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Building Control Report

Consortium of European Building Control

Forward

The Consortium of European Building Control (CEBC) is a pan-European body that represents the Building Control profession across Europe.

Its membership encompasses government departments, professional bodies, institutions and private companies.

Consortium members meet as a body twice a year at locations around Europe. A theme is chosen for each meeting depending on the country to be visited. A typical meeting usually includes a site visit of a significant development, circulation of Technical papers and debate on their content, linked to a particular theme.

At recent meetings, members have debated the following topics:

- Building Control systems in a number of European countries;
- Private/ public involvement in Building Control;
- The Value of Building Control;
- Defining a model Building Control system (best practice toolbox);
- Comparison of E – permitting processes across member states in Europe;
- CE-marking;
- Updates of EU building related legislation.

Each meeting also allows members to debate developing issues in their respective countries and to be able to share information and experiences. This has been particularly important on subjects such as defects in construction, building products and durability.

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Executive Summary

This report offers an overview and comparison of electronic delivery of building control processes in member organisations, most of which are within Europe. We have analysed the replies from an on-line questionnaire accessed by 30 member organisations. As expected, levels of IT solutions in member organisations (and member countries) are developed differently. What is common to all systems is that the process has started in all member organisations and that the need to develop IT solutions is obvious. Some member organisations are well advanced in e-delivery and can serve as an example. New ideas and solutions are being constantly developed.

Background

CEBC (Consortium of European Building Control) is a European organisation which brings together countries in Europe and further afield which are responsible for building control. Members are legislative authorities, as well as those who deliver building control both as a desktop approval service and on building sites to ensure compliant development results.

Part of CEBC work involves the preparation of reports (BCR – Building Control Reports) which summarise the current state of Building Control in Europe whilst also outlining further developments in the building control industry.

Examples of previous reports include: “Building Control Systems in Europe” which explains the systems of building control in member states; another relates to access to the built environment –“Access for All in Europe”. We have published a report which examines self-confirmation: “Study Into Self Confirmation and Building Control and Europe” and finally, the appreciation of construction compliance checks by a building control professional: “The Value of Building Control”.

Purpose

At the CEBC meeting in Milan it was decided to prepare a report on the status and plans for the electronic authorisation and control of construction works (e-delivery) in Europe. It was agreed that the most appropriate method to collect and collate answers was via a questionnaire. The aim was to establish the extent to which e-delivery is being used across all members utilising e-tools in the planning, issuing of permits, design, construction and building control disciplines. The report also seeks to establish any future steps each country is preparing to take in this field. The questions aim to cover the widest possible range starting with general legal frameworks to technical solutions. The motivation that led to the creation of e-delivery needs to be examined, who are the users of the systems, the level of development e-processing has reached in each CEBC member’s country, how open or closed these systems are, what, if any, is the relationship to traditional methods of working (paper based), what is the response of the public and what is the response of the users.
The responses are analysed and presented as a summary report together with additional comments. The purpose is to identify Member States where e-Delivery is well advanced and perhaps draw conclusions from this data where ’best practice’ may be being delivered. It does not necessarily seek to presume that since a Member State is well advance in the delivery or implementation of e-Delivery that ’best practice’ is actually being delivered per se.

Methodology (how we did it and limitations)

To be able to prepare a report on e-delivery we needed input from CEBC members who represent member organisations. In some cases these are private organisations delivering building control; in many cases these are local authorities and in several cases these are representatives from governments. We used a web-based electronic questionnaire as prepared by the working group. Answers were collected in April and May 2017, and the analysis started in August 2017.
The questionnaire was composed of 32 questions (plus one about the respondent), starting with very basic questions. In the questionnaire we tried to follow the logical process of developing a construction project and the preparatory procedures that are part of that process. We tried to cover as many aspects as possible without being too technical. As there are as many building control systems as there are member states we tried to formulate the questions in such a way that the answers could be given no matter what legal and operational framework exists in each member state.
If we happened to receive several responses from the same authority, we amalgamated the results into a single answer using the most useful/detailed answers.
The findings in the report are divided into seven chapters:

- Application for Building Permit
- Process/assessment
- Decision/approval
- Site inspection/construction phase/competition
- Archive/sale of the data/commissioning
- BIM and formats
- Transition and Acceptance.

The electronic format of the questionnaire is archived and could serve as a basis for future repetition of the survey. In this case progress in each member organisation could be demonstrated.

Findings

NOTE: All questions in the Questionnaire were grouped into seven categories relating to the subject matter:

- Application for Building Permit
- Process/assessment
- Decision/approval
- Site inspection/construction phase/competition
- Archive/sale of the data/commissioning
- BIM and formats
- Transition and Acceptance

The following are the findings of the questionnaire broken down by the above categories:

Application for Building Permit

The following questions fall into this category:

Q6(a): For which parts of the building control processes does your country/organisation have IT solutions?
Q11: In what way is it possible to submit the application? Can it be done electronically, in paper form or maybe both?
Q12: Who are users of the service?
Q14: Do you use qualified digital certificates when dealing with processes in the field of building control?
Q24: How do you record the changes between what was designed and what was built?

To aid brevity of this report we have indicated at the beginning of each question how many respondents answered the question and how many skipped answering the question.

Q6(a)

Answered: 28, skipped: 2

Most answered this question. Half of the respondents are partially provided with the initial information (information about the building site and the design of the project, such as the proposed master plan and other preconditions) while almost 30% of respondents receive full details including the application plans, calculations and other relevant documentation to enable the processing of all aspects of the project electronically. Four members reported that they do not provide such service; two are in the development phase.

