GPS Navigation in Project: Way from Chaos

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***Abstract*—**This article provides project managers, the cultural events organizers, with a new approach to plan preparation and to the monitoring of events realization. The Dynamic Iteration Method introduced in this article is based on the system dynamic modelling and on the principles of project iterative development. The plan model and the reality model are structurally similar; they differ in values of exogenous variables. The research results confirm that the method is set correctly. The questions regarding the competences and observance of the project iterative development principles were given to the members of five project teams. Their answers together with the application of dynamic simulation helped establish the projects ranking. This simulated ranking was then compared with actually achieved projects achievements. It turned out that the projects ranking in the simulation fully corresponds with reality. In this way, the model validity was confirmed. Another research question is whether this method can be applied earlier than in the stage of final comparison of projects. The new approach enables to easily monitor the real project course in close connection with the plan and to take timely controlling steps. The effects resulting from the manager´s decision-making process are compared with the plan in regular iterations. Our experience in organizing cultural events proves that the application of the Dynamic Iteration Method is a chance to prevent further chaotic organizing of cultural events in companies. The method thus reminds of a traveler whose route is adjusted by a GPS navigation system.

***Keywords*—**planned value, earned value, actual costs, project management triangle, mental model, system dynamics model, feedback loops, cultural events, productivity, remaining work.

I. Introduction

PROJECTS may be managed or non-managed. However, non-managed projects, due to their inconvenience, pose a risk which organizations cannot afford to take. In culture and arts, there still are projects focusing more on teams´ creative atmosphere rather than on project managers being able to apply project management methods and tools and thus rationally adhere to recommended and practically proven procedures. Cultural events managers care more about creative project environment than about consistent and continuous checking whether the project objective is being achieved. Members of project teams with cultural events-like character are often volunteers and so the specifics of the given type of projects are determined. The work of volunteers is not for free, yet it is not rewarded in common ways used when creating projects in other industrial areas. Therefore, the sophisticated systems of project planning and monitoring based on financial remuneration of project team members cannot be applied in case of cultural projects. In effort to bring order to chaos during the project development monitoring, we tried to introduce a fake system of remuneration of team members. As we could verify, this way is not effective, either. The reason is the need of frequent changes in the project plan and for the purposes of the project development monitoring; the plan was fixed at the beginning of the project stage. A thorough preparation of a high quality plan that would cover all project aspects from the start to its end is extremely demanding.

Project managers are usually too busy to spend time on changing plans which ceased to be actual. As a result, the manager´s possibility to monitor the project and compare its development with a prepared plan becomes a chimera.

The article comes up with a new method of project planning and monitoring. The method will be well applicable during the organization of cultural events and similar projects where team members´ creativity has to be developed and encouraged, not suppressed. Our research regarding the practical benefits of the method focuses on organizing cultural events, yet it may be very well applied during the planning and monitoring of scientific creative projects. The Dynamic Iteration Method, as we called it, removes the shortcomings of the project course management methods that are too simplifying (e.g. the Milestone Method, the Structure-Status-Deviation Method, the Percentage Fulfilment Method etc.) or methods that are too difficult and based especially on the financial remuneration of team members (the Earned Value Management Method, further on referred to as "EVM"). The Dynamic Iteration Method does not suppress the above mentioned methods. On the contrary, they present the method´s basic starting point. The Dynamic Iteration Method builds on the complexity of the EVM method and on the availability, clarity and comprehensibility of the Milestone and Percentage Fulfilment methods. They systematically lead cultural events managers to creative communication with their project teams. The Dynamic Iteration Method prevents team leaders from introducing inefficient detailed planning and at the same time, it helps avoid chaos during cultural events organization without an adequate plan. Our experience in organizing cultural events proves that the application of the Dynamic Iteration Method is a chance to prevent further chaotic organizing of cultural events in companies.

II. Theoretical Framework

Iteration is understood as a repetition of steps enabling to reach the desired project´s objective. Iterative development is based on several basic principles influencing the model behaviour. The project iterative development is used in agile approaches to software projects management rather as an alternative to the currently more used Waterfall Method. The description and principles of agile development of software projects may be modified also within other project types. The following six key principles of iterative development are incorporated into our project model and represent special parameters influencing the project result:

- Adapt the process;
- Balance competing stakeholder priorities;
- Collaborate across teams;
- Demonstrate value iteratively;
- Elevate the level of abstraction;
- Focus continuously on quality [1].

