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Project Management in a Digitally Transformed Museum

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Abstract. The modern paradigm of the museum mission requires the innovative methods and tools for scientific investigations and applied informatics in museum work. Authors offer some data on marketing strategy and business planning as an example of digitally modified business.Contemporary museum project design requires various knowledge and skills. Casual museum activity influenced by innovations and up-to-day technologies in general saved basic functionality but changed some forms. Analysis of the business process in a museum revealed needs in marketing technologies and loop control, while these methods are not so new as we guess.

Keywords: museums management, museum communication, digital transformation

1. Introduction

In accordance with the UNESCO Convention on the Protection and Promotion of the Diversity of Cultural Expressions, “the protection, promotion and maintenance of cultural diversity are an essential requirement for sustainable development”. The modern paradigm of the museum mission requires the innovative methods and tools for scientific investigations and applied informatics in museum work. The open access electronic resources turn to be storage of useful data on cultural heritage, national history and cultural relations [1]. The focus has shifted from artefacts to individuals. We started to speak about researchers, scientists and personalities referring to a museum object. Aiming at being innovative and effective the museums need scientific cooperation with various institutions. The continuous museum social research has revealed them to be the place where people try to avoid social cataclysm and any crisis, financial or psychological — museum attendance increases at the time of economic or political instability. Museums are associated with traditional values which are closely linked with social stability. They give people a feeling of safety, a hope for the future.

At the same time, the digital and communication technologies result in changes in ordinary museum functioning. Digital transformation [2] is a popular term in marketing. It has penetrated from business and describes how the ICT change our traditional functional processes. Evidently, the businessmen are playing words in order to increase attractiveness of a product. Leaders of the business companies define 3 main directions of digital transformation: customer experience, business processes and business models [3].

2. Digital transformation in the museums

2.1. Customer experience in a museum

Every direction comprises also 3 components having influence to the changes (Fig.1). We tried to appreciate the impact of them to the digital transformation in museums. The effectiveness of domestic cultural institutions estimated by a set of coefficients is not able to present an actual level of digital transformation. Strictly speaking, the leaders make a choice between the directions and their components, which results in partial digital maturity (https://digitalmaturitycheck.ey.com/). In 2015 in Paris, just a year ago, at the SITEM expo the experts have spoken a lot about scenarios of museum exhibitions. That's right for design and production, but customer's point of view is completely different. Commercial sector has digital and soft skills to collect users' opinions, to calculate visitors, "likes" and other signs of satisfaction. The museum visitors arrive for special type of communication — museum communication, based on both a cognitive component and the positive emotions. Museum space is not a Disneyland, the positive emotions have other origin than simple distraction. So, the specialised software must be adaptive in very specific meaning [4].