Comments: About 80% of respondents have a fully/partially working IT system that permits electronic processing of spatial planning, construction and procedure information.

Q11

Answered: 30, skipped: 0

Everybody answered this question. An application can be submitted electronically or on paper in 60% of member organisations. In two member organisations/states, electronic submission of a Building Permit application is the only method which can be used to submit such an application, while five respondents stated that only paper submissions are allowed.

Comments: It is not clear if it is for legal reasons or the early stages of adopting electronic means of processing building permits, but most of the member organisations/countries allow both methods – digital or by traditional paper means.

Q12

Answered: 28, skipped: 2

In more than 50%, the users of the IT systems are both individual clients and professionals. In almost 30% the system is only available to professionals. In some cases it depends on the type and size of the building as to the method to be used in the processing of a Building Permit.

Comments: A majority of applications submitted electronically appears to be by professionals but laypersons also use these IT solutions.

Q14

Answered: 29, skipped: 1

The majority of respondents (over 40%) are partly already using digital certificates. Almost 25% use it regularly. Others are not using electronic certificates to identify themselves in electronic applications

Comments: In two thirds of member organisations, respondent digital certificates are used.

Q24

Answered: 30, skipped: 0

One third of member organisations have stated that the same hardware which is used for submitting building permit applications is being used to record changes which have occurred on site to the approved project. All other ways of notifications - in paper, by way of e-mails or by using Cloud based solutions are being used to a lesser extent.

Comments: It appears that there is no unified approach to handling the information about changes during the construction phase. It appears that the replies depend on the legal consequences and the size and type of changes made to the finished project.

Summary:

General observation is that practically all member organisations and member states are already using or are implementing digital building permit processing. Most of them allow submissions in paper or by electronic means. As the processes are being digitalised so too are the possibilities to undertake enquiries and to identify buildings electronically. Perhaps the legal framework in some Member organisation will have to adapt or change for building permit procedures and communication to be mainly made electronically. Some member countries' legislation has already been amended to take account of electronic building permit processing and communications.

Process/assessment

The following questions fall into this category:

Q6: For which parts of the building control processes does your country/organisation have IT solutions?

- (b) Building site selection and visualisation on electronic maps
- (c) Submission of an application
- (d) Submission of project documentation
- (e) Processing of the data of an application
- (f) Assessment of plans on screen
- (g) Control/review of project documentation
- (h) Communication/Consultation with other institutions involved in the process of issuing building permit
- (i) Communication with client of developers (or their authorized designers)
- (j) Hearing of the neighbours online
- (k) Control of the design/project

Q7: Do you have a database where the data related to each application for a building control related building permit is kept?

Q8: At what level is this database being set up and maintained?

Q13: When communicating with other institutions, what type of information technology do you use?

Q15: Is there a computer-aided system(s) in place to control the prescribed technical and other requirements of the building (electronic checking for compliance with national building regulations)?

Q16: What are the essential /basic requirements for construction works checked by these systems? (Structural strength and stability, Safety in case of fire, Hygiene, health and the environment, Safety and accessibility in use, Protection against noise, Energy efficiency and heat loss, Sustainable use of natural resources, Compliance with the spatial plan, Handling of the waste)

Q 17: Is any of the other requirements (eg. Compliance with the additional environmental provisions, the Energy Performance Certificate), which are subject to an approval done by the machine?

Q6(b)

Answered: 28, skipped: 2

More than 80 % of replies state that they have IT solutions for site selection and visualisations. Only 15 % don't have such a system.

Q6(c)

Answered: 27, skipped: 3

Two thirds have a fully developed or partially developed system for the submission of building permit applications; slightly less than 20% are developing a system for this purpose.

Q6(d)

Answered: 27, skipped: 3

75% have at least a partly developed system which enables the submission electronically of the documentation of a building project. Four (15%) member organisations do not have the facility to submit building permits electronically.

Q6(e)

Answered: 27, skipped: 3

In 60% of all respondents answers, they stated that they have IT solutions for processing of an application, one quarter are in the process of establishing such a service.

Q6(f)

Answered: 27, skipped: 3

37% of respondents replies Member organisations indicated that they have IT solutions for fully assessing the building permit plans on screen. 26% have a facility for partially assessing the plans on screen. The remaining are either in development or don't have any intensions of providing such a facility.

Q6(g)

Answered: 28, skipped: 2

Two answers are prominent here: one third of respondents are fully using IT solutions to review documentation, one third are partially using IT systems. 4 member organisations (15%) are developing such system.

Q6(h)

Answered: 28, skipped: 2

Communication with other authorities takes place in 40% of cases and at least 30% is partly carried out using electronic means..

Q6(i)

Answered: 28, skipped: 2

60% of communication with developers is fully or partially done electronically; in 20% of case member organisations do not use electronic methods of communication.

Q6(j)

Answered: 28, skipped: 2

Communication with neighbours is still undertaken in 50% of cases using paper. whilst the same percentage have initiated an electronic or partially electronic method of doing so.

Q6(k)

Answered: 28, skipped: 2

IT solutions to control the design are fully in place in one third of member organisations, one quarter have partial IT solutions. Almost 30% of members don't use IT solutions to control the design.

Comments: In two thirds or member organisations IT solutions are being used. It seems that comprehensive systems are being put to use and most of the procedures are developed at the same time.

Q7

Answered: 30, skipped: 0

An electronic database of building permit exists in 85% of member organisations. Apparently only 4 member organisation don't have an electronic database of building permits or they maintains such a database using traditional paper means.

