

Digital Tools in Landscape Architecture

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Abstract. Nowadays professional tools in landscape architecture are more related to digital tools. Landscape architects' hand powered tools have been replaced by computers and digital tools where the traditional techniques are supplemented with 3D modelling and animation for landscape planning in different scales and for different projects levels. The main aim of this paper is to understand and analyse the use of digital tools in landscape architecture and planning in Latvia. For the collection of data for this study a questionnaire was designed and sent to Latvian landscape architects and planners. The questions it included were on how landscape architects and planners use digital tools for the representation of their sketches and ideas and on what kind of digital tools they use in different landscape types and scales. Results showed that all the surveyed landscape architects use digital tools in their everyday professional practice – for landscape design or assessment. Most of them also still use the traditional drawings by hand for draft sketches and ideas, but for communication with public, projects and designs elaborated by digital tools are used. Landscape architects have emphasized the great potential of digital tools for enhancing communication between the landscape architect and the potential user. Digital tools (visualizations, animations, 3D models, etc.) allow the potential user to participate in the landscape planning process and easily imagine the landscape before it is created. Today landscape architects use digital tools to produce the final project presentation images (visualizations) in the landscape planning processes for selling of the project. However, we believe that in future there is a potential for using digital tools more as a communication tool, which can help in contacting clients at various levels of the project implementation, especially in the early stages of the design.

Keywords: digital tools, visual communication, landscape architecture

Introduction

The landscape architect's daily work is associated with landscaping projects of varying scales, specifics and levels, landscape research or landscape management planning. The landscape architect's profession is comparatively new – dating back a little over a hundred years ago, when in 1863 the Board of Central Park Commission in New York City approved a landscape architect's position. Since then, this new profession had officially gained more stability and recognition in its development. In landscape architecture arts and professional knowledge in the field of landscape planning as well as social, ecological and mental aspects are closely intertwined. The results of day-to-day landscape architect's work are often subject to public criticism and perception, thus influencing the involvement of the residents in the issues of landscape conservation, planning, design and installation [1].

How do information transfer and communication take place? What tools can a landscape architect use to more effectively prepare quality information, simultaneously making it easier for the residents and clients to perceive the ideas. Nowadays more and more digital tools are being used in the field of landscape architecture, which, on the one hand facilitates the presentation of the results of the remote landscape architect's work, but on the other hand reduces the possibility of using traditional drawing methods without additional processing and also leaves no room for direct communication.

Digital tools allow the landscape architects to use new approaches and methods in planning and communicating about landscape planning, conservation,

renovation, or installing issues [2]. In several studies the use of digital tools has been particularly emphasized in landscape architecture and planning in order to improve the project perception and communication among landscape architects and professionals, residents, clients as well as colleagues [3; 4; 5; 6]. The use of these digital tools is diverse, and it is adjustable to the projects of different scales and complexity in different stages of development: illustrative, immersive, interactive, intuitive and intensive [7].

So, one of the aspects is the communication with clients and residents. A part of this communication is the emotional design which does not depict the real function of landscape or real proportions, but influence the clients and residents through artistic tools at the emotional level. The authors in their study call that kind of emotional design a “wow effect” which works not only in landscape architecture but also in all the design fields throughout the world and it is more oriented towards selling of the product [8]. Overall, the result of the landscape architect's work – a project or an installed object – includes the emotional aspect of art, therefore it always involves a subjective evaluation.

Exactly what landscape elements or project parts must the clients and residents most often evaluate or read from the designs made by landscape architects? Does the use of versatile digital tools make it easier and with higher quality to perceive the landscape elements? Communication has always been acknowledged to be one of the most significant aspects in the process of landscape design.

The communication process mainly takes place between the landscape architect and the clients, as well as between two professionals. It is essential when a project is being prepared for real construction [9].

Most often in landscape characterisation such elements as terrain, building or architectural objects, vegetation, roads, surfacing, water elements are used [10; 11; 12], which overall characterise the versatile essence of the landscape in its elements. But also, such factors as the accessibility of the landscape, its scale, colour, texture and the materials found in the landscape, the emotional factor of the total image, versatility of landscape, its uniqueness and rarity are important [13; 14; 15]. Many of these factors and elements are influenced by subjective perception, thus making it difficult to objectively evaluate the results of the landscape projects.