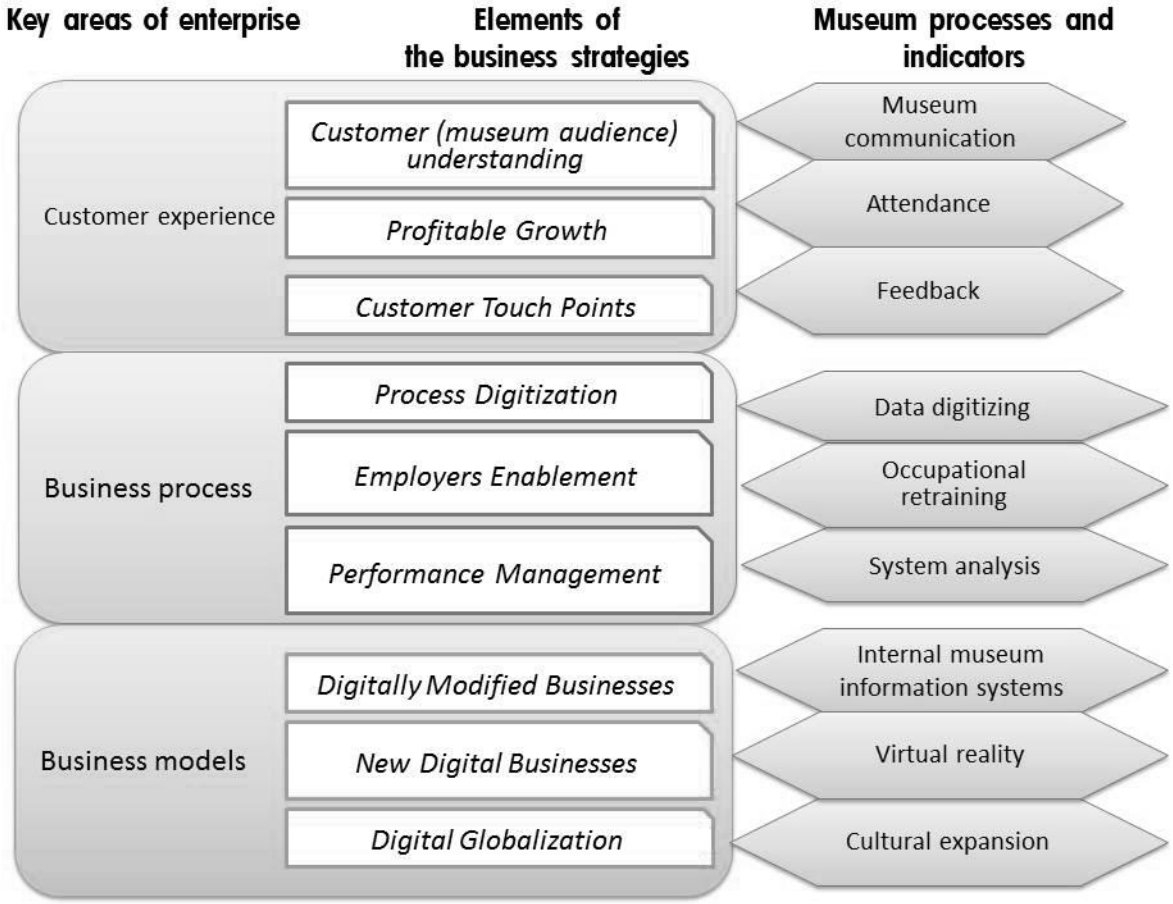

Fig. 1. Digital transformation in the museum business processes

The effect provided by digital transformation comprises the museum audience understanding, museum profitable growth and audience touch points. Museum audience understanding provides the effectiveness of the ICT application. Traditional museum studies form such experience in case if a special department works in the museum or a certain professional company was engaged. A standard questionnaire form gives answers only in frame of an investigation, while social media offer people more free conditions for expression of opinion and estimations. This way many companies and museums as well begin to study customer experience in social media. Optimum of the feedback can be obtained in case of the system of web-sites and different societies in social media reflecting various focus groups. The study of their needs allows the museum to prepare a product relevant to a special audience, or a service

according to the requirements. Collecting of the customer experience is based on the data from the questionnaire forms and on computerized processing with the analytical methods.

The specialists from Victoria&Albert Museum in London recommended to reveal one goal according to the investigation of virtual museum audience, then to try to balance with the museum stuff targets. Clear understanding of the aim helps to create only one information product but successful. Probably, museum needs some products with various aims, but they must in correspondence with museum visitors' experience.

Museum profitable growth has not strong correlation with number of visitors, even this number is taken as a coefficient of effective work. Digital strategy defines the way to get some result with the help of digital technologies. That would be perfect when you have serious financial support helping to provide all necessary improvements. If not, your "best in the world" strategy is useless. For example, actually nearly all foundations are not able to support museum studies and technical projects. The lucky exception — Vladimir Potanin Foundation support cultural and educational programs. The middle and small state museums have very small budgets. ICT are too expensive for them. The State Hermitage is exception because there other possibilities: endowment, special foundation helping its activity and Hermitage Museum Friend's Club program. Finally, even if you have financial support, the anti-corruption laws leave you no chance to get the equipment you need, casuistic case. A reasonable solution was found in scientific collaboration, cooperation between museums and universities. Museums possess informative content and creative ideas, universities have equipment and modern technologies. Their mutual activity creates positive atmosphere for education of new generation of specialists who could be attracted in future for cultural heritage preservation.