Project management aims to ensure the effective and efficient introduction of the targeted change process that will bring the desired benefit. The main objective of project management is to propose and realize a successful project, i.e. to achieve the objective in the planned time, with the allocated costs and available resources [2]. Project managers have to accept the responsibility for the project development in all of its stages and satisfy the interests of all people or groups involved in the project. One of these interest groups is the project team bringing their expectations, demands, skills, rights and responsibility into the project. According to Soukalová [3] the essence of managing may be very simply characterized as an information-communication action aimed to transfer information quickly, efficiently, truthfully and reliably. A well-managed project always includes an own model. This model is given by the project plan and predetermines which outputs are to be created within the project realization. According to De Marco and Rafaele [4], system dynamics is a useful tool when identifying the behaviour of complex projects in the overall perspective. The project model enables the project manager to simulate costs and team performance in advance and without risk and to manage the team in a way to be able to direct the performance towards reaching the project´s objective. Besides the principles of iterative development, we build on other starting points for the effective application of the Dynamic Iteration Method. These are:

- International standard according to IPMA: International Competencies Baseline (International Project Management Association [5]);
- International standard A Guide to the Project Management Body of Knowledge [6];
- Systems Approach [7];
- System Dynamics [4], [8], [9].

The project model uses values for the plan quantification and then the achieved progress during the subsequent realization. Due to this, the project model – both the plan model and the model copying the reality – includes some basic indicators from the Earned Value Management Method, (further on referred to as "EVM") according to the Project Management Institute standard [6]. The method has been widely modified so that we could use what is well applicable for cultural events projects. For the project values measurement, the following key values have been used for each output:

- Planned Value as a budgeted cost of work scheduled (PV);
- Earned Value as a budgeted cost of work performed (EV);
- Actual Costs as an actual cost of work performed (AC);
- Budget at Completion (BAC);
- Estimate at Completion (EAC) [10].

In its original approach, the method works with key values for the project activities. We focused on the measurement of reached values regarding the project outputs (not activities). As the PMI standard [6] states, the EVM method in its variations is the most useful method for the measurement of project performance. It includes scope, costs and time measurement in the project and thus enables project manager to evaluate the project performance, given by its constraints. In connection with projects and project objectives, we are always limited by three basic elements: scope, schedule and costs. These constraints are the factors that are limiting us throughout the project management [11]. This is why their sophisticated application in the Dynamic Iteration Method is so important. Traditionally, these concepts are called as scope, schedule and costs and are covered under the general term *Project Management Triangle*, where each side of the triangle represents a constraint (*Triple Constraint).* One side of the triangle cannot be changed without affecting the other sides [12]. A situation brought about by the project triple constraint is depicted in Figure 1.

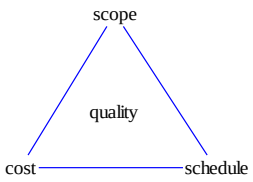

Fig. 1 Project Management Triangle

The Triple Constraint technique in the Dynamic Iteration Method allowed us to take full control of all three key constraining elements. *Systems Thinking* and *System Dynamics* are the other two approaches that supported the control over the project. In this way, the *Triple Constraint* technique is enriched by the project success evaluation also in other parameters – i.e. whether the project result is positively evaluated by various interest groups. All that characterizes a successful project is offered in our new Dynamic Iteration

Method, the method for planning and development monitoring of cultural event projects.

A project as a whole may be divided into several project management stages which together form the project lifecycle. The IPMA Standard [5] describes the following basic project life phases:

- Pre-project phase;
- Project phase (1-initiation, 2-design – planning, 3-execution, 4-closing);
- Post-project phase.

Further in the text, the Dynamic Iteration Method works with two parts of the project lifecycle – the second (planning and design) and the third phase (execution) – see Figure 2. In the planning project phase, team members under their manager´s supervision will proceed according to the simplified scheme shown below:

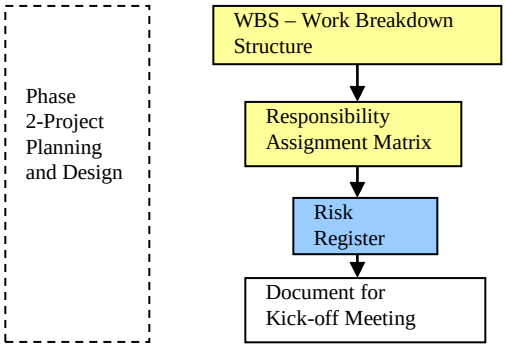

Fig. 2 Phase 2 – Project Planning and Design, Basic Scheme Based on IPMA Standard

For our new approach to cultural events management, we have selected four project management tools which will be applied in further description of the new method for cultural events planning and management:

- Work Breakdown Structure (further on referred to as "WBS");
- Responsibility Assignment Matrix;
- Risk Register;
- Issue Log – in the Execution Phase.

