

**Digitizing European initiative****Working Group2:  
Strengthening Leadership  
in digital technologies and in digital industrial platforms  
across Value Chains  
in all sectors of the Economy**

This paper, based on the conclusions of the Second Report of February 22nd 2017, wants to highlight and provide some justification on the need to include the Construction chain as a vertical focus in WG2 report on the Digitising Industry Initiative including specific challenges that would need to be addressed at the European level in the construction sector and the impact that could be created with its speedier digitization. This position of Federcostruzioni is also formally supported by the Italian Ministry of Economic Development (MISE); FIEC (European Construction Industry Federation); the European Construction, built environment and energy efficient building Technology Platform (ECTP); and by the Dutch organization FME.

Federcostruzioni, (<http://www.federcostruzioniweb.it/>) is the Italian federation, member of the Confindustria network, that represents and promotes the interests of the building production chain's companies, in close co-ordination with our sector member associations.

Federcostruzioni is articulated in 5 production sectors: Construction of buildings and infrastructures; Technologies, plants building and installation, machines; Construction materials; Engineering and design; Innovative and digital services. Overall our federation represents: 80 Sector associations, 30.000 companies, a turnover of 400 billion, with 2.6 millions employed, 12% of the Italian working population.

At European level, after the deep crisis that has hit the sector particularly hard from 2008, since 2014 the construction sector in the EU has given signs of stabilisation, and the outlook is generally considered positive for the years ahead. Investment in construction is also witnessing a positive development. As results from the last FIEC (European Construction Industry Federation) Report, after a slowdown over the past years, 2014 marked an inversion of the negative trend with investment growing by 1,7% with this trend strengthening in 2015 (+2,4%), accompanied by net job creation. Total investment in construction amounted to EUR 1.241 trillion in 2015 that amounts to 8,5% of European GNP. For 2016 the increase in investment should amount to 2,1%. The Juncker plan with its investments of 315 billion in three years should have some positive effects on private and public investments.

Globally, based on the data of the recent report of the McKinsey Global Institute, Reinventing Construction, *"the sector is one of the largest in the world economy with about 10 trillion spent on construction related goods and services every year. The sector employs 7 percent of the world's working population and has fundamental role for society as it builds the constructions where we work, live and the infrastructures necessary for global trade and travel. If everybody agrees that the health sector has a global impact on society and quality of life, the construction sector matters too. However the industry productivity has trailed behind that of other sectors for decades, and there is a 1.6 trillion dollars opportunity to close the gap"*. The Report shows that the labour-productivity growth has been 3.6 times more in manufacturing and 2.8 times more in the total world economy and if the construction productivity were to catch up with

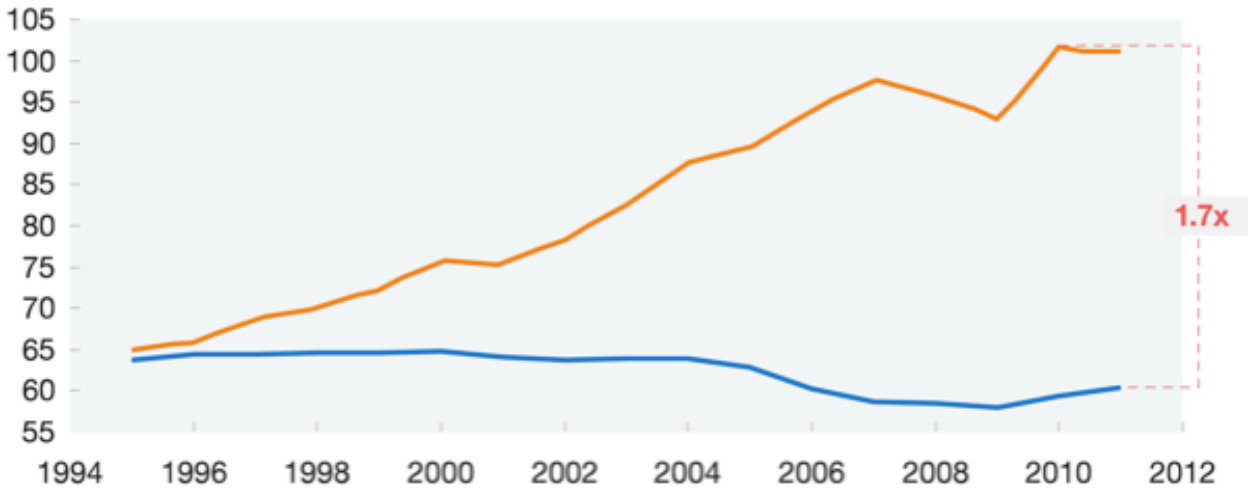
the total economy, the industry value added could rise by 1.6 trillion dollars /year and an increase of global GDP of 2%.