In our study we have chosen those landscape evaluation criteria which most vividly characterise the project idea, the main parameters and also the essence of the design:

- the placement of elements in the landscape;
- the perception of the design on the whole and the idea of the project;
- vegetation – the existing and planned woody plants;
- inclusion of the objects in the environment, connection with the adjoining territories;
- perception of the proportions of space and elements;
- terrain.

The study deals with the digital tools in landscape architecture. In the current study digital tools have been analysed and compared, information about the most popular digital tools, their choice and use in the field of landscape architecture in Latvia has been obtained and the perception aspects for the types of visualization in the projects of landscape architecture have been evaluated.

Methods

The study consists of two parts:

- the first part presents information about the most popular digital tools, their choice and habits of use in the field of landscape architecture – the evaluation method of the use of digital tools has been used. This information was obtained from the results of the survey on **the habits of the use of digital tools** in the field of landscape architecture in Latvia where the representatives involved in the field of landscape architecture participated;
- in the second part of the study the perception aspects of landscape architecture visualization materials have been evaluated by means of the photography method – the evaluation method of

perception aspects of visualization types has been used.

The evaluation method of the use of digital tools

Within the framework of the research, a survey was conducted to find out the most popular digital tools, their choice and use in the field of landscape architecture in Latvia. In Latvia actively working Latvian Association of Landscape Architecture. In the 2017 association had approximately 100 members, who are specialists in the field, of which 23 are certified landscape architects. In the field of landscape architecture in Latvia there is approximately 10 companies. 20 professionals from different education levels in the field of landscape architecture: the secondary professional – 1; Bachelor – 12; master's degree – 4; PhD – 3 was participated in survey. The online survey from March to April of 2017 was carried out using systematic gathering of data from the target audience (professionals of the landscape architecture) characterized by the invitation (e-mail) of the respondents and the completion of the questionnaire over the World Wide Web, using software www.visidati.lv. All twenty individuals who filled in the questionnaire forms were included in the data processing.

The questionnaire consisted of eleven questions. At the beginning of the questionnaire the data about the respondents' education level and working experience in the field of landscape architecture were obtained. Further on the questions were associated with the digital tools the respondents use and the habits of their use, preconditions and goals. At the end of the questionnaire, the survey participant's opinion on digital tools in the field of landscape architecture was collected. MS Excel software was used to compile the collected data and to interpret the results.

Evaluation method of the perception aspects of visualisation materials types

In the current study the photography comparative method was used in determining the perception aspects of visualization materials types of landscape architecture design. The evaluation of the perception aspects of visualization materials types consisted of four stages (Fig.1).

In the first stage, the materials for designing visual materials were obtained. In the second stage, within the framework of one project, using different digital tools, visual materials were created, which in the third stage were evaluated by the present and future professionals of landscape architecture as well as representatives of other professions. The last stage was planned for summarizing the results obtained from the respondents.



Fig. 1. The stages of the evaluation process of the perception aspects of visualisation types
[created by the authors, 2017]

The visual materials were prepared for Tradition Square of the town of Plavinas, in Latvia during the development of the technical project in January/February of 2017. The territory is located in Plavinas among Turgus, Rainis and Daugava streets. The project has been developed with an aim to regain the lost identity of Tradition Square and connect it with the bank of the Daugava river. According to the project Tradition Square will be developed as a modern public outdoor space, incorporating both - a place for people to gather and fulfil the function of a green zone and recreation, thus radically changing the spatial planning of the existing territory – the network of pathways and layout of a green zone, at the same time showing respect to the existing valuable plantings to be preserved.

In total, four visual materials were prepared – a technical plan, an animation, a poster and an interactive 360° panorama using CAD, 3D modelling and Image processing tools. During the process of designing visual materials, several computer software programmes were used – AutoCad, Sketchup, Adobe Photoshop, V-Ray for SketchUp and Lumion3D.

To have the opinion of Latvia's landscape architects and the professionals of the respective field on the designed visual materials, a questionnaire was created. The online survey was carried out using systematic gathering of data from the target audience (professionals and students of the landscape architecture, Latvian citizens) characterized by the invitation (e-mail) of the respondents and the completion of the questionnaire over the World Wide Web, using software Google forms from March – April of 2017. In total, 81 respondents were involved. The questionnaire included eight questions. The respondents were asked to evaluate the following parameters: the layout of the elements in the planned landscape, perception of the design as a whole and the project idea, vegetation – the existing and planned woody plants, the inclusion of the object in and harmonizing it with the existing environment, linkage with the adjoining territories, perception of the proportions of the space and elements and terrain. At the beginning of the questionnaire the data about the respondents' profession and age were obtained, whereas in the middle part the respondents' opinions about the perceiving capacity of the visualization types were analysed. At the end

of the questionnaire the respondents were requested to express their opinion about the visualization types they saw. MS Excel software programme was used for summarizing the data and interpreting the results.