According to PMI [6], a *Work Breakdown Structure* is a product-oriented group of project elements organizing and defining the overall scope of the project. For WBS elements, this article uses the term *output* in sense of the result of our work in the project, i.e. such work that is completed and approved for the project use. *Responsibility Assignment Matrix* is a tool for defining individual team members´ responsibilities for different parts of project outputs/activities (work packages). *Risk Register* acts as a central repository for information about risks: especially probability, risk impact and others. It is a live document as during the project execution risks change, appear and fade. *Risk* is an uncertain event that may occur and influence (usually in a negative way) the execution or objective of the project. *Issue Log* is a list of open points and problems that need to be dealt with during the project realization. These are problems and activities to be solved above the framework of planned tasks. Such open issues must be recorded, prioritized, assigned to a responsible person and set a deadline for solution.

The system dynamics tools and methodology help us evaluate projects development both retrospectively as well as to the future. The project development simulation may be applied as a strong tool for the prediction of project success. However, it requires a good knowledge of project management problems and a willingness to change thinking stereotypes. Sterman [9] suggests that models should not be used as a tool for strengthening critical arguments against the project development but as a tool for judgement improvement and as an aid for further project manager´s decision-making process. The system dynamic modelling usually starts by designing a mental model that may be converted into causal feedback loop diagrams. Such models are descriptive, flexible, yet not sufficiently exact. Another problem could be their ambiguous interpretation.

According to Sterman (Sterman 199), projects are extremely complex, consistent, involve more interdependent components and are highly dynamic. Projects include many feedback processes, non-linear relationships and their execution is interfered with the knowledge of technical tools as well as with the understanding of behaviour of people responsible for solving and managing the projects. Successful project management resulting in a high quality final product is difficult by itself. A model simulating such project management has to represent a system reflecting the standards that lead the manager to the right project management procedures. At the same time, the model needs to be applicable and comprehensible for project managers. It is quite frequent in project management that a change in one part of the system may have impacts in other, more distant project stages. This interdependence of project elements complicate and, using only mental models, disable the project´s analysis. The cause and impact are distant in time; therefore managers find it much more difficult to identify errors [13]. The main argument as to why to apply the system dynamics is the possibility to detect interdepencies in such a way that the causal impact on change is identified within the system. Systems thinking tools enable system elements to identify and determine relationships among them. System dynamics models aim to interpret the system elements and project results in numeric values.

In order to quantify the variables entering into the model, it is useful to use the fuzzy logic. According to Tsabadze [14], managers usually think in vague categories and are not led only by decision-making based on yes/no answers. The approach of fuzzy logic is applied in the model to quantify the complexity of planned outputs and to determine the competencies of team members. The scale may then depict the increasing or decreasing output complexity as well as other conditions in the project. The scale points illustrate the sought numerical expression of model input variables.

III. Research Methods

A. Systems Thinking

The research in project teams was preceded by designing a mental model of a cultural event project that may serve as a general background for project modelling. With help of the systems thinking method, the mental model was then converted into a causal feedback loop diagram. The key feedback loop in the following Figure 3 explains the model´s basic structure.

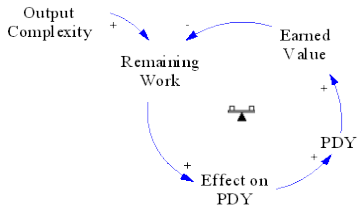

Fig. 3 Basic Feedback Loop

What needs to be considered first is the evaluation of *the Output Complexity* as an exogenous variable directly influencing the amount of *Remaining Work*, i.e. a stock of work that has not yet been completed. The amount of remaining work has an impact on *Work Productivity* (more remaining work, higher productivity) and higher productivity causes higher *Earned Value*. Higher earned value results in lower stock of work-to-do which in turn causes lower work productivity (PDY) and lower earned value. The feedback loop is thus negative, self-correcting, which is highlighted by a symbol of balance within the feedback loop. Figure 4 depicts the whole project feedback loop diagram. The loop diagram is enhanced with further variables researched in project teams. Specifically, we are talking about the elements representing six principles of iterative development and the numeric interpretation of the level of project team members´ competencies. Low competencies of team members mean lower earned value or lower work productivity. As a consequence of team members´ lower competencies, there is a request to increase the time needed for the project execution. However, cultural events projects rarely allow longer time for the project completion and the result often is a demand to decrease the number of outputs and subsequent lower quality of the achieved project objective.