That solution gives the feelings of comfort and satisfaction to a visitor and results in profit from sale of the souvenirs and books in museum-shop. The e-shops have clear aim of increasing pure profit, as for the museum web-sites — they are not an objective tool for the feedback study. Sometimes, they look like a barrier between audience and museum specialists. So-called, "special functions" for museum sites — "my collection" or "share" — came from marketing, where they suppose a "market basket". For museum it looks strange. Nobody proposes planning of the museum visit according to the user choice, because in reality there too much constraints and conditions.

Audience touch points are revealed on different levels, which results in a complex estimation. At the State Hermitage museum the very first contact is a result of booking or purchase of the e-tickets, planning season tickets or crossing the turnstiles. Second contact with a museum happens during the visit, when there the possibility to comment the impressions is provided by a sensor kiosk in the exit zone. The official feedback channel exists on the museum Web-page. But the personalized notes in virtual space are possible only in social media. The internal museum communication is not enough for the system analysis.

The digital services of a museum can be various: e-tickets, e-shops with books and souvenirs. The most part of "digital tours" presents typical e-catalogues. Smart apps designed instead of audio-guides are useful in open space, where the distance between described objects exceeds several meters. The requirements consider AR based on GPS location. The panoramic views of the museums are popular less than it was predicted. The new technologies are applied mostly in the cultural centers and the technical or natural history museums, e.g. the list of the modern museums of Canada (http://www.ngxinteractive.com/#work). The historical monuments and art museums use innovation more rare in order to keep attention on the aim of visit. World experience of the social media profiles use for the individual tours compiling is not accepted by the domestic developers [4].

The only one museum web-page based on the principles of life communication is Brookline museum's one. The study at the State Hermitage Museum has revealed the communication with virtual visitors forming the permanent museum audience during autumn and winter, after the high-touristic season — regular patron. E.g., General Staff Building is visited daily by young women with families and friends or managers of the big private companies (Y-generation), and evenings — employers of budget institutions (X-generation). Of course their preferences are different, and emotional reactions on exhibitions and museum atmosphere vary. Addressing the concrete audience, a project manager requires the data on its specifics. If one suppose generation Y (1984–2000) to be stakeholder of video for Youtube-channel, we should take in account creative style of communication, pragmatism and video thinking.

Commercial sector has digital and soft skills to collect users' opinions, to calculate visitors, "likes" and other signs of satisfaction. In my opinion, we are mistaken expecting benefit from the interaction with computer. Being a means of human communication, museum communication requires more complex system than simple human-computer interaction. A "signal" we transmit from a person to another person is an emotion [5]. There are different ways to fix the emotional state but it is not the same as engineers do for simulators in education and training. Today we are not ready to offer suitable AR or VR equipment helping people enjoy a museum, as well as we propose them certain simulacres instead of virtual museums. The museum visitors arrive for special type of communication — museum communication, based on both a cognitive component and positive emotions.

While the interactive and mobile applications are based on cognitive approach, museum audience prefers emotional component in any museum space, virtual or real. Thus, a loop control in virtual museum space requires a tool for emotional balance control. All researchers, the museologists and engineers together are only in the beginning of mutual way [4].

2.2. Museum business process

Evidently the main benefit of the museum consists in improved business processes, the fact with which every commercial institution starts. This internal process includes museum processes digitalization, employers enablement and performance management.

Museum process digitization is defined by strategy of the museum, describing the main problems: keeping, management, conservation, restoration and demonstration of the museum collections. According to the actual laws collection management is based on the electronic database aiming legal protection and state control of the museum objects. The data input to this database became the priority objective, but no formal automatization can increase productivity. All terms depend of human resources. New functions of the museums aiming digital heritage design and archiving appear. In commercial company time saved from the repeatable operations allows employers to concentrate on investigations and creativity, the state-of-art of digitalization in museums is completely different. Instead of expectable vacant employers we fix necessity in additional stuff: photographers, computer operators, data control managers etc. In addition, the quality of images varies for publications in art books, for restoration needs and for museum documentation. Guided tours could be followed by tablet presentations, or mobile applications for individuals, but they result in new specialists. Sometimes new technologies enter our everyday life so fast that we think they are designed only for pleasure. We do not realise them being not only entertainment, but labour-intensive work. We completely forget numerous designers and engineers developing them for us. For example, virtual reality looks nice only on pictures and in films. Virtual space possesses its own rules, modes of interaction and even limits. That means we have a span between scopes of museum visit and being in virtual space even a lot of financial or material efforts were applied. The expenses of a museum grow up, and its budget must take in account new equipment, supplies and refresher training.