Comments: The large majority (85%) of member organisations/states have established electronic collection and storage of building permits and their associated documents.

Q8

Answered: 27, skipped: 3

In more than half of member organisations the data is being stored at municipal level. In 25% it is the state responsibility.

Comments: The answer is probably linked to legal systems across member organisations and the division of powers. It would be interesting to explore the correlation.

Q13

Answered: 29, skipped: 1

More answers were possible in this question. The prevalent (90%) method of communicating with other authorities during the building control process is by e-mail. Using a centralised computer system is used in over 50% of cases, ordinary e-mail in 40%.

Comments: Most members use several methods of communicating with other authorities. Traditional stand-alone email systems and centralised systems are by far the most prevalent.

Q15

Answered: 29, skipped: 1

Electronic checking for compliance with national building regulations is not yet widely used – over 70% of member organisations don't have such systems. In three member organisation such systems are being utilised and in four these are under development.

Comments: Computer systems are not yet able to assist in checking for full compliance with building regulations. Most advanced systems are in Estonia, parts of UK (derby) and part of Italy. Good examples can be found in Norway, Iceland and Finland.

Q16

Answered: 6, skipped: 24

This question was only answered by a minority of respondents, however it is safe to say that nowhere was there a system which carries out complete checking of compliance with national building regulations. In member organisations where electronic checking is partially undertaken, human expertise is combined with computer output.

Comments: It seems that for basic enquiries about compliance, computers can be used, but a human expert is carrying out the final check.

Q17

Answered: 29, skipped: 1

When asked if any of the other requirements which are subject to an approval is done by the computer the majority said "No" (55%). 24% of member organisations partly use computer based systems, three (10%) plan to do it.

Comments: As with building regulations, more effort will be required to develop systems that will be able to assist humans in more comprehensive building control.

Summary:

In most member organisations/countries, IT solutions are being used or are in development to assist in issuing building permits. As these systems develop, it has become standard practice to use them to also store the data in the long term. For the time being computers are not used to provide full checking of compliance with regulations. It is well known that technologies are being developed which will enable building proposals to be fully checked for building regulation compliance solely by electronic means, but we are not there, yet! Innovation of design will, in the meantime, continue to require human intervention for building control compliance checks.

Decision/approval

The following questions fall into this category:

Q6(I): For which parts of the building control processes does your country/organisation have IT solutions?
- Issuing the building permit

Q21: In what way is the notification of a decision being carried out (in processes where this is required)?

Q22: May the client choose the way in which the notification of a decision would be done?

Q6(I)

Answered: 28, skipped: 2

IT solutions for issuing building permit are in place in 40% of member organisations. In 42% the issuing of building permits electronically is in development. In 24% of cases there are systems in place to assist in the issuing of building permits. There are 5 member organisations that don't have IT assistance when issuing the permit.

Comments: In more than 80% of member organisations/states there is or will be IT solutions assisting administrative personnel to issue building permit.

Q21

Answered: 29, skipped: 1

Notification of the decision to the developer is carried out in 35 % by e-mail, 28% is carried out by ordinary mail and some members advise of the decision in different way or the developer can choose the method of notification themselves.

Comments: There is no common method used to deliver the decision.

Q22

Answered: 30, skipped: 0

There is almost perfect split between the possibility that the client can or is not allowed to choose in what way the notification of a decision in relation to the Building Permit will be carried out.

Comments: No comment is necessary.

Summary:

While IT solutions are widely used during the preparation and delivery of building permit decision, in several instances the decision can or has to be delivered by ordinary mail. On occasions, it is the developer that chooses the way the decision is delivered. In some countries/member organisations there is legislation which dictates the method of delivery.

Site inspection/construction phase/completion

The following questions fall into this category:

Q6(m): For which parts of the building control processes does your country/organisation have IT solutions?
- Monitoring/controlling the construction phase and authorising the building to use

Q16: What are the essential/basic requirements for construction works checked by these systems? Structural strength and stability?

Q17: Are any of the other requirements (e.g. Compliance with the additional environmental provisions, the Energy Performance Certificate), which are subject to an approval done by the computer?

Q23: How does the contractor/investor notify each phase of construction?

Q24: How do you record the changes between what was designed and what was built?

Q25: Can this be carried out on the same system electronically?

Q26: Do building control personnel use electronic devices when they work on building sites?

Q28: Does your country/organisation have means of electronic monitoring of the demolition phase and reporting the quantity of construction & demolition waste and reporting its quality, i.e. further classifying it according to the EU Waste List or similar?

Q6(m)

Answered: 29, skipped: 1

Practically everyone answered this question. Almost half of the respondents state that they have partially implemented an electronic method of monitoring/controlling the construction phase and authorising the building's use. 30 % of members have already fully implemented it. Five members have reported that they have not introduced electronic controlling and completion and they are not planning to do so..

Comments: About 80% of respondents have fully/partially implemented or have in development IT solutions which adequately address the construction phase.

Q16

Answered: 7, skipped: 23

As many didn't answer this question, the interpretation is not truly relevant. More than half of those that have answered have partly implemented electronic checking for compliance with national building regulations during construction phase; one member is in development stage.

Comments: More than 75% of the respondents didn't answer that question. This may indicate that the subject is relatively unknown.

Q17

Answered: 29, skipped: 1

More than half of the respondents have stated that other requirements are not carried out electronically, one quarter of replies state that this method is partially implemented. 10% are planning to introduce it.

Comments: Other requirements/building regulation are not widely checked electronically. Reasons are not known. It may be that reasons are embedded in the national building control systems.