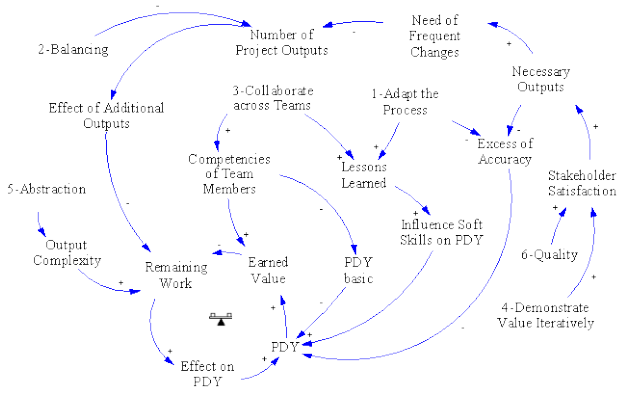

Fig. 4 Causal Loop Diagram of Influence of Iterative Development Key Principles on Cultural Project.

Causal loop diagrams are an important means of communication; they can explain the system dynamics and depict significant causal relationships as well as feedback loops including their polarity, important for model interpretation. They are therefore suitable for the identification of mental models and are well applicable for team communications. Causal loop diagrams, however, are not by themselves an exact tool that would help monitor the project development.

B. System Dynamics

When checking the project and comparing the achieved results with the plan, it is necessary to be familiar and work with numeric values. Therefore, the next step is to create a system dynamics model. Dynamic models may cover even the level of behavioural competencies influencing the overall project development.

The following elements are applied when designing system dynamics models: accumulation, flows, endogenous variables and constants (exogenous variables). Models show both positive and negative feedback, the existence of non-linearity as well as delays in relations among the system elements.

For modelling, we used the Vensim software, a Ventana Systems, Inc. product [15]. To apply the new methods of dynamic iteration, the Molecules of Structure tool by Hines [16] was introduced. For the purpose of designing the project model, the structure molecule *Level of Executed Work Protected by Productivity* was suitable.

This molecule of structure is predetermined to solve the problem with the level of remaining work which must not decrease below zero. The basic scheme in Figure 3 clearly shows the project team members successively reduce the level of remaining work by production. The solution to this task is the understanding of value change in the *Productivity* variable (hereinafter also referred to as "PDY"), which must reach zero value, unless the level of remaining work shows any unfinished tasks. The level of tasks thus decreases as a result of production flow; production flow is influenced by productivity that declines together with a drop in the stock of work-to-do. In order to maintain the team´s high work productivity, we would have to, simultaneously with the productivity decrease, create further stock of work on which the team could work so that their productivity would remain high.

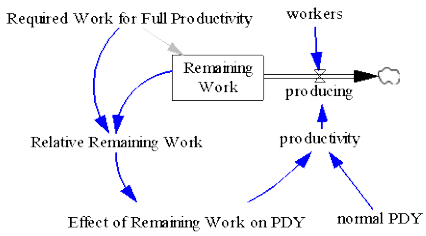

Fig. 5 Level Protected by PDY [16]

The variable *Normal Productivity (normal PDY)* is exogenous; its values may be set by the project manager´s decisions (Figure 5). The manager´s decision-making process will differ according to the distance of the project team from the predetermined plan. The basic building element *Level Protected by Productivity* forms the system dynamics model. It also contains other two key exogenous variables or variable systems – the level of team members´ *Competencies* and the *System of* six *Principles of* project *Iterative Development*.

Figure 6 depicts the sequence of the Planning Phase to the Execution Phase. In comparison with the first scheme (Figure 2), there is a clear back correction and WBS clarification, change of the Responsibility Assignment Matrix as well as a change of outputs corresponding to the defence against the negative impact of risk on the project. The iteration among WBS, Risk Register, Responsibility Assignment Matrix and Issue Log is one simulation step, in the real project a time between two project meetings.

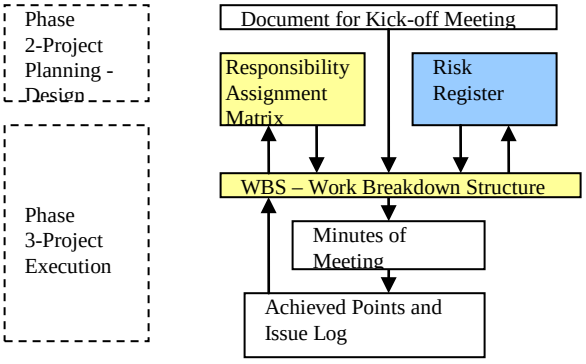

Fig. 6 Sequence of Planning and Execution Phases in Project Phase – Modification

The background for the model compilation is dividing the project execution phase into a certain number of key planned outputs that need to be created within the project solving process. To try the methods, we have selected 5 planned outputs; their number will, however, vary according to how many key outputs the project will be evaluated by its team. Every project is original and it is impossible to set one universal model for all kinds of projects. Every output will then consist of other partial outputs (work packages) according to the WBS definition. Reaching these outputs in the model is not initially limited by time, as e.g. when designing the project *time schedule* that always follows upon creating a WBS project. According to the Dynamic Iteration Method, the Project Schedule Document will not be necessary for the project time management – this will make the project work easier.