Overview of productivity improvement over time

Productivity (value added per worker), real, \$ 2005

Manufacturing  
Construction

\$ thousand per worker

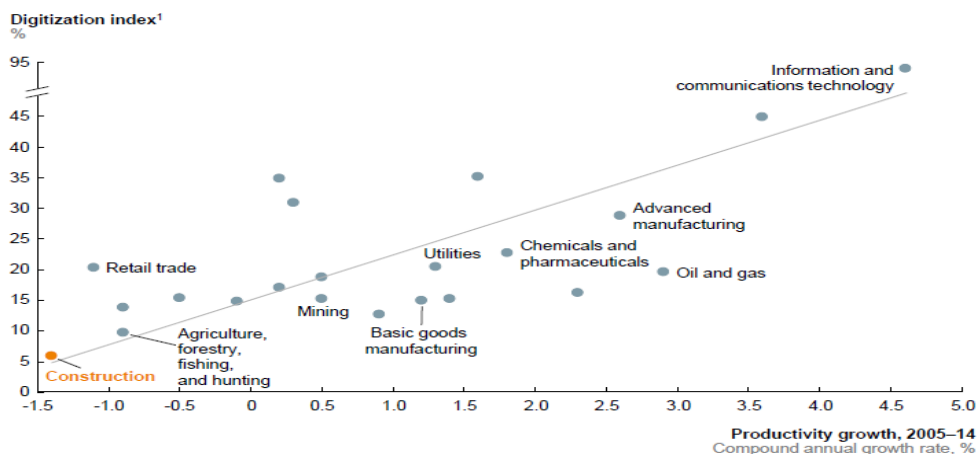


Source: Expert interviews; IHS Global Insight (Belgium, France, Germany, Italy, Spain, United Kingdom, United States); World Input-Output Database

McKinsey&Company

Reasons of poor performance are, extensive regulatory burden, very dependent on public sector demand, highly fragmented with big differences between large players, that operates internationally in heavy large scale construction either civil or industrial, and much smaller players engaged in fragmented and specialized works. Even if large companies are from 20% to 40% more productive then the small ones, they are still far away from the productivity levels obtained by manufacturing and the gap risks to become much wider when manufacturing will benefit from industry digitization.

Digitization in constructions



Knowledge about what could be done better and differently has been available to the industry but, also as a consequence of the crisis of the last couple of years, the industry has not been moving forward as it should. Also the potential opportunities of productivity gains from digitization could be largely missed because construction is among the least digitized sectors in the world, according to [MGI's digitization index](#).

**McKinsey Global Institute industry digitization index; 2015 or latest available data**

Relatively low digitization  Relatively high digitization  
 Digital leaders within relatively undigitized sectors

