



European Construction Sector Observatory

Policy measure fact sheet

Estonia

E-defice: Digital Construction Cluster

Thematic Objectives 1, 4 & 5

January 2018



In a nutshell

Implementing body:	The E-difice Cluster Management Board made up of 4 companies, in collaboration with 22 cluster partners, including construction and engineering companies; academia; R&D organisations; and local government. Supported by Enterprise Estonia/ERDF.
Key features & objectives:	Development of an innovative digital construction environment with new VDCM products, Grid and an e-construction portal for the whole building lifecycle. A collaborative approach to push the digitalisation and automation of the construction sector in Estonia and advance the market for smart, added-value construction solutions.
Implementation date:	2015
Targeted beneficiaries:	The construction value chain in Estonia.
Targeted sub-sectors:	Architecture, engineering, consulting, property development, building, construction IT and management, real estate, higher education, public sector, owners and residents.
Budget (EUR):	606,000 (2015-2018)

Estonia is one of the European leaders in providing online public services, and Estonians are also leaders in the use of digital technologies and internet services. Moreover, Estonia belongs to the high performing cluster of countries in terms of digitalisation¹. Despite the fact that Estonia is a pioneer in fostering the digital society, the key challenge is the digitalisation of Estonian companies. To tackle this issue, Estonia's Digital Agenda 2020 aims to create an environment that facilitates the development of the information society, the take-up of ICTs (Information and Communication Technologies) and the development of smart solutions. Together with the Estonian competitiveness strategy "Estonia 2020", the objective is to increase productivity and employment through higher value-added products

and services, and ultimately, to boost competitiveness in every field of the economy and life².

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Digitalisation and the emergence of new technologies are affecting the development of the construction sector and are creating significant growth opportunities.

The Estonian Digital Agenda naturally includes the construction sector with a focus on two main areas for the future development of the sector: energy performance of buildings; and boosting productivity with the introduction of information technology in all the stages of the construction/building lifecycle³. Data from Eurostat shows that the broad construction sector accounted for 17% of the country's GDP in 2013, which represents approximately EUR 2 billion in terms of the total added value of the broad construction sector⁴. However, the added value per employee is significantly lower than the EU average (25,200 and EUR 53,100 respectively per employee in 2012), caused by a lack of employees with the right professional qualifications (in 2014, only 41.5% of construction sector employees were professionally qualified)⁵. Thus, there is a significant room for improvement and growth in terms of productivity. The construction sector is an important part of the national economy and more effective processes would contribute to faster development⁶.

The E-difice Digital Construction Cluster brings together country representatives and construction sector companies to an expert team joining together in order to start the digitalisation of the construction sector in Estonia. The objective is to develop an innovative digital environment developing new VDCM products (Virtual Design, Construction and Management), Grid and e-construction portal (hereinafter e-portal) focusing on the entire lifecycle of a building and fully integrated with national digital services. It is funded by the construction companies and the European Regional Development Fund and is implemented through Enterprise Estonia (hereinafter: EAS).

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General description

E-difice was founded in 2015 and it is built on the cooperation of different actors, which represent the whole value chain of the sector. The formation of the E-difice Cluster was initiated by the private sector by applying a bottom-up approach. However, the cluster is working closely with government representatives, such as the Riigi Kinnisvara Aktsiaselts (State Real Estate Ltd, hereinafter RKAS)⁷, the Ministry of Finance and the Ministry of Economic Affairs.

The overall budget for the Cluster is EUR 606,000, with the partners and the European Regional Development Fund contributing each 50%, through the national cluster development programme of Enterprise Estonia (EAS)⁸.

E-difice Cluster members include building and construction management organisations, property owners, property developers, architects, engineers, consultants, construction software developers, higher education institutions, competency centres and local government (Väätša Vallavalitsus)⁹.

The Digital Construction Cluster aims to shift paradigms inside the construction sector by implementing ICTs and placing significant emphasis on altering traditional business models. This is accompanied by creating a construction environment, where collaboration between various parties is central and the building is looked at throughout the lifecycle - from inception to utilization. The strategic objective is to create an innovative digital construction environment with new VDCM products, Grid and an e-construction portal for the entire lifecycle of a building¹⁰.