Employers enablement, revealed in commercial field, is not evident in the museums. The museum specialists need new skills and knowledge, because they have to be relevant to the modern challenges. In former time the programmers composed algorithms and translated them into a computer code. The engineers supported an interaction with computer, who returned back results in order to find mistakes in the algorithm. Thus, we had time to evaluate all parts of an information system. Now nearly everybody feel himself a Creator, even a Designer and does not realise the functionality of the system, which he tries to break the deadlock. Many operations became automatized, not appreciable and nobody is responsible for mistakes [6]. Museum curators try to design content for the virtual excursions as they did it in exhibitions hall and ignore the principle of virtual space, the rules of a "computer game", of course the result is very bad. The only possible decision exists. We are able to invite VR-specialist in museum team in order to get the necessary skills. No new job profiles in museums, perhaps the old jobs require new competence of use modern facilities. Network and common use services allows employers to contact in chart anywhere they are, and get access to any data. Such possibility is very comfortable for supplementary services of a museum, while the main museum functions cannot be provided online. The museum collections description, restoration and conservation, transporting, mounting of exposition require presence of curator. Thus the question is in effective tools and applications providing the functionality, preferably free or with one license per the institution.

Any change in a museum is always painful, but even so conservative institution realize new competences as requirement influenced by time and external factors, as telephone and electricity in the beginning of last century. The main problem is not in electron device instead of human but in relevant combined team for the project using ICT [7]. Work within ad hoc teams under time is a real challenge for the domestic museums.

Performance management particularly takes in account attendance of a museum and not a communication result. Museum communication, from the museum visitor's point of view realise the information exchange in museum space resulting in the visitors reactions. Part of reactions could be found in visitors' book, because it fixes mostly audience composition and binary estimation "like-dislike". Field research in museum space with the help of social psychological methods offers possibility to get data on real visitors. These data result in visitors' feedback analysis and require fast processing.

The basic charge of those, who are responsible for 'museum performance' management (in the meaning of productive capacity, not art), to do the statistical reports, and they do not manage proposals on strategy or recommendations for middle managers. The strategic solutions on museum development need definition of the critical factors related with positive impression from exhibition projects and museum atmosphere. That means there is necessity in investigation of real and virtual audience of a museum in comparison with main competitors.

2.3. Museum business model

Digital transformation involves both operation business processes and interaction between various services. For this reason there are digitally modified business, new digital business and finally, digital globalization.

All types of geolocation based on Wi-Fi and Blue-tooth, digital marks, security systems — all these technologies are helpful, but they solve only supplementary problems. Anyway all of these innovations, especially maintenance of them, are very expensive and require extra money from the museum. Museum queues as a result of muss media activity, aiming to increase profitable growth, turned to the museum a catastrophe. Reasonable number of visitors per a museum depends of numerous factors (limited places in cloakroom and checkroom, throughput rate of ticket offices, available number of caretakers and security in the entrance zone), and not well thought out advertising is very risky.

Strictly speaking, digitally modified business leads yet to the increment of electronic document flow following by enormous paper consumption. The correct management and leadership are also important but not as a successful aspect, only as second level provision of the project.

The new digital businesses for museums suppose electronic ticketing, online shops and also absolutely new activity as a virtual museum. The term appeared in 1991 with an object of computer-art and then it was transformed to the marketing ploy. The entity of term consists not in a digitized form of an existing object, but in a specific virtual environment, which level of immersion can be estimated. In addition to the technical parameters of immersion the feedback should take in account psychological evaluation of the emotional reactions of human. Museum is not a simulator for training; it is companion for whom the individuality of real or virtual visitor is very important.