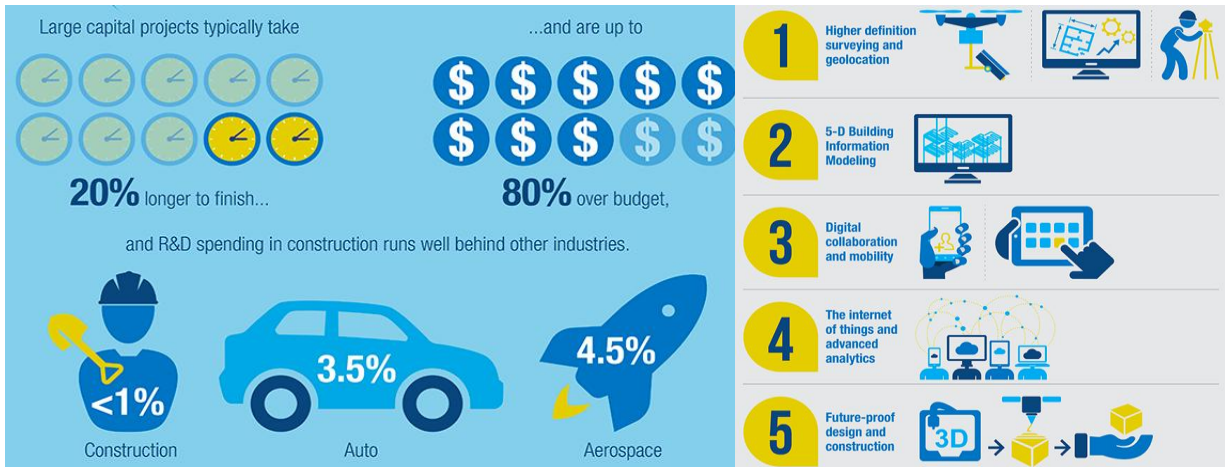


In the United States, construction comes second to last only better of agriculture, and in Europe it is the last of the index after agriculture. The highly non-linear and complex nature of construction projects has made impossible for the sector to move to more manufacturing style, lean and digitized project systems. A few Members States are starting to design policy initiatives for construction to improve its environmental performance, productivity and efficiency, policies that could also benefit the public sector budget by reducing the costs for infrastructure building and maintenance. New digital technologies and smart and innovative materials are out there and could make a difference but their market penetration is still limited and, if we want to accelerate the pace of innovation, the whole construction chain, as outsourcing has a fundamental role, needs to be helped to change the way it works and pushed to embrace innovation. The investment capacity of the industry is negatively impacted by the higher volatility of the sector reducing its ability to invest in new technologies, materials and services. Market failures also affect the sector. The most common are: suboptimal procurement criteria by public and private owners, information asymmetries due to fragmentation, lack of cost transparency and geographic dispersion that makes difficult for contractors to benefit from scale.

Of the MGI seven areas of action identified for the construction sector to catch up with its productivity gap, 5 are heavily impacted by digitization: *rethink design and engineering processes; improve procurement and supply-chain management; improve on-site execution; infuse digital technology, new materials, and advanced automation; re-skill the workforce*. The other two, *reshape regulation and raise transparency and rewire the contractual framework*, are both affected by digitization on issues like transparency and

regulation making simplification, control and performance evaluation, all tasks made easier to be effectively performed in a digitized and transparent environment.

## innovation in constructions



Imagining construction's digital future - McKinsey & Company

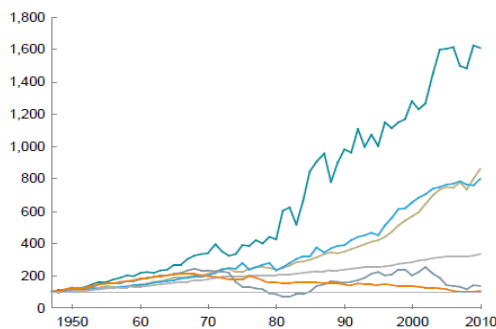


Going back to the DEI initiative and its aims, we believe that the construction chain should be included in the vertical perspective with the four selected others: Connected Smart Factories, Smart Agriculture, Digital Transformation in Health and Care and Industrial data Platforms. As for these four sectors, digital platforms in construction could be fundamental in increasing productivity by making digitization more accessible to all companies of the value chain including SMEs, and in improving efficiency and reduce costs for public and private projects alike. It would also well integrate to other EU Commission initiatives on construction digitization like the ones carried on by the EU BIM Task Group or the initiatives on digitization that will stem from Annex 1 of COM(2016) 860 final "Accelerating Clean Energy in Building" chapter 2 Construction and the specific topics elaborated by ECTP for FP9 on the importance of data and digitization in buildings and construction – *like multi-dimensional decision-making frameworks and tools able to perform simulations based on information retrieved from the BIM and that takes into account the building in its environment – e.g. in energy aspects considering the building as an active node in the energy grid and evaluating the impact of such a node in its area (and the impact of the area on the building itself).*

## Productivity compared in 3 sectors

In the United States, labor productivity in construction has declined since 1968, in contrast to rising productivity in other sectors

Gross value added per hour worked, constant prices  
Index: 100 = 1947



Many sectors have transformed and achieved quantum leaps in productivity; construction has changed little, limiting productivity gains  
Key advances, 1947-2010

### Construction

Limited improvements in technological capabilities, production methods, and scale

### Manufacturing

Implemented entirely new concepts of flow, modularized and standardized designs, and aggressively automated to increase production

### Agriculture

Leveraged scale through land assembly and automation; deployed advanced bioengineering to increase yields