One iteration step (simulation) for our model has been set up to 1 week. The total scope of the project during which the objective must be successfully achieved is 25 weeks. This time corresponds with an average time of planning and execution of a cultural event project (in our researched projects). The project plan model is in its structure identical as the project execution model. The plan is a model within the executed project. Figure 7 shows a simplified system dynamics model of the project plan and execution.

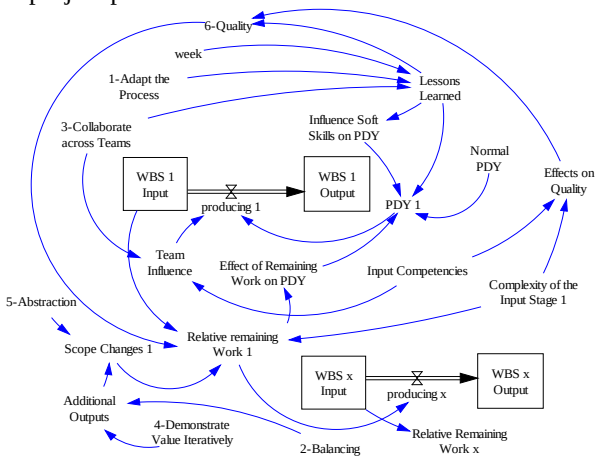

Fig. 7 System Dynamics Model of First (and next "x") Project Delivery

A suitable application of system dynamic modelling as a research method is conditioned by acquiring input data that can be simulated on models. The data resulted from the quantitative research method and a questionnaire research followed by interviews with research participants. We applied qualitative techniques or techniques on the borderline of quantitative and qualitative techniques. With help of questionnaires and subsequent interviews with thirty members of five project teams, we have covered three areas for the model input information:

1) Identification of complexity of key project outputs and determination of their expected creation order,
2) Identification of project team members´ competencies with respect to project outputs,
3) Identification of ability to follow principles encouraging project iterative development.

C. *Identification of Complexity of Key Outputs*

For more complex outputs the project has so far allowed more time or increased resources. However, especially in conditions focused on cultural event projects, this is a way which is sure to fail. It is impossible to design a project plan without considering the complexity of outputs. A fifty-point evaluation scale is adequate for estimating the complexity of each output. Below is a description of each scale level, modified according to Ojha [12].

1-10: Trivial. A trivial task is one in which the approach and design is well understood, no research is expected to be needed, and is not a large effort.

11-20: Simple. Fulfilment of a simple task requires evaluation of several different approaches.

21-30: Can be done – this task will require some research, could be considered challenging.

31-40: Difficult – these tasks need significant research and are known to have hidden or unexpected difficulties.

41-50: Very Difficult – the most complex task that could be accomplished in iteration. The most senior members of the

project team work on the task, the delivery may be outsourced to specialized workplaces.

The new Dynamic Iteration Method was used to verify the model validity. The project plan is a sample model of a project where we assigned the same complexity to all five outputs. Project managers from five teams distributed 100 points among these five project outputs (Table I).

TABLE I. ESTIMATE OF OUTPUT COMPLEXITY

	Output 1	**Output 2**	**Output 3**	**Output 4**	**Output 5**
Project-plan	20	20	20	20	20
Project-1	25	25	10	15	25
Project-2	30	10	10	30	20
Project-3	20	15	35	20	10
Project-4	20	10	30	30	10
Project-5	15	20	30	20	15

D. Identification of Team Members´ Competencies

The scale for the assessment of individual team members´ competencies has been set to 1 – 5.

The assessment of competencies of responsible team members concern five project outputs.

1 – Totally incompetent team member;
2 – Team member has some knowledge about the problem, unable to complete a task independently;
3 – Team member has partial knowledge, familiar with related areas, under certain circumstances able to work independently;
4 – Team member familiar with the problems, able to work independently, needs expert´s advice when designing outputs;
5 – Team member has full knowledge of the problems, able to complete outputs independently.