Results

The results of the evaluation method of the use of digital tools

The number of the respondents taking part in the survey – professionals engaged in the field of landscape architecture – happened to be equally distributed regarding the responses given to the question about their experience in landscape architecture – six of them responded that they have had fifteen or more years of work experience, four of the respondents have had 5–15 years of experience, seven have had 3–5, but three of them 1–3 years of work experience. Most of the respondents – 16 (80 %) of them responded that their knowledge is adequate, whereas 3 (15 %) responded that they are beginners.

In order to find out about the frequency of the use of digital tools in the design process of landscape architecture in Latvia, the respondents were asked how often they use these tools in their projects. The professionals in the field of landscape architecture use digital tools in each project (85 %), which indicates the popularity and necessity of digital tools in the work of landscape architects. The results also testify about the need to acquire the digital tools already in the study process so that knowledge and skills are obtained for the designing process.

Giving the response to the question whether the landscape architect him/herself uses digital tools or a professional is involved, 11 (55 %) respondents acknowledged that they both use digital tools themselves and also engage professionals, while 8 (40 %) respondents use these tools themselves without any professionals' assistance. The responses allowed us to conclude about the lack of skills in the use of digital tools, showing also that there is a need for developing high quality visual material.

According to the respondents' answers to the question about the main prerequisites of the use/non-use of digital tools in the design process, most often four variants of answers were chosen – the possibility of depicting the landscape (80 %), the time for project developing (75 %), qualitative exchange of information with the customer (70 %) and data exchange possibilities (55 %).

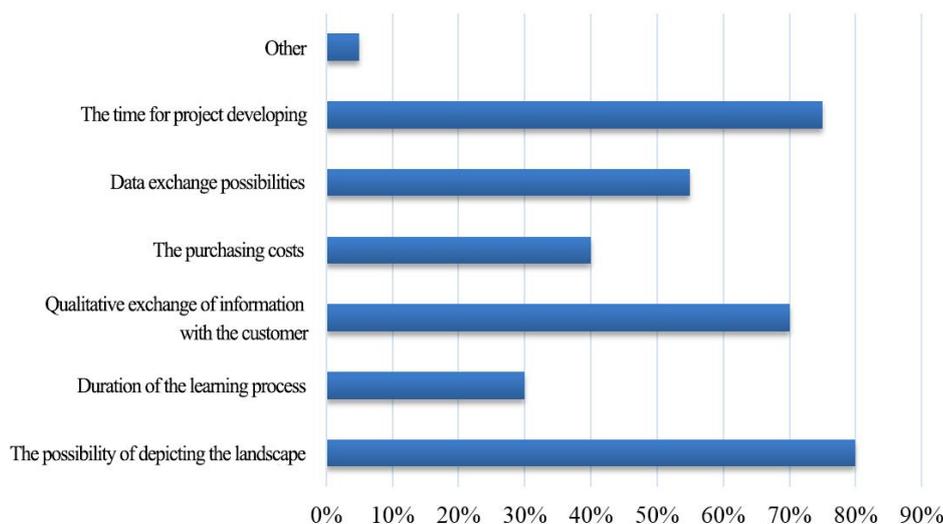


Fig. 2. Main prerequisites of the use/non-use of digital tools in the design process [created by the authors, 2017]

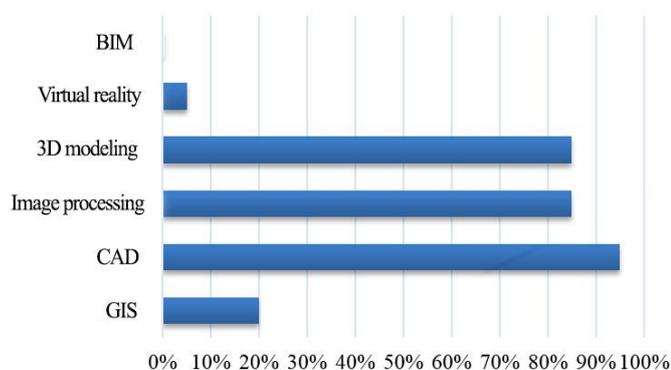


Fig. 3. Most popular digital tools used by landscape architects in Latvia [created by the authors, 2017]

The purchasing costs and duration of the learning process were mentioned as less important – (40 %) and (30 %), respectively.