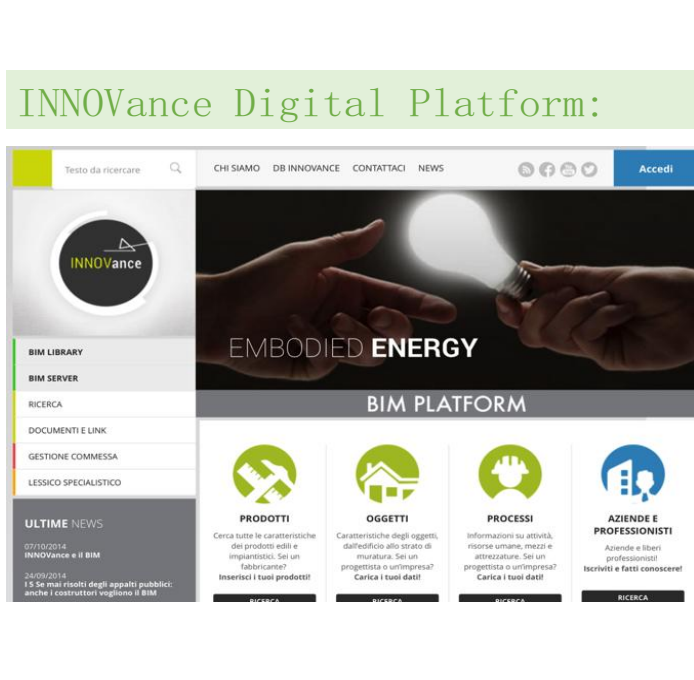


In Italy, under the umbrella of the programme *Industria 2015* launched by the ministry of Economic Development, the project INNOVance was approved with the objective to create the first national BIM platform for the construction chain. A building process optimization needs a systemic and holistic approach in order to correctly manage its complexity. Despite many important contributions have been provided in the last few years, both from a procedural point of view and from a normative one, building process management is often fragmented. This may cause repercussions on building quality and inefficiency in cost and time management.

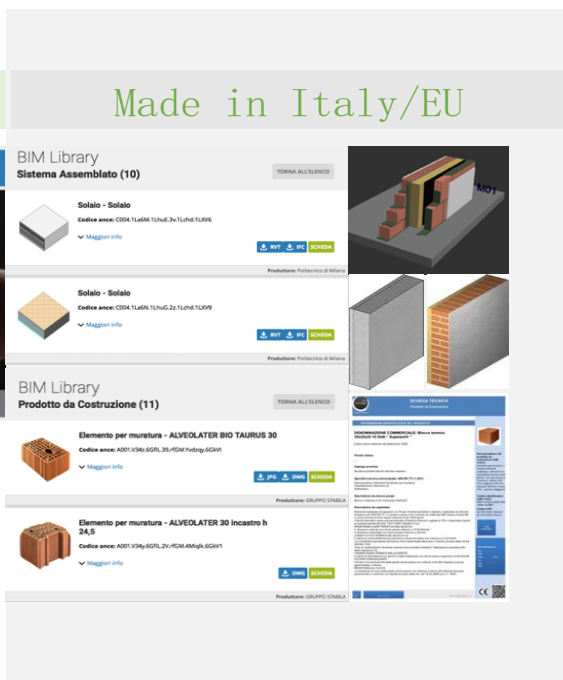
The INNOVance research project, as an interoperable platform for exchanging information in the building industry, is aimed at enabling the structured information exchange through the whole process in favour of all the actors. For this reason, the scope of the research project is threefold: the development of an unambiguous classification system for every object in the construction field, the collection of informative attributes through datasheets, and the creation of an unique database to smartly store and share information by a user-friendly website. Unambiguous language and standardized information increase building process efficiency. If we then consider that data exchange is possible through the exploitation of a user-friendly web portal and some interoperable web services, efficiency and economic savings in the entire construction chain could be extremely relevant.

The cooperation with manufacturers' and constructors' associations (ANDIL, ATECAP, FLA, UNICMI, ANCE, etc.) and the presence of UNI, the Italian standard organization, has allowed the proper implementation of the database. The INNOVance project has been successfully concluded and Federcostruzioni is negotiating with MISE, in the framework of the *Industria 4.0 Italian strategy*, to activate a pilot and testing action that would lead to a full scale availability of the platform. The INNOVance project has already had some positive effects at European level on the European standardization effort; on the 12th of December in Vienna in the framework of CEN TC/442 "Building Information Modelling (BIM)", Italy has been given the coordination of the work to define the European LOD (Level of Object Development) with as reference base the Italian standard UNI 11337 "Building and civil engineering works - Digital management of the informative processes"; LODs are the core of BIM, the digital information system for the construction sector.