Q23

Answered: 30, skipped: 0

While everybody has answered this question, results are almost equally split between notification carried out electronically, partially electronically or no electronic system is being used for this purpose.

Comments: 60% of respondents use fully/partially electronic means of communicating during the construction phase.

Q24

Answered: 30, skipped: 0

When reporting changes one third uses the same system as has been used for the original application – some by way of an application for an amended Building Permit application. The centralised system is used by 20%, 13% use e-mail as the means of communication and one tenth record changes on paper. Other non-specified ways are used by quarter of the members.

Comments: Many variations in the methods of communicating and recording of the changes are being used. It is probably not only the question of the technical means available to authorities but also what is convenient to constructors/developers.

Q25

Answered: 30, skipped: 0

When asked if the same electronic system can be used to record changes almost 60% said that it can, when more than a third replied "no".

Comments: About 60% of the respondents have the possibility to use electronic means of recording changes.

Q26

Answered: 30, skipped: 0

Tablets, smart phones or equivalent electronic devices are being widely used (70%) on site inspection work, some are allowing it but not enforcing the use of electronic devices, few (6.5%) don't use it.

Comments: About 90% of respondents either fully or partial use electronic devices when they work on building sites to record findings/take photos or communicate with relevant parties in relation to the project.

Q28

Answered: 30, skipped: 0

For members who have such recording systems, 30% have implemented it partially, and one member organisation is in the process of developing it. Other half of respondents don't have such facilities.

Comments: About 50 % of respondents either fully or partial use electronic devices when monitoring the demolition phase.

Summary:

Most participants are well developed in the implementation of electronic means of recording site conditions, etc. during the construction phase. The most advanced solution can be found in Finland, Scotland, Estonia, Norway and Spain.

Archive/sale of the data/commissioning

The following questions fall into this category:

Q6(n),(o),(p):

For which parts of the building control processes does your country/organisation have IT solutions?

- Monitoring the use of the building, maintenance and refurbishment;
- Data and document permanent archival;
- Web shops for selling drawings of existing buildings:

Q9: In the case of an existing database, is it possible to obtain information about the historical status (timeline) of a particular building?

Q27: Does your country/organisation have a system that keeps record of the changes of the building (i.e. change of use, refurbishment, minor and major reconstructions)? Is the computer control of changes of building in place?

This Section examines what each Member State is doing for e-Delivery in relation to Archival of data as a direct result of their receipt of electronically received and processed applications through the approval stages for Building Permits.

Q6(n),(o),(p)

Answered: 28, skipped: 2

28 out of 30 respondents answered these questions (See Annex B) with two respondents indicating in all three of their replies that they had "Fully implemented/introduced" a solution. These being "Building Control, City of Vantaa, Finland" and "Derby City Council, England". The "General Council of Technical Architecture of Spain" indicated in Q6(n) that they had Partially implemented "Monitoring the use of the building, maintenance and refurbishment" whilst having "Fully implemented/introduced" a solution for Q6(o),(p). Of the three Member states noted above in Questions (Qs 6(n), 6(o), 6(p), 9 and 27, only "Building Control, City of Vantaa, Finland" answered "Yes" as did many others of which notably, "Technical Regulatory Authority, Estonia" and "Vereniging Beow- en Woningtoezicht Nederlands", both of whom had also been positive about the above Q6 questions. The "General Council of Technical Architecture of Spain" indicated that they had "Partly" implemented a solution.

Comments: In general 60% of members are using electronic systems to monitor use and maintenance of buildings, the potential of using archived data from the electronic system is recognised with more than 90% of members. The same goes for web access to existing buildings records/data.

Q9

Answered: 27, skipped: 3

Most respondents answered this question with 11 saying "Yes" to the question. Seven (7) respondents stated that they had partly implemented a solution.

Q27

Answered: 30, skipped: 0

Two thirds of members are fully or partially using electronic means of keeping records relating to site changes, around one fifth don't use electronic or any other means of keeping a record of changes to their building portfolio.

Comments: Of the five previously noted members above only "Derby City Council, England" answered "Yes" to this question. The other four Member States (Finland, Spain, Netherlands and Estonia) all stated that they had "partly implemented" a solution.

Summary:

Electronic systems are widely used to archive documents related to building control. Timeline is important feature that is used almost everywhere and is recognised as added value to the life of a building. Finland, England, Estonia, Netherland and Spain are the counties to look for inspiration and experience.

BIM and Formats

In the questionnaire a few questions are dealing with the use of different types of electronic formats in which applications and projects can be delivered to the authorities. Questions are:

Q10: Do you use open formats or proprietary formats of electronic documents?
Q18: Is BIM already being used in the building control procedures? Are you planning to use it?
Q19: In case BIM is being used in the building control procedures, what formats are used?
Q20: In the case where BIM is being used in building control procedures, what features are included in the process?

First question has the aim of understanding what formats are acceptable to the authorities so that they can visualise and examine them. The other set of questions are dealing with the use of BIM which is not a format but more very advanced tool that can be used not only in the process of design but in the construction phase as well as during the use of buildings.

It is important to stress that question Q10 received 26 answers, only 4 skipped that question. On the other hand the BIM questions (Q18 - Q20) have very different number of replies. Therefore, the answers to technical questions regarding BIM are not necessarily representative.