TABLE II. TEAM MEMBERS' COMPETENCY

Competency	**Output 1**	**Output 2**	**Output 3**	**Output 4**	**Output 5**
Project-plan	5	5	5	5	5
Project-1	4	4	5	4	5
Project-2	3	4	5	4	5
Project-3	3	5	5	5	5
Project-4	5	4	5	4	4
Project-5	5	2	5	2	5

E. Ability of Project´s Iterative Development

In order to determine the team members´ capability of managing the project´s development to be able to respond to its current state, a scale from 1 to 6 has been used. Based on a set of questions we created six groups with 6 questions in each group and with help of a questionnaire research we were investigating the team members´ answers. We required an agreement or disagreement with each question and then carried out a team evaluation of the percentage ratio of answers corresponding with the iterative development principles. Finally, we distributed a respective number of points. Cultural events principles that defined the research questions have been characterized as follows:

Principle 1-Adapt the Process

In the effort to execute a high quality project, sometimes we focus too much on designing a project plan in advance in order not forget any plan items. We want to plan all outputs and then successively create them. The iterative development principle suggests that we prepare only a draft project plan which will be closer specified during project meetings, and only to the short-term future.

Principle 2-Balance Competing Stakeholders´ Priorities

Specifically in cultural projects it is extremely important to seek balance between what project outputs to plan to meet the expectations of target groups and project customers and at the same time to meet the project team´s expectations. The element in the model is called *balancing* demands for the project objective among the interested parties. The *Balancing* variable influences an increase in the number of project outputs in the given project phase.

Principle 3-Collaborate Across Teams

The team approach principle is another characteristic feature of culture projects production. Team work is especially about involving team members into the project so that everyone knows what is expected of them and is able to maximize their talents to be beneficial for the team. Synchronized teamwork results in higher work productivity.

Principle 4- Demonstrate Value Iteratively

A detailed planning of the whole project only to compare actually achieved project outputs is not enough to achieve the objective. The most important is communication and clarification of the necessary outputs including the related Risk Register.

Principle 5- Elevate the Level of Abstraction

Abstraction influences changes of outputs with respect to higher team competencies based on simplifying work through abstraction and analogy. Abstraction also helps identify the places which may be simplified in the project.

Principle 6- Focus Continuously on Quality

If we want to create high quality projects outputs, we have to know the quality parameters and be able to describe the outputs thoroughly. If a task is to be executed, it must have quality attributes assigned. The evaluation of team answers and the corresponding ability of the team to respond to current project development has been carried out as follows (Table III):

TABLE III. ITERATIVE PRINCIPLES OF PROJECT DEVELOPMENT

Distribution of Points in Compliance with Iterative Principles of Project Development	
Correct Answers in %	***Points***
100	1,5
51 - 99	1
50	0,5
under 50	0

The gained results are recorded in Table IV and create the third key system of exogenous variables to the project model.

TABLE IV. ITERATION PRINCIPLE FULFILMENT

	Principle 1	**Principle 2**	**Principle 3**	**Principle 4**	**Principle 5**	**Principle 6**
Project-plan	6	6	6	6	6	6
Project-1	3	5,5	3,5	3,5	4,5	2
Project-2	2,5	4,5	2	3	4,5	3
Project-3	2,5	2,5	4	4,5	2,5	3

Project-4	3	4	5,5	5	3	2
Project-5	3,5	4,5	4	5,5	4,5	2,5

IV. Results of Project Modelling

The result of system dynamic modelling is depicted in Figure 8. It is a basic graphic interpretation when we compare the project plan designed under optimal starting conditions. All project outputs are similar in complexity (20 points) and team members´ competencies for all five outputs reach the maximum value of 5 points. Input parameters of the project plan are based on the highest scale levels in case of the ability to comply with the iterative approach (6 points in all six principles of iterative project development).

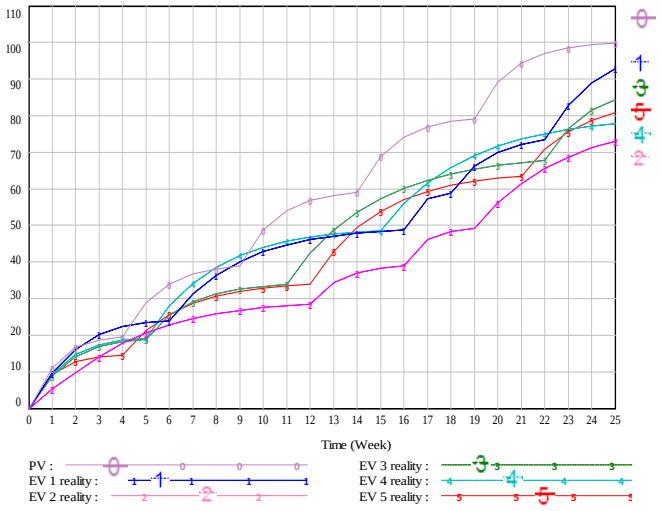

Fig. 8 Comparison of Success Rate of Development of 5 Projects with Plan

The picture shows that the best result was achieved by Project 1 (line EV 1 reality) which, within the monitored period, created most evaluated outputs and came closest to the plan (line PV). Also the following group of projects may be considered as successful. Project 2 came with the worst results and showed the worst parameters out of the five monitored projects. In reality, this was the project that failed to meet expectations for a balanced budget and ended up in a loss. It also did not achieve other measured tasks. The overall ranking of the projects and numbers of achieved points are listed in Table V.