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The Cluster consists of four working groups in following competence fields¹¹:

- the analysis and systematisation of the best experiences in the digital construction field;
- the development, description and marketing of new VDCM products;
- the development and description for the e-construction portal, and Grid structure, as well as all the parts of the construction lifecycle;
- creation of prototypes for a digital construction information exchange environment in order to manage the construction lifespan.

E-difice directly contributes to the main objectives of the smart specialization area, contributing to the following main objectives in the field of ICT¹²:

- Moving the ICT sector from a service-based business to a product-based business (digital building products);
- Broader application of ICT in other sectors (planning, design, construction, management);
- Improving the quality of ICT professionals' skills and increasing their number.

The cluster's mission is to create a well-functioning, cooperative, end-user oriented and innovative internal market, competitive at the national level (with other sectors), but also at the international level, while also attracting young people to pursue a career in the construction sector¹³.

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Achieved or expected results

As the implementation of this initiative is currently ongoing, there are only limited results available. Thus, we provide a comprehensive overview of expected results.

By 2020, E-difice partners expect to achieve significant growth in their international competitiveness resulting from the joint development, marketing and sales activities. The e-construction portal should be fully operational, integrated with the national system through the Grid and actively used. The new VDCM products should be fully adapted and exploited on the market, contributing to increasing efficiency, revenues and lowering costs of the users¹⁴.

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The expected results, set in the strategy of the cluster for 2015-2020, Action Plan 2015-2018, are closely interconnected but divided into four categories. This division also illustrates consecutive steps / actions that are quantified in specific results that are designed to achieve the goals¹⁵.

1. Learning & Development – development of construction related ICT skills and raising awareness about digital construction environment in cooperation with higher education institutions.

The development of the innovative digital constructing environment is based on close cooperation with experts and specialists representing key stakeholders, working together on a formulation of common goals. While starting with 20 experts in 2015, more and more experts will be gradually involved in the process, reaching 70 experts by 2020. The beta version of the e-portal, ready for testing, is planned to be delivered in 2017. By involving the experts, the cluster ensures to reflect and meet the actual needs of the companies, clients, end-users and public sector.

A delegation of experts representing the cluster, together with government representatives, has visited several companies and research institutions in the USA¹⁶ and Singapore¹⁷ in order to

exchange experiences, learn from global leaders, get an overview of software development and future plans for start-ups in the construction industry.

2. Processes – implementation of IT solutions

Fast development, implementation, or adaptation, of digital forms of cooperation (BIM, VDCM) among cluster partners and among the most important players in the Estonian construction sector, through the development of the IT platform, connected to the national digital systems through Grid, and new digital building products. It is foreseen to increase the number of organisations joining the IT platform each year by 5 (for the period 2015-2020) as illustrated in Table 1 below. Simultaneously, in cooperation with RKAS and the government (the Ministry of Economic Affairs and the Ministry of Finance), the cluster is planning to modify public procurement procedures in Estonia to implement a multi-criteria selection procedure to replace the 'lowest price wins' criterion.

Table 1: Expected results - number of IT platform users

	2015	2016	2017	2018	2019	2020
N° of users - IT Platform	0	5	10	15	20	25

Source: The Digital Construction Cluster, 2015¹⁸

3. Clients – involve large contractors, key players in the Estonian construction sector and users of new innovative products.

The goal is to ensure the adoption of the new products by users, enhancing the competencies (training, manuals) to fully understand the benefits of new opportunities. The quantitative results are measured by the average revenues generated from new digital building products of the cluster partners and number of users adopting these new products. The main increase is expected between 2018 and 2020 when the initial phase will be over and first results will be visible.