Q10:

Answered: 26, skipped: 4

In practically one third of all member organisations/countries are using open formats while the same number (31%) is allowing the use of open and proprietary formats. A quarter (23%) of countries is using only proprietary formats. From those that have provided a different answer, only one clearly states that applications have to be submitted using paper only. Most of the countries have allowed the use of one or more electronic formats when submitting an application for building permit. It seems that there is a clear split among the proprietary and open formats. We didn't ask what types of open formats are allowed. However it seems that the most commonly used format is PDF.

Q18:

Answered: 13, skipped: 17

More than half (56%) of the respondents didn't answer that question. No country is using BIM in the building control procedures fully, some are using it partly (15% of respondents), and several are planning to introduce it (46%). Interestingly some of the respondents (39%) that are aware of BIM have no plans to introduce it in the building control process for the moment. From the number of the replies it can be concluded that the subject is relatively unknown. The awareness of the BIM is rapidly growing so it will be interesting to see the development in the next few years. Since 56% of respondents did not answer the question it may be deduced that they don't use BIM in Building Control suggesting that BIM is not currently of interest to them.

Q19:

Answered: 7, skipped: 23

It is logical that only those using BIM are able to answer this question (23% of all respondents). Three out of five are using open (IFC) format or open and proprietary format, two have replied that they use formats that were developed specially for them. Answers are not representative since we only have 7 responds and the number is even lower than in the general question about the use of BIM. Finland (City of Vantaa), Estonia and UK (some municipalities/companies) are the countries where BIM is being used regularly.

Q20:

Answered: 7, skipped: 23

There are several possible answers to the question: rule-based checks, visual checks, visual checks in city models and 3D maps, attribute extraction, archival. Most of the members that have answered this question are using BIM to do rule –based check (71%) or as archival tool (57%). Two (295) answered that they do visual checks in city models and 3D maps which would indicate that BIM is being used in the planning approval process. We only have 7 responses and that is not enough to have a sound basis for any meaningful conclusion. More answers were allowed. It seems that it is easier to use BIM where clear rules are established. It is a bit surprising that attribute extracting is not more extensively used as this is the easiest way to get the information about the project. Finland, Estonia and UK are the countries where use of BIM in the building control process is most advanced.

Summary

It is obvious that the use of BIM is relatively less known and not yet broadly adopted in building control processes. No-one among CEBC members has fully developed system that would integrate BIM as a part of the control - many didn't even start. Most advanced in the use of BIM in building control are Finland, Estonia and parts of UK. There is some amount of scepticism as several members reported that they have no intention to introduce BIM into the BC process for the time being. When dealing with application for building permit the picture is quite different: most of the countries use electronic systems and in most places you could submit the documents in open digital format(s).

Transition and Acceptance

The following questions fall into this category:

Q30: How did you do the training of the participants (Developers, designers, contractors /builders, administrative staff)?

Q31: How long was the transition period between your paper based system to what you currently have or will have?

Q32: How was your IT solution accepted amongst stakeholders?
Q33: How was your IT solution accepted amongst your administrative staff/building control staff?

This Section examines how the transition period was managed and how did the different stakeholders accepted the new ways of dealing with building control.

Q30

Answered: 25, skipped: 5

Several answers were possible. Almost 70% of dissemination was done at seminars and workshops, almost 50% prepared written instruction, webinars and videos were used in less than 30%. Only in one case was there no training tools available.

Comments: More than one method was usually used to reach all the stakeholders.

Q31

Answered: 24, skipped: 6

Most of respondents (30%) answered this question with 2-5 years, several (almost 30%) have stated that there is no deadline. Nobody did it in one month, just one organisation managed to do it in less than six months.

Comments: Transition is obviously a lengthy process that takes years therefore suggesting that good planning, communications and training are essential elements of successful implementation.

Q32

Answered: 23, skipped: 7

Average scoring for the question is 3.4 out of 5, which means that it was regarded as a positive development. In three cases it has been accepted with enthusiasm in one case the transition to e-building control didn't go well – it was badly accepted.

Comments: Stakeholders didn't have problems accepting new IT solutions.

Q33

Answered: 22, skipped: 8

Average scoring for the question is 3.4, which means that it was regarded as a positive development. In all but two cases the results are the same as the previous question.

Comments: The most frequent users didn't have problems accepting new IT solutions.

Summary:

The training was undertaken using several different means, probably depending on the clientele. Switching to IT solutions is a lengthy process which sometimes doesn't appear to have a defined deadline. Generally the changes have been positively received among all that are using electronic systems in building control.

General conclusions

Doing business electronically in building control is already becoming the mainstream method for obtaining a building permit among CEBC members organisations/countries. Practically all member organisations/countries are working with or moving towards digital methods of working in building control. An overwhelming number of member organisations (22-25 respondents) are well developed in some areas of e-Delivery with most other areas being developed in some shape or form. Only one or two member organisations show that they are in the early stages of implementing or developing e-delivery solutions.

As the processes are being digitalised so are the possibilities to undertake enquiries and building identification electronically. As these systems develop it is a natural progression to use the same systems to also store the data.

Of the thirty (30) respondents, five members were noted as having well advanced systems of e-Delivery and they are all seeking to further advance these systems towards full IT solutions in the building control discipline. These are City of Vantaa, Finland, Derby City Council, England, General Council of Technical Architecture of Spain, Technical Regulatory Authority, Estonia and "Vereniging Beow- en Woningtoezicht, Nederland. For the time being computers are not used to provide full compliance checking of building regulations. Technologies are being developed which will enable building proposals to be fully checked for building regulation compliance solely by electronic means. Perhaps legal frameworks and legislation will have to adapt for the procedures and communications involved in obtaining building permits to become fully electronic.

