SGG**

Country: **SLOVENIA**

Representative name: **Mr. VLADIMIR GUMILAR**

Representative title: **DIRECTOR**

ESCP-4i Partner 1

Organisation name: **BALTYCKI KLASTER** Signature:
SEANERGIA

Organisation acronym: **SEAD**

Country: **POLAND**

Representative name: **MRS. ANNA FIRLEY**

Representative title: **DIRECTOR**

ESCP-4i Partner 2

Organisation name: **ASOCIACION CLUSTER** Signature:
CONSTRUCCION SOSTENIBLE

Organisation acronym: **CCS-SBC**

Country: **SPAIN**

Representative name: **DIEGO BROOCK**

Representative title: **DIRECTOR**

Annex 2: ECCA partner application form

(Organisation`s letter head)

ECCA partner application form

I undersigned, as (position in the organisation, authorised to represent cluster, network organisation)

of the (name of organization)

located in (legal address, country, website)

accept the terms of ECCA partnership agreement and demonstrate our strong interest to actively contribute to implementation of the ECCA strategy development in its implementation.

We are cluster/business network (enter explanation, legal form) :

We are other type of organization (enter explanation, legal form):

We are registered at European Cluster Collaboration Platform: YES / NO / WE CONSIDER TO REGISTER

Short description of the cluster represented through innovation cluster organizations, circular economy related cluster organization, or similar business network organization:

Mission / vision:

Thematic area(s) related to circular construction:

Number of members / No. of SME members / No. of members interested for circular economy and internationalization which can benefit from ECCA actions:

.....

Data on authorised representative (name, surname, title):

Data on contact person(s): (name, surname, title, email, phone, address):

Date/place:

Sincerely,

Stamp

Name, signature

Annex 3: ECCA supporting organisation statement of interest

(Organisation`s letter head)

ECCA supporting organisation statement of interest

I undersigned
as *(position in the organisation)*
of the *(name of organization)*
located in *(legal address, country, website)*

confirm that we are acquainted with the aims and organisation of the ECCA (European Circular Construction Alliance) as European Strategic Cluster Partnership for internationalization (ESCP-4i) and demonstrate our strong interest to support the ECCA as described below.

Short description of the organization *(enter explanation, legal form, fields of activities, especially related to circular economy)*:

.....
.....

Terms of our support *(describe and be specific if possible - for example with expertise, support for communication and promotion, networking in third countries, policies support, consultancy and other services, and/or to collaborate within ECCA activities and projects in particular thematic fields)*:

.....
.....
.....

Data on authorised representative (name, surname, title):

Data on contact person(s): (name, surname, title, email, phone, address):
.....

Date/place:

Sincerely,

Stamp

Name, signature

also all the other organizations that are related to construction or to sustainable development of the built environment, green, and circular economy. CCS is a member of European Construction Technology Platform and of the E2B association (Energy Efficient Buildings).

The main competences of the CCS as innovation cluster are:

- Information, consultancy and other services in identifying innovation opportunities, development trends and prospects for development and business cooperation
- Advice and training to develop the innovation system, innovation potential and activities: from human resource development to commercialization, access to foreign markets and internationalization
- Support for R&D and innovation project preparation, identification of suitable tenders (national calls, Horizon 2020, COSME ...), set of the application, connecting EU and domestic partners
- EU and national R&D and innovation projects coordination and management, including costs / financial reporting
- Coordination and management of dissemination and exploitation actions in EU funded RTD projects, consultancy and deployment of exploitation activities, technology transfer and intellectual property issues.
- Cluster and other new collaborative organizational and business models innovation.
- Innovation management consulting and training
- National and international networking, policy actions (ECTP, E2B).

Annex 5: Thematic areas and suggested topics of circular construction defined in ECCA COSME project, WP2:

1. **Raw materials extraction, production and supply of products, components, remanufacturing:** green, innovative extraction of raw materials, Eco-remediation of queries, lean engineering, innovative production practices, Industry 4.0 (Smart factory), durability of products and components, wood based and hybrid wood products, bio-based, biodegradable materials, change / replacement of non-sustainable materials, off-site production, prefabrication for disassembly, re-use and remanufacturing, light weight products development, smart (self-adaptive) materials and components such as bio-adaptive facades, strengthening of standard construction materials, use recycled materials and reusing existing materials, use waste inner loop as a fuel in production processes.
2. **Building design and urban planning.** integrated eco/sustainable design of new and retrofitted buildings (sustainable urban planning – compact use of land, local renewables, design for light weight, ease of maintenance, and selective deconstruction , optimizing and re-using existing buildings and infrastructure, flexibility, multi usage and adaptability of building spaces , new business models development replacing ownership with leasing, renting, sharing.
3. **Smart building, Smart cities:** production and supply smart building components HVAC and other equipment, implementation of building automation, smart building components and real time monitoring tools, smart home appliances, integrated with BMS/building automation, water supply and management, including rain water management, interoperability/ inter-linkage of energy and utilities between district and building level, smart mobility and parking.
4. **Construction:** smart on-site and off-site processes, use of ICT tools to support the coordinator of contractors and other actors, effective supervision and quality control procedures, new green supply and distribution channels and inbound logistics, smart transport, logistics and mobility services, smart and sustainable sharing/renting of construction machinery and equipment, separating concrete with plasma, 3D printing technology, robotics and automated construction technologies.
5. **Use, operation, maintenance, retrofitting:** sharing vs ownership use models, green e.g. circular practices of building owners related to use and operation activities such as delivering space for living or working as a service, infusing life and new functionality (innovative design, remanufacturing) into unattractive buildings and avoiding demolition, innovative green refurbishment methods and tools, smart, automated maintenance, performance monitoring system, resource efficient retrofitting an existing buildings into a nearly zero energy ones.
6. **Demolition and CDW management:** replacement of demolition with dismantling, selective deconstruction, and re-use even on site, CDW management, including recycling and reusing of energy intensive and unsustainable materials, CDW market development, local /on-site CDW use, new recycling techniques for concrete (recovery of high-value fractions), resource efficient separation and collection systems.
7. **Horizontal areas:** BIM (Building Information Modelling) systems aimed at virtualization of building components and processes in whole construction value chain, Internet of things (IOT) implementation at Smart building, Smart city, new business models development, including new methods of investment financing, new standardization practices that popularize material efficiency and circularity in the construction sector.