Summarising the responses to the question about the tools used in the designing process, CAD turned out to be most widely used tool (95 %), followed by image processing (85 %) and 3D modelling (85 %). As shown in Fig. 3, GIS, Virtual reality and BIM tools are not widely used among landscape architects in the designing process in Latvia. Almost 100% use of computer aided design is explained by the development of the plans required for each project, whereas in the process of the development of visual material for presenting the idea, image processing and 3D modelling tools have gained popularity. As the results show (Fig. 3), these tools can be used in combination with each other. As it can be seen in Fig. 3. the tools of Virtual reality and BIM have not gained great popularity among the professionals of landscape architecture. It could be explained by the increasing costs of developing visual materials, the lack of knowledge and skills using the tool as well as the lack of special tools for landscape architects.

Analysing the results of the survey it is obvious that the most popular ways of obtaining a visual material are plans (100 %) and sections (90 %) developed by using CAD tools for the elaboration of technical projects. The next most often used types of obtaining visual material are the photomontage of images (90 %) and 3D model rendering (75 %) for better reading of technical plans and presenting ideas. Regarding the VR and BIM tools, they are rather unpopular and less frequently used tools in the design work of landscape architects.

According to the respondents' answers mostly all the tools are used for smaller scale projects, but GIS tools are mostly used for large scale projects (30 %) compared to small scale projects (15 %). Analysing the results of the use of 3D modelling there is a small difference between the use of the tools for small scale projects (65 %) and large-scale projects (45 %) which are mainly influenced by the large time consumption of creating a 3D model, large costs involved and lack of digital data resources.

From the results of the survey with regard to the question about the use of digital tools in the

process of design it can be concluded that CAD tools are evenly used throughout the entire designing process. As to the use of image processing tools, there is a big difference between the beginning and finishing stages – the greatest majority of respondents acknowledged using this tool at the completing stage of the project (85 %) and at the beginning fewer respondents (40 %) do it. Referring to E. Lange who emphasized that 3D visualization is a necessary constituent part of a project [16] it is also possible to observe among the respondents 55 % of whom use this tool at the beginning of the project and 75% in the final stage of it.

From the responses to the question about the types of the communication the digital tools are used for, it can be concluded that CAD, image processing and 3D modelling tools are most often used for this purpose. If CAD tools are more often used for communication with landscape architecture professionals (90 %) than with clients (70 %), then in the case of the use of image processing tools it is the other way compared to the communication with clients (85 %), whereas with regard to communication with the professionals it is 35 %.

Most of the landscape architecture professionals who participated in the survey expressed their point of view about the great variety of digital tools and their advantage in terms of higher quality and faster project development. There were also opinions emphasizing the start of a graphic situation analysis and sketching by hand and in the initial stage to use digital tools only for obtaining information and for analytical tasks, but afterwards – to choose the best tool to present the project vision.

Although, mostly 4 response variants prevailed as the main prerequisites for the use/non-use of digital tools in the design process – the possibilities of illustrating the landscape (80 %), project development time (75 %), qualitative exchange of information with clients and the possibilities of data exchange (55 %), the price of the software and the skills to work with the tool had also been emphasized. The price of software, compared to market prices in Latvia, is very often too high, which limits the use of these tools. The lack of skills to handle the available tools was also mentioned, but there is also a desire to learn and expand the knowledge of digital tools. The drawbacks in digital tools themselves were also highlighted. With digital tools, it is hard to keep one's identity and shape one's handwriting, so there are those among the respondents who believe that the very best visualization types are those created by one's own hands. As a disadvantage, the lack of specifically tailored tools for landscape architecture was pointed out. The digital tools for the needs of landscape architects are not fully developed due

to the lack of plant assortment, or it is not sufficiently realistic in 3D modelling, and terrain modelling and object integration in it, is complicated and requires additional work.

Obtained results from the survey about the use of digital tools in Latvia are similar as they are in another survey which was made in Norway where the aim for survey was to find out the most common visualization methods used in practice. Results shows that the most common used visualization methods in landscape architecture companies in Norway are 2D maps and drawings followed by hand drawings and 3D models [5].