Whilst IT solutions are widely used during the preparation of decision, in several instances the decision can or has to be delivered by ordinary mail. Sometimes it is the developer that chooses the way in which the permission is delivered. In some countries/member organisations legislation dictates the method of delivery.

Most countries/member organisations have or are implementing methods of working electronically on site during the construction phase. The most advanced solution can be found in Finland, Scotland, Estonia, Norway and Spain.

Electronic systems are widely used to archive documents and data related to the building control process. Being able to track through the lifetime of a building (or "Timeline") showing the various alterations, extensions, demolitions and building uses etc. is an important feature that is used almost everywhere and is recognised as adding value to the life of a building. Finland, England, Estonia, Netherland and Spain are the countries to look towards for inspiration and experience in this respect.

Use of BIM is relatively less known and not yet broadly adopted in building control processes. No-one among CEBC members has a fully developed system that would integrate BIM as a part of the control processes, many didn't even start. Most advanced in the use of BIM in building control are Finland, Estonia and parts of UK.

Annexes

Annex A: Questionnaire

Q2 Are the building control processes in your country IT supported?		
Yes	Party	No

Q3 Has your country/state/region/municipality (authorities) introduced an electronic way of doing business in building control?		
Yes	Partly	No

Q4 Are the authorities planning its introduction in the next year 2017/18?		
Yes	No	Other (please specify)

Q5 Is it planned that the system will be developed further?		
Yes	No	Other

Q6 For which parts of the building control processes does your country/organisation have IT solutions?			
Providing information prior to the initiation of legal proceedings (reviewing restrictions, conditions of execution ...)			
Building site selection and visualisation on electronic maps			
Submission of an application			
Submission of project documentation			
Processing of the data of an application			
Assessment of plans on screen			
Control/review of project documentation			
Communication/consultation with other institutions involved in the process of issuing building permits			
Communication with Developers (or its authorised designers)			
Hearing of the neighbours online			
Control of the design/project			
Issuing the building permit			
Monitoring/controlling the construction phase and authorising the building to use			
Monitoring the use of the building, maintenance and refurbishment			
Data and document permanent archival			
Web shops for selling drawings of existing buildings			
Fully implemented/ introduced	Partially implemented	Not introduced	In development

Q7 Do you have a database where the data related to each application for a building control related building permit is kept?			
Yes	No	Party	Other

Q8 At what level is this database being set up and maintained?				
Municipal	Regional	Provincial	State	Other

Q9 In the case of an existing database, is it possible to obtain information about the historical status (timeline) of a particular building?			
Yes	No	Partly	Other

Q10 Do you use open formats or proprietary formats of electronic documents?			
Open	Proprietary	Both	Other

Q11 In what way is it possible to submit the application? Can it be done electronically, in paper form or maybe both?				
Only electronically	Only on paper	No mix of electronic and paper forms	Both are permitted	Other

Q12 Who are users of the service?			
Professionals	Citizens	Both	Other

Q13 When communicating with other institutions (other authorities), what type of information technology do you use? (Multiple answers possible.)			
Ordinary mail	E-mail	Via the centralized system	Other

Q14 Do you use qualified digital certificates when dealing with processes in the field of building control?			
Yes	No	Partly	Other

Q15 Is there a computer-aided system(s) in place to control the prescribed technical and other requirements for the building (electronic checking for compliance with national building regulations)?			
Yes	No	Partly	Other

Q16What are the essential/basic requirements for construction works checked by these systems?		
Structural strength and stability		
Safety in case of fire		
Hygiene, health and the environment		
Safety and accessibility in use		
Energy efficiency and heat loss		
Sustainable use of natural resources		
Compliance with the spatial plan		
Handling of waste		
Control is fully done by software	Control is partially done by software, partly by an expert	Control is done by an expert (not by software)

Q17 Is any of the other requirements (eg. Compliance with the additional environmental provisions, the Energy Performance Certificate), which are subject to an approval done by a machine?				
Yes, it is used	Planned to be	No	Partly	Other

Q18 Is BIM already being used in the building control procedures? Are you planning to use it?				
Yes, it is used	It is planned	No	Partly	Other

Q19 In case BIM is being used in the building control procedures, what formats are used?			
Open standards (IFC)	Proprietary formats	Both	Other

Q20 In case BIM is being used in the building control procedures, what features are included in the process? (Multiple answers possible.)					
Rule-based checks	Visual checks	Visual checks in city models and 3D maps	Attribute extraction	Archival	Other

Q21 In what way is the notification of a decision being carried out (in processes where this is required)?			
Ordinary mail	E-mail	Via centralized system	Other

Q22 May the client choose the way in which the notification of a decision would be done?		
Yes	No	Other

Q23 How does the contractor/investor notify each phase of construction?			
They do not notify	Notify in writing	Via centralized system	Other

Q24 How do you record the changes between what was designed and what was built?				
With notification by post	By notification by e-mail	Via centralized system	By a formal amend-ment to the original application	Other

Q25 Can this be carried out on the same system electronically?		
Yes	No	Other

Q26 Do building control personnel use electronic devices when they work on building sites? (Multiple answers possible.)					
Laptop	Tablet/i-Pad	Smart phone	No	Partly	Other

Q27 Does your country/organisation have a system that keeps record of the changes of the building (i.e. change of use, refurbishment, minor and major reconstructions)? Is the machine control of changes of building in place?			
Yes	No	Partly	Other

Q28 Does your country/organisation have means of electronic monitoring of the demolition phase and reporting the quantity of construction and demolition waste and reporting its quality, i.e. further classifying it according to the EU Waste List or similar?			
Yes	No	Partly	Other