Table V. Project Success Ranking

	Points Achieved	**Project Success Ranking**
Project-plan	100	
Project-1	92,83	1.
Project-2	73,08	5.
Project-3	84,45	2.
Project-4	77,71	4.
Project-5	80,81	3.

The model in our research tested the projects upon their completion, i.e. the modelling in this case provided us with a confirmation of the previous evaluation of project success rate, whose results were already known at the time when the research was being carried out. The modelling confirmed our assumptions and verified the model correctness.

V. Discussion and Further Research

Successful cultural projects bring our society more than just entertainment. Cultural and arts projects are used to develop creativity with positive outputs in areas possibly distant from art and cultural activities: especially in research and development, social relationships as well as business activities. Cultivation and education in the area of culture-focused project management enable to enhance positive externalities which arts and culture publicly produce for the society as a whole.

The new method of planning and cultural projects management, the Dynamic Iteration Method, may be applied prior to the final project evaluation. Graphical illustration of the plan and phase of project execution makes it possible to proceed with rapid and accurate evaluation based on comparisons of planned points in specific phases of the project and their real achieved value. The variable *Productivity* is crucial for directing the manager´s actions and serves as a measurable value in the number of points scored with respect to the project outputs the team is able to accomplish in one week. The planned productivity of points per week is established on the basis of starting (in our case – ideal) conditions. The planned productivity is naturally lower compared to real productivity which is always complicated by weaker input values of exogenous variables. For example, team members´ competencies lower than 5 decrease work productivity and the same is valid for weaker scores (lower than 6) of applying the principles of iterative approach. Work productivity is also negatively influenced by unsuitable *output* ratio evaluated as *Difficult* or *Very Difficult* as well as by the team manager´s approach who delegates the responsibility for results to less competent team members. As soon as there are more simultaneous negative aspects in the project, its execution will begin to fall behind the plan. Weekly meetings with team members aim to identify real situation of the project and modify the model parameters accordingly. If the project is behind the plan, the manager must take corrective measures, alternatively may decide to cancel some planned outputs. Of the five researched projects, Project-2 has been selected for further testing since it showed the biggest delay against the plan. We verified that it is possible to similarly monitor the development of real project costs. In case of costs, however, it is essential to use the total project budget and convert the input values of used financial resources to points to make them comparable with the plan (also expressed in points). The plan calculated with respect to the complexity of expected outputs acts at the same time both as a time schedule and financial plan. Therefore, it corresponds with the key parameter Planned Value (PV) applied according to the Earned Value Management Method.

The following table illustrates the project manager´s corrective actions in PDY2 Scenario where the demand for

work productivity is increased from 5,4 to 8 points, respectively 9 points per week for the following output.

TABLE VI. MANAGER'S CORRECTIVE ACTIONS IN SCENARIO 2

Manager´s Corrective Actions in Loss-making Project (Project-2)					
Project -2	***Output 1***	***Output 2***	***Output 3***	***Output 4***	***Output 5***
PV	20	20	20	20	20
PDY plan	5,4	5,4	5,4	5,4	5,4
EV1reality	30	10	10	30	20
PDY1reality	5,4	5,4	5,4	5,4	5,4
PDY2scenario	5,4	8	9	9	5,4
AC-points	22	33	55	11	0
AC-in EUR	20	30	50	10	0

Table VI also depicts the work with costs and keeping with the budget. The breakdown of the calculations used in the table is described below.
Budget at Completion (BAC) = 85 000 EUR
Estimate at Completion (EAC) = 110 000 EUR
1 point = EAC/total points for outputs
1 point = 110/100 = 1,1 point

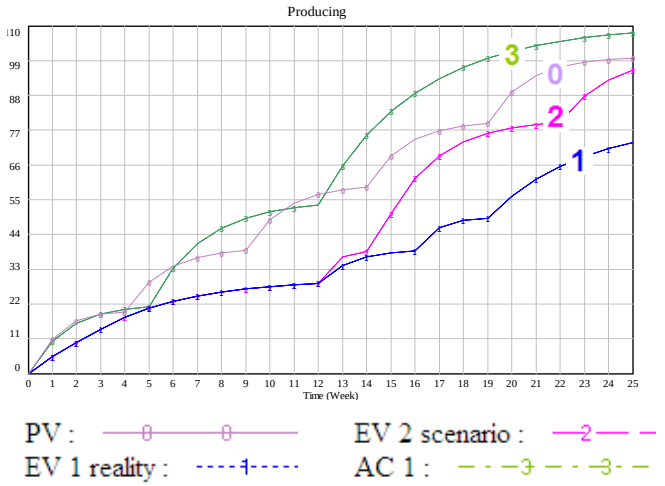

Fig. 9 Manager´s Action in 12th Project Week – Increasing Work Productivity for Project 2