The digital globalization of activity allows museum transferring from local level to the regional or even national. According to the Strategy of the State Cultural Policy (http:// http://mkrf.ru/upload/mkrf/mkdocs2016/09_03_2016_01.pdf) the state museums of the Federal level are in need to create their regional branches and therefore to take in account the local specifics and possible risks. [8] Coordination of the work of branches requires new professional skills: some troubles in one point will cause troubles in other one. That is even one of requirements for the international project submission, e.g. Horizon2020 - the EU Framework Programme for Research and Innovation (http://ec.europa.eu/programmes/horizon2020/).

3. The basic methods of planning

If we place the most popular methods in chronological order (Fig.2), evidently they are not really modern. The first principles of control and strategical planning were formalised in XVIII century by mathematician of Russian Academy of Science Leonard Euler, who solved the Konigsberg Bridge

problem. This way the graphs theory appeared. Program Evaluation Review Technique (PERT) for the projects analysis was designed by USA Military Forces hundred years ago, nearly the same time as Henry Gantt's charts [9, 10]. The SWOT-analysis is the youngest, developed only for marketing in Harvard Economic School [11]. Application of PERT requires the knowledge from graphs theory [8]. It helps to solve Monge-Kantorovich optimal transport problem, that means to optimise planning and control of a project. The main idea consists in optimal but not unique decision. The engineers use to apply Henri Gantt's charts to present in horizontal bars all the problems, which must be solved during a project step by step, in turn. They view was perfected and even the special applications are available, while the entity left the same — planning of sources (raw materials, staff, technique etc.) for the project.

Among the special methods, not so new but leading to the positive results SWOT-analysis is very popular. Author wrote that the original title was SOFT (satisfactory-opportunity-fault-threat) not SWOT (strengths-opportunities-weekness-treats). The first variant, showing the dynamics of transfer from present to future, was replaces by static one, using only the external factors of development. The system analysis had to fins an internal potential for evolution of a company. The actual examples from Internet revealed the SWOT-analysis is applied for cultural tourism projects the wrong way.