## INNOVance Digital Platform:



## Made in Italy/EU



As far as the role of technical standards is concerned, in the last decade the attention of the EU on the standardization is being continuously increased as it is considered a valid tool to enhance the competitiveness of the European construction industry, to facilitate the market penetration of innovative goods, to reduce the production costs incurred by the industry. Standardization allows industry to improve its production for the benefit of the whole construction sector as well as the consumer protection. According to Regulation EU no. 1025/2012, public authorities have to be committed to enhance the value of the contribution provided by standardization to the growing of the European economy as competitiveness tool of the industry: open, shared and interoperable standards supporting strategies on dissemination of the technical and scientific culture needs for education and training of the workforce. For instance, implementation of Regulation EU no. 305/2011 on construction products is based on the CE marking according to the harmonised European standards which comply with this fundamental principle. On the contrary, according to a SWOT analysis non-open standards and/or private standards lead to weaknesses and threats for the open market and fair competition. With regards to the relevance of the standards in the communication and exchange of data, open standards reduce the risk of control of the whole chain by a single actor or a few actors.

In this framework, the Building Information Modelling (BIM) is definitely become the key point in any new technology supporting the construction chain aiming at fostering the construction sector by innovative tools and methodology. The switch from manual technical drawings to CAD mainly affected the operating tools. Now the switch from CAD to BIM implies a fundamental change over the ordinary operating process involving the management systems of any actor in the construction chain.

There is a direct relationship between BIM and IFC. In that respect, the European committee CEN/TC 442 has actually endorse the international standard ISO 16739 "Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries". As European standard EN ISO 16739, it has been automatically become a national standard in any EU Member State. It specifies a conceptual data schema and an exchange file format for BIM data and represents an open international standard for BIM data that is exchanged and shared among software applications used by the various participants in a building construction or facility management project.

The Italian standard UNI 11337 (5 parts published, 3 parts under development) applies to any kind of construction work, regardless of its nature (public vs. private; building vs. infrastructures) and of the process (planning, design, execution, operating activities, maintenance, dismissing or refurbishing). Indeed, in that respect there is no reason to have a different approach. For any kind of construction work the key point is the conformity against technical performances and the customer/user satisfaction against the usability of the works.

Standards are a dynamic tool which can be effective for the co-regulation of the construction sector provided that they are properly acknowledged and endorsed by a smart public regulation for the benefit of the whole economy (construction industry, professionals, consumers, authorities).

A list of main possible benefits from an effective relationship between voluntary standards and compulsory legislation on the digital technologies in the construction sector could be the following:

- Strengthen of cooperation and coordination within the construction chain
- Openness of the market, increase of quality of the commitment, measurability of performances, reduction of litigation

- Improvement of the planning activities at the long term
- Reduction of costs and time, improvement of quality
- Reduction of outsourcing of competences
- Acknowledge of innovative entrepreneurs and of production quality
- Sustainability of processes and products, reduction of waste
- Digital infrastructure of the whole construction chain
- Competitiveness of industry and professionals

Italy is in favour of European level initiatives to accelerate the digitization of the construction sector as stated in the letter endorsement of our ministry of Economic Development to our request to add the construction sector to the one already selected by WG2, but is not alone; good examples are to be found in several Member States like France with the programme "Industrie du futur" but also the « Plan de transition numérique du Bâtiment » targeted to TPE/PME, with the development of digital BIM models and the UK with Digital Built Britain with the Level 2 BIM strategy with obtained savings in 2015 of 840m Pounds and moving forward to Level 3 BIM strategy and continue in the development of the NBS BIM Library and NBS BIM Toolkit. Other member states are also active like Germany (Germany Builds) and Holland where FME is undertaking several initiatives in this domain, one of which is a Fieldlab industrial building of houses, where digital standards are essential, the other is the expansion and collaboration of the standards IFC and ETIM MC and the connection to a uniform object library (UOL) that is currently being developed based on these standards. Standards have a fundamental role to play and we believe that a joint effort at European level should be undertaken to accelerate the process of creation of viable, effective and interoperable open platforms for the construction sector.