Figure 9 shows what the manager´s decision-making process can look like in case s/he detected a failure to achieve the expected tasks in 12th week and suggested steps to increase the project work productivity. The graph (Figure 9) clearly shows the outputs execution in Project 2, which ranked as the worst in our evaluation. In case the manager had not intervened, the project would not have fulfilled the expectations, respectively would have gained only 73 points for its outputs, out of 100 possible points. Project manager´s actions are the aim and substance of our method serving for planning and subsequent revision of the course of the project with the objective to create effective actions that would help accomplish a successful project.

The Dynamic Iteration Method brings the advantage of depicting all three project constraints in one figure. We have achieved measurable and comparable results without complicated calculations of project complexity with respect to work hours spent on the project. The project is planned and its course monitored without designing a detailed time schedule of work that would otherwise be difficult to amend. Outputs are planned in advance and their accomplishment results in the completion of the project itself. In the pre-project phase of the project life cycle, the key outputs are planned for the whole project, the second and third project phases are thoroughly analysed to reflect their real fulfilment within the scope of the project. From the project initiation, the project team is familiar with division into outputs and exactly knows the overall project complexity. The plan was processed into an independent system dynamic model, contains similar elements and parameters as the project execution model. The plan is a comparison platform for monitoring the course of the project realization.

VI. CONCLUSIONS

Cultural events present specific projects whose organization often hides challenges difficult to anticipate and hard to solve. Project managers are in most cases unable to evaluate the impacts of their decisions well in advance.

Project modelling using the tools and methods of systems thinking and system dynamics helped us create a new, simple procedure for planning and monitoring the development of cultural projects. The method is based on the system dynamics and principles of project iterative development; therefore, we called it *The Dynamic Iteration Method*. Research in project teams first aimed to evaluate the success ranking of five completed projects. When evaluating the project's success ranking it was found out that the Dynamic Iteration Method can be useful also during the project execution. The project plan was designed to identify the project parameters in its three constraints: costs, scope and schedule. In order to measure the values of exogenous variables essential for the project, we have compiled a tri-set of research questions. Answers to these questions were then collected from thirty members from five project teams.

The new method is based on well-proven procedures according to the PMA [6] and is enhanced with competence model elements in compliance with the IPMA [5]. The method builds on a defined project objective and its quantification using the *Work Breakdown Structure*. Each key output was ranked by its expected completion and assigned points of its complexity. Each key output is modelled in a system dynamic model as an individual flow of remaining work in the project plan. Their detailed breakdown to work packages is accompanied by a detailed structure of points reflecting the key output´s level of complexity. The breakdown of key outputs to work packages may be successive according to the level of the project development. The project plan was enhanced with a set of behavioural competencies reflecting the team setup against project management according to these principles. Regular operative team meetings with a predetermined agenda evaluate the achievement of expected outputs and plan the fulfilment of other tasks based on what project phase the team is currently in. This monitors the real project fulfilment compared to the plan both from financial and factual points of view. Eventual delays in the project schedule are eliminated by actions of the project manager. The

manager decides on work productivity increase and utilization of the project budget. Rather than increasing work productivity primarily by pressure on competent and active team members, the outputs are delegated to increase productivity by involving more team members into the task completion. Output complexity then decreases with their chunking into smaller, simpler parts, in case the project allows this.

The system dynamic modelling is a method which may be creatively extended and modified by the project managers and project team members. Its advantage is in the possibility of processing exogenous variables that are capable of measuring planned and completed outputs as well as the financial resources spent in the project. Nevertheless, it even enables the modelling of worse measurable parameters corresponding with team members´ behavioural competencies. As it has been proved, these competencies may well be measured using questionnaire research or other creative methods. The system dynamic modelling is suitable for teams realizing projects with cultural event character or other projects based on human creativity and invention and whose outputs are inefficient to be modelled at the beginning of the project lifecycle. We are convinced that the Dynamic Iteration Method contributes to enhancing project management tools for monitoring projects development. The method is creative and after designing the project model is also easy to use. The Dynamic Iteration Method in its method of correcting project work procedures is similar to correcting a traveller´s route via GPS navigation.

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