The results of the evaluation method of the perception aspects of visualization materials types

In the online survey participated 32 citizens, 26 professionals and 22 landscape architecture students.

Responding to the first question on how the placement of elements is perceived, the residents (75 %) and students (60 %) admitted that it is very easy to perceive through animation, whereas the professionals considered that it is easier to perceive by means of a poster (62 %). The representatives of all three groups acknowledged that all four visual types may help serve for the perception of the existing and planned placement of design elements.

The summarized results show how important the animation visualization type is for the perception of the design of the project. All three respondent groups – residents 78 %, professionals – 62 % and students 64 % considered this type to be the most easily perceivable one. The residents and students had emphasized the fact that the perceiving of the design by means of technical drawings was more difficult rather than easy.

Regarding the question of how the existing and planned woody plants, shrubs and perennials are perceived, the students and residents responded that most easily it could be done by means of animation and with an interactive panorama. The students and residents emphasized that with technical drawings it is rather more difficult than easy to perceive information about vegetation. The results summarized in Table 2 demonstrate that professionals do not have any difficulties in perceiving information of all types of visualization, but with animation and the interactive 360° panorama it is the easiest to do.

The responses to the question of how perceivable the inclusion of the object is into the surrounding environment are shown in Table 3, which shows that for the residents it is most easily perceived by means of animation, but the most difficult way turned out to be technical drawings. Similarly, also the students mentioned that the easiest link of the design object

TABLE 1
The evaluation of design and composition perception
[created by the authors, 2017]

Clients and inhabitants								
	Technical drawings		Poster		Animation		Interactive 360° Panorama	
	Very easy	4	25%	6	19%	25	78%	20
Easy	6	9%	11	34%	7	22%	11	34%
Hard	9	31%	13	40%	0	0%	1	3%
Very hard	13	40%	2	6%	0	0%	0	0%

Professionals								
	Technical drawings		Poster		Animation		Interactive 360° Panorama	
	Very easy	6	23%	10	38%	16	62%	13
Easy	9	35%	13	50%	10	38%	10	38%
Hard	11	42%	3	12%	0	0%	3	12%
Very hard	0	0%	0	0%	0	0%	0	0%

Students								
	Technical drawings		Poster		Animation		Interactive 360° Panorama	
	Very easy	3	14%	11	50%	14	64%	11
Easy	6	27%	6	27%	8	36%	9	41%
Hard	7	32%	5	23%	0	0%	2	9%
Very hard	6	27%	1	5%	0	0%	0	0%

TABLE 2
The evaluation of vegetation perception
[created by the authors, 2017]

Clients and inhabitants								
	Technical drawings		Poster		Animation		Interactive 360° Panorama	
	Very easy	4	13%	6	19%	25	78%	20
Easy	6	19%	11	34%	6	19%	11	34%
Hard	9	28%	13	41%	1	3%	1	3%
Very hard	13	41%	2	6%	0	0%	0	0%

Professionals								
	Technical drawings		Poster		Animation		Interactive 360° Panorama	
	Very easy	7	27%	5	19%	15	62%	15
Easy	15	58%	16	62%	10	38%	9	35%
Hard	4	15%	5	19%	0	0%	2	8%
Very hard	0	0%	0	0%	0	0%	0	0%

Students								
	Technical drawings		Poster		Animation		Interactive 360° Panorama	
	Very easy	3	14%	5	23%	15	68%	13
Easy	7	32%	11	50%	7	32%	9	41%
Hard	12	54%	5	23%	0	0%	0	0%
Very hard	0	0%	1	5%	0	0%	0	0%

with the environment could be perceived by means of animation and interactive 360° panorama. Analysing the results presented by respondents who are professionals in landscape architecture it was clear that all types of visualization are easy to perceive.