Q29 Do you have a support system for users of e-delivery in place, e.g. call centre/forums? (Multiple answers possible.)					
Call centre	Forum	FAQ	Dedicated admin support team	No	Other

Q30 How did you do the training of the participants (Developers, designers, contractors/builders, administrative staff)? (Multiple answers possible.)				
Seminars, workshops etc.	E-seminars, webinars	Written guidelines, books	Videos	Other

Q31 How long was the transition period between your paper based system to what you currently have or will have?					
1 month	2-6 months	6-12 months	1-2 years	2-5 years	Other

Q32 How was your IT solution accepted amongst stakeholders? (Stakeholders meaning: all people having an interest as users of your system: developers, designers, contractors/builders)				
1 (badly accepted)	2	3	4	5 (accepted with enthusiasm)

Q33 How was your IT solution accepted amongst your administrative staff/building control staff? (22)				
1 (badly accepted)	2	3	4	5 (accepted with enthusiasm)

Annex B: Summary Responses

Q2 Are the building control processes in your country IT supported? (30)					
Yes	53.3%	Party	33.3%	No	13.4%

Q3 Has your country/state/region/municipality (authorities) introduced an electronic way of doing business in building control? (30)					
Yes	46.7%	Party	43.3%	No	10%

Q4 Are the authorities planning its introduction in the next year 2017/18? (4)					
Yes	0%	No	75%	Other (please specify)	25%

Q5 Is it planned that the system will be developed further? (10)					
Yes	70%	No	0%	Other	30%

Q6 For which parts of the building control processes does your country/organisation have IT solutions? (28)							
Providing information prior to the initiation of legal proceedings (reviewing restrictions, conditions of execution ...)							
Fully implemented/ introduced	28.6%	Partially implemented	50%	Not introduced	14.3%	In development	7.14%
Building site selection and visualisation on electronic maps							
Fully implemented/ introduced	50%	Partially implemented	32.1%	Not introduced	14.29%	In development	3.6%
Submission of an application							
Fully implemented/ introduced	44.5%	Partially implemented	22.2%	Not introduced	14.8%	In development	18.5%
Submission of project documentation							
Fully implemented/ introduced	40.7%	Partially implemented	33.4%	Not introduced	14.8%	In development	11.1%
Processing of the data of an application							
Fully implemented/ introduced	37.1%	Partially implemented	25.9%	Not introduced	11.1%	In development	25.9%
Assessment of plans on screen							
Fully implemented/ introduced	37.1%	Partially implemented	25.9%	Not introduced	18.5%	In development	18.5%

Control/review of project documentation							
Fully implemented/ introduced	32.1%	Partially implemented	35.7%	Not introduced	17.9%	In development	14.3%
Communication/consultation with other institutions involved in the process of issuing building permits							
Fully implemented/ introduced	28.6%	Partially implemented	39.3%	Not introduced	14.3%	In development	17.8%
Communication with developers (or its authorised designers)							
Fully implemented/ introduced	32.1%	Partially implemented	28.6%	Not introduced	21.4%	In development	17.9%
Hearing of the neighbours online							
Fully implemented/ introduced	21.4%	Partially implemented	25%	Not introduced	46.4%	In development	7.2%
Control of the design/project							
Fully implemented/ introduced	32.1%	Partially implemented	25%	Not introduced	28.6%	In development	14.3%
Issuing the building permit							
Fully implemented/ introduced	39.3%	Partially implemented	21.4%	Not introduced	14.9%	In development	21.4%
Monitoring/controlling the construction phase and authorising the building to use							
Fully implemented/ introduced	32.1%	Partially implemented	39.3%	Not introduced	14.3%	In development	14.3%
Monitoring the use of the building, maintenance and refurbishment							
Fully implemented/ introduced	21.4%	Partially implemented	21.4%	Not introduced	50%	In development	7.2%
Data and document permanent archival							
Fully implemented/ introduced	39.3%	Partially implemented	32.1%	Not introduced	7.2%	In development	21.4%
Web shops for selling drawings of existing buildings							
Fully implemented/ introduced	21.4%	Partially implemented	67.9%	Not introduced	7.1%	In development	3.6%

Q7 Do you have a database where the data related to each application for a building control related building permit is kept? (30)							
Yes	56.7%	No	13.3%	Party	26.7%	Other	3.3%

Q8 At what level is this database being set up and maintained? (27)									
Municipal	51.9%	Regional	0%	Provincial	3.7%	State	25.9%	Other	18.5%

Q9 In the case of an existing database, is it possible to obtain information about the historical status (timeline) of a particular building? (27)							
Yes	40.7%	No	18.6%	Partly	25.9%	Other	14.8%

Q10 Do you use open formats or proprietary formats of electronic documents? (26)							
Open	30.8%	Proprietary	23 %	Both	30.8%	Other	15.4%

Q11 In what way is it possible to submit the application? Can it be done electronically, in paper form or maybe both? (30)									
Only electronically	6.7%	Only on paper	16.7%	No mix of electronic and paper forms	6.7%	Both are permitted	60%	Other	10%

Q12 Who are users of the service? (28)							
Professionals	28.6%	Citizens	3.5%	Both	53.6%	Other	14.3%

Q13 When communicating with other institutions (other authorities), what type of information technology do you use? (Multiple answers possible.) (29)							
Ordinary mail	44.8%	E-mail	93.1%	Via the centralized system	51.7%	Other	17.2%