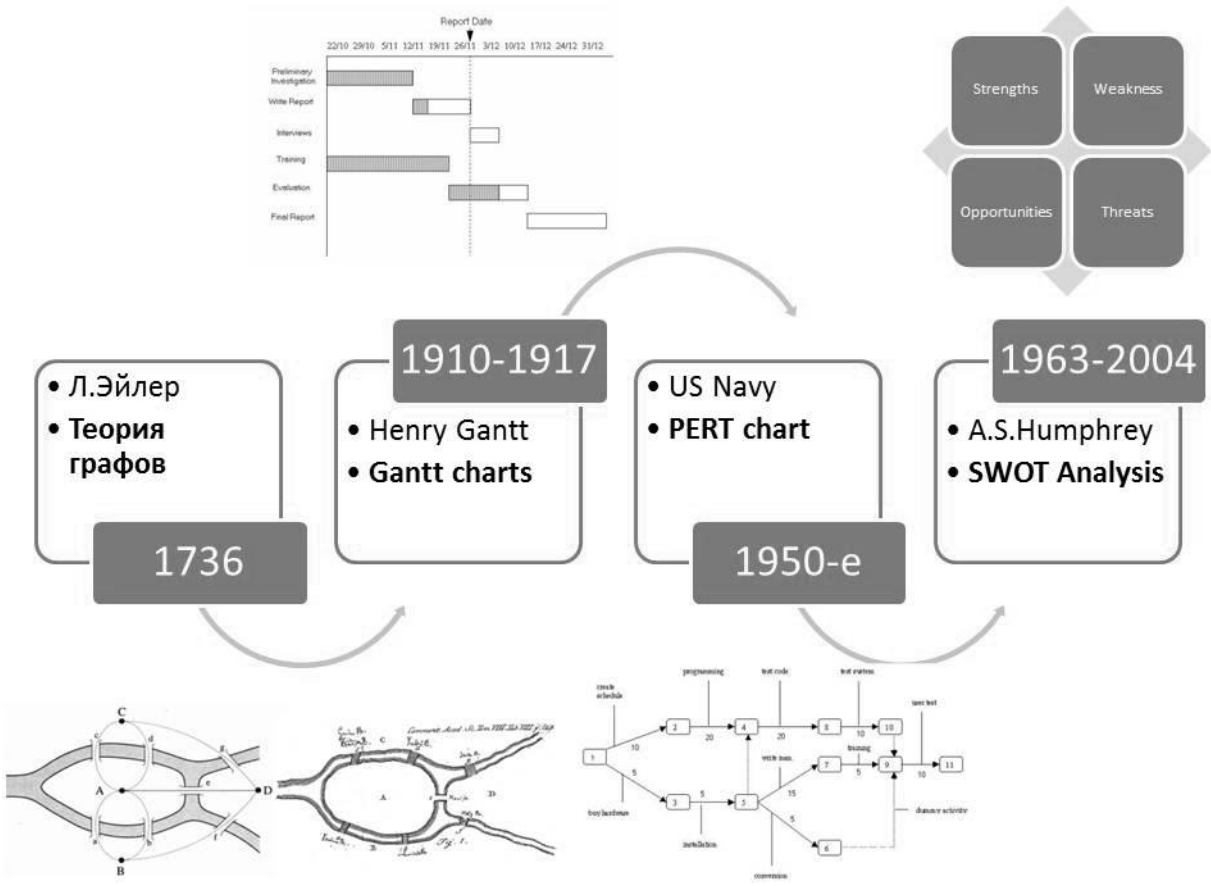

Fig. 2. The basic methods of planning in chronological order

Numerous up-to-date museum projects imply use of the automated systems. These works require application of State Standards [12, 13] However, the "advisors" of the project managers recommend to ignore rules and to concentrate on good presentation and illustrations for reports, because nobody manages the feedback after operation, especially maintenance. These stages simply are not included into the plan, although they are obligatory for the digital sources of the cultural institutions.

4. Conclusion

Museum business process is continuous. The physical analogue of the process can be presented as short-time impulse influences to a periodic signal, e.g. sinusoid. Imagine, you have your ordinary, traditional everyday functionality but a weather-forecast says you must adapt your business to the new climate conditions, like an impulse. The changes in business and in museum activity will be the convolution of functions: typical, continuous and a new one, influenced by innovative technologies, helping your stakeholders and you too, to get more benefits from your activity. That means a digitally transformed museum, who achieved digital maturity in marketing terms, must have properties of commutativity, associativity, distributivity, linearity and multiplicative identity, and differentiation rule and property of Fourier transform can be applied too. Regarding to these properties, the museum functions will have following characteristics:

- The order of decision of small problems composing a complex problem does not influence to the final result, if all of them must be finalised;
- Spectrum of functions of a cultural institutions is the same, while the ICT are implemented in the main or supplementary business processes;
- The scale of a museum does not affect the digital transformation and its functioning. Velocity of changes in convolution of the functions is defined by velocity of changes in every function separately.

No one of analysed foreign business companies did not take in account all 9 directions of business strategy. Domestic companies first of all try to optimize business processes; they are not so interested in customer. The review on experience of ICT use describe the positive examples and do not discuss the reasons of the unsuccessful cases. Any automated system must take in account the actual State Standards allowing to avoid the primitive mistakes on the very first stages. It should be mentioned, that relationship with clients, internal processes and competitive offers depend firstly of competently and structural management/ that is why the museums have to pay attention to the mistakes in marketing and investigate their own clients — museum audience — before any change in their activity.

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Управление проектами в музее в эпоху цифровой трансформации

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Аннотация. Современная парадигма музея требует инновационных подходов и методов для научных исследований и применения компьютерных технологий в музейной деятельности. Авторы приводят некоторые данные по маркетинговым стратегиям и бизнесс-планированию как пример цифровой трансформации в музейной сфере. Разработка успешных проектов требует разнообразных знаний и навыков. Повседневная работа в музее подвержена воздействию модных тенденций и различных инноваций, в результате которых сохраняются базовые производственные функции, но их форма частично меняется. Анализ бизнес-процессов выявил необходимость применения маркетинговых технологий и научных основ теории управления, которые оказываются не настолько новыми, как нам кажется на первый взгляд.

Ключевые слова: управление музейными проектами, музейная коммуникация, цифровая трансформация

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