After summarizing the results in Table 4, it can be seen that residents and students encountered problems regarding the perception of space and element proportions with two-dimensional visualizations – technical drawings and posters. It is just the opposite when complementing two-dimensional visualization types with animation and interactive 360° panorama types – the designed

TABLE 3
The evaluation of object inclusion
into surrounding perception [created by the authors, 2017]

Clients and inhabitants								
	Technical drawings		Poster		Animation		Interactive 360° Panorama	
	Very easy	2	6%	9	28%	27	84%	17
Easy	7	22%	10	31%	4	13%	12	38%
Hard	15	47%	12	38%	1	3%	3	9%
Very hard	8	25%	1	3%	0	0%	0	0%

Professionals								
	Technical drawings		Poster		Animation		Interactive 360° Panorama	
	Very easy	5	19%	7	27%	15	58%	15
Easy	14	54%	13	50%	7	27%	7	27%
Hard	7	27%	6	23%	4	15%	3	12%
Very hard	0	0%	0	0%	0	0%	1	3%

Students								
	Technical drawings		Poster		Animation		Interactive 360° Panorama	
	Very easy	1	5%	1	5%	13	59%	13
Easy	5	23%	13	59%	8	36%	5	23%
Hard	9	41%	8	36%	1	5%	3	14%
Very hard	7	32%	0	0%	0	0%	1	5%

TABLE 4
The evaluation of space and element proportions
perception [created by the authors, 2017]

Clients and inhabitants								
	Technical drawings		Poster		Animation		Interactive 360° Panorama	
	Very easy	2	6%	7	22%	26	81%	19
Easy	7	22%	7	22%	5	16%	10	31%
Hard	10	31%	15	47%	1	3%	3	9%
Very hard	13	41%	3	9%	0	0%	0	0%

Professionals								
	Technical drawings		Poster		Animation		Interactive 360° Panorama	
	Very easy	3	12%	3	12%	17	65%	12
Easy	12	46%	16	62%	7	27%	12	46%
Hard	11	42%	6	23%	2	8%	2	8%
Very hard	0	0%	1	4%	0	0%	0	0%

Students								
	Technical drawings		Poster		Animation		Interactive 360° Panorama	
	Very easy	1	5%	1	5%	14	64%	11
Easy	5	23%	10	45%	7	32%	9	41%
Hard	10	45%	10	45%	1	5%	1	5%
Very hard	6	27%	1	5%	0	0%	1	5%

spaces and the shapes of their elements become more easily perceived. It is also recognized by professionals that by complementing the two-dimensional animation methods with animation, an interactive 360° panorama makes the space easier to perceive.

With regard to the question of how the terrain is perceived, 78 % of the residents and 68 % of the students responded that the terrain is most easily perceived by animation. In a slightly smaller number of questionnaires, 59 % of residents and 64 % of students responded that the terrain is very easy to perceive with the help of interactive 360° panorama, whereas in technical drawings and

posters the terrain is difficult to perceive. The professionals noted that the terrain was equally easy to perceive in all the types of visualization, but it is most easily perceived in animation (58 %). The respondents acknowledged that this issue is somewhat confusing for them due to the non-expressive terrain, but they themselves already acknowledged that the terrain is flat, which they were able to see in successful visualizations and landscape elevation.

All three groups of respondents – residents – 94 %, professionals – 77 % and students – 73 % acknowledged that the project idea is most easily perceived by means of animation. The residents (72 %), unlike students (55 %) and professionals (38 %), noted that the Interactive 360° panorama in general is also easy to perceive. Some respondents from the general population emphasized that for them the Interactive 360° panorama was better to perceive than animation, since it is not so intense. Due to great experience and working with CAD tools on a daily basis, most professionals admitted that technical projects are also easy to perceive, unlike residents and students most of whom considered that information is difficult to perceive.

At the end of the survey the respondents had an opportunity to express their opinion about the visual materials and visualizations they saw. The professionals acknowledged that it was best to perceive a project when it is viewable in both two-dimensional and three-dimensional ways, since in each aspect of visualization some other aspect can be better evaluated. The perception of information from CAD technical drawings is facilitated by the fact that the professionals work with them on a daily basis. The professionals also acknowledged that the interactive panorama and animation are more intended for clients and other people who are not involved in the design. The technical drawings and the project plan make it easier to perceive the overall composition of the project, the proportions, the connection with the surroundings, but the place, the design of the landscaping elements, the amenities and the choice of plantings are easier to perceive in 3D animation and in the interactive panorama. The respondents from among the population and students acknowledged that the animation and interactive panorama visualization methods perfectly complement the 2D visualization types, thus obtaining more complete information about the project.

Similar research about visualisation methods was made in the Virtual Reality laboratory at the Norwegian University of Life Sciences. Hansen explored how different methods of visualization are understood and experienced by lay people and professionals. Results from the VR-Lab

study showed the same results as survey made by research authors that the 3D realistic model visualization was the most engaging for both professionals and lay people [5].