## Effects of BIM introduction – UK (2025)



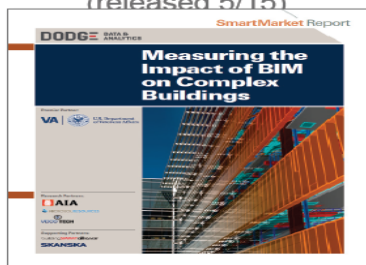
At international level the USA are also analyzing the impact on digitization on construction. In the Dodge Smart Market Report the impacts are the following: 40% of owners report that BIM and have identified the following outcomes: accelerated project completion by a minimum of 5%, and 15% credit it with more than 10% schedule compression. 41% of contractors report that BIM reduced internal construction cost by

at least 5%, with 8% achieving more than a 10% decrease. 67% of contractors report a percentage of improved productivity, with 16% seeing increases of 25% or more.

## Benefits of BIM – USA

### US users doing complex buildings report significant outcome improvements

#### New study on BIM metrics (released 5/15)



#### Five Top-Rated Positive Impacts of BIM (According to the Percentage of High or Very High Impact Ratings by Type of Respondent)

Dodge Data & Analytics, 2015

	Respondent Type	% Rating High or Very High
Improved Constructability of Final Design	Contractors	74%
Increased Owners' Understanding of Proposed Design Solutions	Owners	73%
Improved Quality/Function of Final Design	Engineers	71%
Generated Better Construction Documents	Owners	70%
Improved Ability to Plan Construction Phasing and Logistics	Owners	70%



**Innovation actions:** We believe that the economic case for including the construction industry within the vertical focus areas of WG2 is a strong one. From this will result a more intense cooperation at European level that should lead to an acceleration of digitization uptake from the industry and the relevant demand both public and private through state of the art digital platform development. The challenge is to take stock of ongoing initiatives, promote mutual learning and coordination, and identify knowledge and intervention gaps through Platform creation, large scale piloting and ecosystem building initiatives.

**Platform Creation:** Various initiatives and platforms are at different stages of development at national level but to create a sufficient capacity of involvement of the all construction chain, it is necessary to bring the various initiatives together including pilot testing, experimental and concrete applications and best practices developed by the different initiatives with a focus on interoperable solution suitable for SMEs.

Bring together of industrial digital platforms like INNOVance could create accelerate platform creation and improved mastering of the digital value chain in construction with the result of facilitating the inclusion of digital innovation in products, processes, services and new business models in the construction chain providing opportunities for companies to operate in an EU wide digital market for construction product and services .

**Large scale piloting:** Pilots should use existing platforms and populate them with innovative applications testing and validating them in concrete cases as well as in controlled lab environment. They should focus on specific applications that target specific needs of the industry testing their effectiveness in addressing these needs opening the way for large scale applications and testing in cooperation with other large scale pilots. Its fundamental that all solutions developed are interoperable, provide ease of use for business and all users, are adapted to be implemented in a strongly regulated environment. They should also be tested not only by SMEs but also by micro companies/professionals that have a large presence in the construction chain.

**Ecosystem building:** the activities on the development of Construction Digital Platform will certainly enhance the involvement of stakeholders, including SMEs, both as market players and as interested



parties in the standard building process. The take-up of digital platforms is fostered by increasing the ecosystem of players involved both on the demand and supply side, and by standardisation activities with the involvement, at European level, of national standardization bodies in line with the DSM strategy.

**Conclusions:** Construction matters to growth, employment and society. An enhanced European cooperation in Construction could lead to a faster increase in digitization, productivity and quality for all European companies of the construction chain regardless of their size, with a positive impact on their competitiveness from local to global.

Large scale federating at EU level between existing platforms would improve interoperability, cooperation between companies and diffusion of all available digital technologies and tools within the industry, particularly with SME's with a positive impact on intra community trade and increase of global competitiveness by leveraging on European strengths and reducing the impact of weakening factor like company size.

Also Digital Innovation Hubs could play a role in helping raise the awareness, train companies and workforce, and disseminate opportunities and best practices of digital transformation in construction. Furthermore, a reinforced EU cooperation in construction would allow a much better coordination of national and regional initiatives across Europe, an improvement of the regulatory framework and standardization with an improved consensus of stakeholders, a better focus on digital training needs of a workforce of about 18 million, a more focused effort on the industrial operation side of the industry with a strong leverage on how data, through the digital platforms, may be more accessible and create value and transparency to users and providers alike.

We sincerely hope that our request will be taken in consideration by the Commission and WG2 members and a specific Construction WG created in addition to the existing four WGs, and its finding included in the conclusions of WG2 as well as in the working programme 2018-2010 of H2020.