Table 2: Expected results – new digital building products 2015-2020

	2015	2016	2017	2018	2019	2020
Avg revenue from new products	0	384,863	575,398	977,566	1,458,713	1,855,064
N° of users of new products	0	5	25	100	200	300

Source: The Digital Construction Cluster, 2015⁹

4. Finance – aiming to improve the financial results (reduce costs, increase quality, efficiency, turnover and profit) and competitiveness of the cluster partners.

Ultimately, the digital construction environment will bring financial benefits for the cluster partners but also for the Estonian construction sector overall.

The more efficient, interconnected, digital environment will improve international competitiveness, market share, turnover and profit, and added value per employee.

Table 3 shows the average profit that the Cluster partners are expected to achieve through E-difice activities up to 2020:

Table 3: Expected results - average profit (EUR) of cluster partners 2015-2020

	2015	2016	2017	2018	2019	2020
Avg revenue from new products	76,510	77,180	84,838	93,784	111,768	125,554

Source: The Digital Construction Cluster, 2015¹⁰

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Perspectives and lessons learned

From a **government perspective**, the Estonian government in Estonia has been supporting clusters since 2008, as the experience has proven that the clusters are valuable collaborative networks that strengthen the international competitiveness of companies²¹. The Ministry of Economic Affairs believes that the Estonian construction sector is lagging behind, especially with regards to the introduction of digital solutions.

Facing big challenges coming along with the so-called Fourth Industrial Revolution, digitisation and automation, and adoption of zero-energy buildings, national attention should be focusing on prompt adaptation to new market trends and should foster the digitisation of the construction sector in Estonia²².

From the **perspective of the E-difice Cluster partners**, representing the implementing body as well as beneficiaries, the Digital Construction Cluster will help to²³:

- Create equal opportunities for all companies in the market;
- Make construction projects more transparent;
- Reduce the financial, human and material resources of construction projects through e-solutions.

The Chairman of Novarc, an architectural and consulting engineering company, believes that the creation of an e-construction system will help to solve many of the daily problems that the construction sector has to deal with.

As the Scandinavian experience shows, digitalisation will help to make the construction process more transparent, construction costs more predictable and the greater availability of [reliable] data will also help to avoid mistakes in the construction process²⁴.

The Development Director at E.L.L. Kinnisvara is on the E-difice Digital Construction Cluster Management Board²⁵, representing the property development within the cluster partners, underlines the importance of knowledge transfer and learning from global leaders. For him, the visit to Singapore was in particular inspirational and useful as the country is a great example of the

implementation of the digitalisation in the construction sector with clear goals and innovative approach²⁶.

Digitisation would enable a better communication between the involved parties resulting in better planning, more accurate scheduling and cost reduction

For developers, digitisation of the construction sector would enable a better communication between the involved parties resulting in better planning, more accurate scheduling and budgeting with related cost reduction. On the other hand, digitisation of permits, coordination procurement, digital notices and inductions is greatly appreciated by architects, contractors and subcontractors, providing a better planning and overview of subcontractor progress, fewer problems and conflicts. Moreover, reducing the administrative burden would benefit not only the private sector but also public sector.

From an engineering perspective, the use of 3D engineering design will help to avoid design inconsistencies that can occur in the planning phase when using 2D design technologies (currently used). New 3D technology solutions will enable faster and more efficient detection and correction of problems and deficiencies. All building information is planned to be stored in a public database, with 3D plans and BIM providing all details about the materials used, the maintenance costs and the state of the building, which will help to make the real estate market more transparent. The main benefits for end users will include easier maintenance, improved problem prevention, easier planning for major repairs and overall cost reductions. Finally, in regards to demolition, there would be also an environmental impact, as all the details about used materials will be known and can be more easily recycled rather than placed in landfill²⁷.

From an **academic perspective**, the Rector of Tallinn University of Technology emphasizes on the opportunity to fundamentally change the construction sector in Estonia. BIM will enable the automation of all processes throughout the whole lifecycle of the building, providing the opportunity to achieve vast savings in terms of time and resources. The Rector argues that the full potential of BIM will only be reached when it is widely used at national level and is actively used across the whole construction value chain²⁸.

Endnotes

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