Conclusions

In recent years, more and more attention has been paid to the use of digital tools and project visual representing in Latvia. The standards for visual representing materials of the project have been developed, as well as tasks for the digitalization of the construction documents circulation, facilitating a gradual transition to electronic data circulation and storage, using the latest technologies and world best practices.

Summing up information about digital tools, their disadvantages are clear: the lack of qualitative specially designed tools for landscape architects when working in 3D modelling – lack of plant assortment or it is not sufficiently realistic and for the modelling of the landscaping elements in the terrain and the integration of objects in it is complicated and requires additional work; the lack of specific BIM software to provide better quality collaboration with professionals of other sectors during the design process and efficient file sharing.

Although digital design possibilities, project development time, qualitative exchange of information with the client and data exchange opportunities are acknowledged to be the main prerequisites for the use/ non-use of a digital tool in the design process, the software price and skills to operate the tool have also been mentioned. The prices of software, compared to market prices in Latvia in this respective field, in respondent's opinion are very often too high, which limits the use of these tools. There is also a lack of skills in handling the digital tools available, but there is also a desire to acquire and expand knowledge about these tools.

Landscape architecture professionals in Latvia mainly use CAD, image processing and 3D modelling tools during project development. GIS, Virtual reality and BIM tools are not widely used in the design process among landscape architects in this country. An almost 100 percent use of computer-aided design tools is explained by the development of plans that are required for each project. For the developing of the visual material, while presenting the idea, the image processing and 3D modelling tools have gained great popularity. According to the results of the survey these tools tend to be used in combination with each other.

The results of the survey of determining the perception aspects of visual types showed that the technical project does not fully allow the residents to get an idea of the project, but the 3D visualization types – animation and the

interactive 360° panorama perfectly complement the 2D visualization types. Among the residents there were also respondents who emphasized that the interactive 360° panorama is better than animation because it is less intense. The professionals acknowledged that it is best to perceive a project when it is viewable both two-dimensionally and three-dimensionally, as in each type of visualization it is possible to appreciate some other aspect of the project. The perception of information

from CAD technical drawings for professionals is facilitated by the fact that they work with them on a daily basis.

Complex use of digital tools in landscape design process are more helpful for understanding of landscape projects parts: placement of landscape elements; design; vegetation; connection of the planned object with the surrounding environment; proportion of space and elements; terrain.

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Kopsavilkums. Mūsdienu ainavas plānošanas process ir cieši saistīts ar digitālo rīku lietošanu dažāda mēroga un atšķirīgo izstrādes etapu projektos. Pētījumā mērķis apkopot un analizēt ainavu arhitektu paradumus un aspektus digitālo rīku izmantošanā Latvijā. Pētījums veiks izmantojot aptaujas metodi, apkopojot un analizējot datus par to, kādus digitālo rīkus ainavu arhitekti izmanto savā darbā atšķirīgā mēroga un dažādu mērķu sasniegšanai. Rezultāti apkopo datus par digitālo rīku lietošanu un uztveršanu no klientu un kolēģu puses. Jautājumi uzdoti par digitālo rīku izmantošanas biežumu, kur līderība ir AutoCad, 3D modelēšanas un attēlu apstrādes rīkiem; jautājums par ierobežojošiem faktoriem digitālo rīku

izmantošanai atklāj problemātiku ar laika ietilpīgiem procesiem, apgūstot jaunus rīkus un ievadot informāciju, ka arī pašu programmu dārgumu. Otra pētījuma daļa ietver klientu un kolēģu, jeb sadarbības partneru aptauju, kas sniedz atbildes par digitālo rīku lomu projekta uztveres procesā un komunikācijas procesā. Rezultāti parāda, ka ar animācijas palīdzību visvieglāk uztverama projekta kopēja kompozīcija, vietas mērogs un elementu proporcijas, bet 3D rīkiem ir ierobežots Latvijā augošās veģētācijas sortiments, kas ierobežo projekta precīzo attēlošanu. Tehniskie rasējumi grūti izprotami klientiem un iedzīvotājiem, bet viegli uztverami profesionāļiem, no kuriem tie spēj nolasīt tehniskā rakstura informāciju un specifikācijas. Kopumā nav universālo digitālo rīku un katram projekta etapam un atšķirīgai mērķauditorijai izmantojami atšķirīgie digitālie rīki vai to kopas.