Q14 Do you use qualified digital certificates when dealing with processes in the field of building control? (29)							
Yes	24.1%	No	20.7%	Partly	41.4%	Other	13.8%

Q15 Is there a computer-aided system(s) in place to control the prescribed technical and other requirements for the building (electronic checking for compliance with national building regulations)? (29)							
Yes	10.3%	No	72.4%	Partly	13.8%	Other	3.5%

Q16 What are the essential/basic requirements for construction works checked by these systems? (6)					
Structural strength and stability					
Control is fully done by software	0%	Control is partially done by software, partly by an expert	66.7%	Control is done by an expert (not by software)	33.3%
Safety in case of fire					
Control is fully done by software	0%	Control is partially done by software, partly by an expert	50%	Control is done by an expert (not by software)	50%
Hygiene, health and the environment					
Control is fully done by software	0%	Control is partially done by software, partly by an expert	50%	Control is done by an expert (not by software)	50%
Safety and accessibility in use					
Control is fully done by software	0%	Control is partially done by software, partly by an expert	50%	Control is done by an expert (not by software)	50%
Energy efficiency and heat loss					
Control is fully done by software	0%	Control is partially done by software, partly by an expert	50%	Control is done by an expert (not by software)	50%
Sustainable use of natural resources					
Control is fully done by software	0%	Control is partially done by software, partly by an expert	50%	Control is done by an expert (not by software)	50%
Compliance with the spatial plan					
Control is fully done by software	0%	Control is partially done by software, partly by an expert	60%	Control is done by an expert (not by software)	40%
Handling of waste					
Control is fully done by software	0%	Control is partially done by software, partly by an expert	40%	Control is done by an expert (not by software)	60%

Q17 Is any of the other requirements (eg. Compliance with the additional environmental provisions, the Energy Performance Certificate), which are subject to an approval done by a machine? (29)									
Yes, it is used	6.9%	Planned to be	10.3%	No	55.2%	Partly	24.1%	Other	3.5%

Q18 Is BIM already being used in the building control procedures? Are you planning to use it? (13)									
Yes, it is used	0%	It is planned	46.1%	No	38.5%	Partly	15.4%	Other	0%

Q19 In case BIM is being used in the building control procedures, what formats are used? (7)							
Open standards (IFC)	14.3%	Proprietary formats	28.6%	Both	28.5%	Other	28.6%

Q20 In case BIM is being used in the building control procedures, what features are included in the process? (Multiple answers possible.) (7)											
Rule-based checks	71.4%	Visual checks	14.4%	Visual checks in city models and 3D maps	28.6%	Attribute extraction	28.6%	Archival	57.1%	Other	42.9%

Q21 In what way is the notification of a decision being carried out (in processes where this is required)? (29)							
Ordinary mail	27.6%	E-mail	34.5%	Via centralized system	10.3%	Other	27.6%

Q22 May the client choose the way in which the notification of a decision would be done? (30)					
Yes	46.7%	No	50%	Other	3.3%

Q23 How does the contractor/investor notify each phase of construction? (30)							
They do not notify	13.3%	Notify in writing	33.3%	Via centralized system	16.7%	Other	36.7%

Q24 How do you record the changes between what was designed and what was built? (30)									
With notification by post	10%	By notification by e-mail	13.3%	Via centralized system	20%	By a formal amendment to the original application	33.3%	Other	23.3%

Q25 Can this be carried out on the same system electronically? (30)					
Yes	56.7%	No	33.3%	Other	10%

Q26 Do building control personnel use electronic devices when they work on building sites? (Multiple answers possible.) (30)											
Laptop	36.7%	Tablet/ i-Pad	46.7%	Smart phone	40%	No	13.3%	Partly	36.7%	Other	16.6%

Q27 Does your country/organisation have a system that keeps record of the changes of the building (i.e. change of use, refurbishment, minor and major reconstructions)? Is the machine control of changes of building in place? (30)							
Yes	30%	No	26.7%	Partly	36.7%	Other	6.6%

Q28 Does your country/organisation have means of electronic monitoring of the demolition phase and reporting the quantity of construction and demolition waste and reporting its quality, i.e. further classifying it according to the EU Waste List or similar? (30)							
Yes	13.3%	No	43.3%	Partly	30%	Other	13.4%

Q29 Do you have a support system for users of e-delivery in place, e.g. call centre/forums? (Multiple answers possible.) (27)											
Call centre	40.7%	Forum	18.5%	FAQ	29.6%	Dedicated admin support team	33.3%	No	25.9%	Other	18.5%

Q30 How did you do the training of the participants (investors, developers, designers, contractors/builders, administrative staff)? (Multiple answers possible.) (25)									
Q3Seminars, workshops etc.	68%	E-seminars, webinars	28%	Written guidelines, books	48%	Videos	20%	Other	24%

Q31 How long was the transition period between your paper based system to what you currently have or will have? (24)											
1 month	0%	2-6 months	4.2%	6-12 months	8.3%	1-2 years	29.2%	2-5 years	20.8%	Other	37.5%

Q32 How was your IT solution accepted amongst stakeholders? (Stakeholders meaning: all people having an interest as users of your system: inventors, designers, contractors/builders) (23)									
1 (badly accepted)	4.3%	2	13.1%	3	30.4%	4	39.1%	5 (accepted with enthusiasm)	13.1%

Q33 How was your IT solution accepted amongst your administrative staff/building control staff? (22)									
1 (badly accepted)	0%	2	9.1%	3	40.9%	4	31.8%	5 (accepted with enthusiasm)	18.2%

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