MANAGEMENT SYSTEM FOR THE EXCHANGE OF EXEMPLARY PROJECTS OF CIVIL SERVANTS

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Abstract

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In the context of a "shift in understanding" of today's unprecedented opportunities, problems, and challenges for everyone, there is a change in thinking, understanding and explanation of the best digital transformations, literacyand competencies based on the adoption, alignment and integration of the achievements of various scientific disciplines and digital techn0logies in different areas of application and territories. The common goal, problem of our research is the promotion of sustainable development of arrow theory, innovative approaches, models and a pilot project as a practical means of their comprehensive verification. The main principle of arrow theory in natural language — People should not “run” after samples but vice versa, samples should “run” after people. One of the possible ways, solutions, is the implementation and use of a new object — an Exemplary double, the management of which will allow all interested parties to best personally manage the exchange of exemplary solutions and the end result of will be people armed with the best competencies of the 21st century in a timely manner. Exchange covers many different defined processes and events patterns, templates such as lifelong learning, joint sensing, measurement, collection, cleaning, processing, storage, visualization of information, evaluation, providing feedback based on the Real Time Analytics. The article presents an arrow approach to modeling an Exemplary double, the *conceptual i*dea, principles, the Metaphorical task register model and Management model of samples for project teams.The basic scientific disciplines of are mathematics, psychology, linguistics, lifelong learning, pedagogy, computer science, project management. The basic metaphor system for the Exemplary double is Exemplary companion (Fellow traveler, voyager) among Best First Search trajectories of digital transformations project groups. The main evaluation criterion is the degrees of use of innovative projectsforCivil servant’sproject teams.

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Introduction:-

The acceleration and spread of digital transformations (DT) and artificial intelligence technologies (AI) creates unprecedented opportunities, problems and challenges for everyone. Modeling the targeted development of mass learning in the era of DT, AI and unprecedented acceleration of changes at all levels in the digital and traditional worlds requires solving many complex scientific and practical problems, tasks, such as understanding and

explanation, adoptation, management, forecasting, control, evaluation, leadership, evolution or revolution, variability, complexity, scalability, property protection and confidentiality, reliability, elimination of uncertainty, compatibility, harmonization with existing official and actual standards, laws. In the conditions of the "shift of understanding" the current scientific and practical problem is the change of thinking and understanding and explanation based on the integration of scientific and technical achievements of various disciplines in various fields of application, territories.

The common goal, проблем of our research is the promoting sustainable development of arrow theory, innovative approaches, models and a pilot projectas a practical means of their comprehensive verification. One of the possible ways, solutions, is the introduction and application of a new object — an Exemplary double, the management of which will allow all interested parties to best personally manage the exchange of exemplary solutions and the end result of will be people armed with the best competencies of the 21st century in a timely manner. Exchange covers many differen defined processes and events patterns, templates such as lifelong learning, joint sensing, measurement, collection, cleaning, processing, storage, visualization of information, evaluation, providing feedback based on theReal Time Analytics.. Of particular importance is the exchange of questions and answers in order to improve the search for valuable information samples, patterns, insights, regularities. The criteria for selecting the target audience are mass appeal, social significance of the right decisions, high motivation and attitude towards improving leadership competence.The main principle of sustainable development of arrow theory in natural language — People should not "run" after samples but vice versa, samples should "run" after people. All arrow patterns are made as person-centered, metaphorical, known, practical as possible, and move in a timely manner with the best practices. The content of the main principle is revealed and interpreted by the of mathematized principles. The principle of "Duality". This is the famous mathematical principle of Duality (https://en.wikipedia.org/wiki/Duality_(mathematics: If there is an entity, then there is usually its double (and vice versa), which is represented in convenient forms. The construct Double is defined in a formalized dictionary with the meanings Contextual Double. Psychological, Mathematical Double, Metaphorical Double. Digital Double, Artificial Double, etc.

The article presents an arrow approach to modeling an Exemplary double. Content:**Arrow approach:**Background and knowledge gap, The problem, The *conceptual i*dea and principles, The Metaphorical task register model, The Management model of samples for project teams;**Results**;**Conclusion**;**References**: 60+.

Arrow approach:-

Background and knowledge gap:-

Common, fashionable concepts and objects in the era of increasingly rapid DT and advanced AI have many different definitions, meanings and explanations that dynamically change in different contexts from the perspective and perspectives of fundamental scientific disciplines. Moreover, this is a complex problem. For example, modern linguistics, having realized that the object of its research — language — is evolutionary, has an informational nature, and in the objective sense is a carrier of intelligence, faced a cardinal problem for itself: to realize and understand at the fundamental level the nature of the emergence and formation of connections between language and the natural and AI and vice versa (Shirokov, 2022).

Examples of fragments from our learning-oriented Glossary. One way people communicate with each other about their separate and different experiences in the world is by using figurative language to describe or understand one thing in terms of another. The three most common metaphorical systems that stakeholders use to describe their learning experiences are: "learning is construction," "learning is growth," and "learning is movement (Manak0[1], 2025)In psychology, **metaphor**: a figure of speech (figurative language) in which a word or phrase is applied to an object, person, or action that it does not literally denote (e.g., a life path) in order to create a strong, energetic, and powerful (forceful) analogy. **Conceptual metaphor**: a cognitive process that expresses and shapes new concepts, and without which new knowledge is impossible; iceberg metaphor: the notion that conscious events, like the proverbial tip of the iceberg, represent only a small and accessible aspect of a larger domain of unconscious psychological functioning. Although this metaphor is commonly attributed to Sigmund Freud, it appears nowhere in his published works (APA, 2018).**Arrow approach:**a systematic approach defined in the constructs of arrow patterns, , insights to improve understanding and use of the Best FIrst Search (**BFS**) method, problem-solving strategies; an analytical practice tool, approach in the form of arrow patterns for understanding and using BFS and problem-solving strategies. Different possible solutions are evaluated in terms of the state in which they are likely to be successful, and the path, trajectory, that is considered most promising is tried first. Different possible solutions

are made by a person taking into account reliable recommendations of the AI system and are evaluated according to established criteria. Our arrow approach is based on determinism as a fundamental assumption, empiricism as a basic directive, experimentation as a basic strategy, repetition, the necessary requirement of reliability, parsimony as its conservative value, and philosophical doubt as its guiding conscience. It is implemented step by step, combining adaptation and digital transformation of scientific and technical solutions with sustainable value addition using an adapted Agile approach. Agile: is a way of thinking and philosophy, which corresponds to a set of approaches (Scrum, Kanban, XP, Lean) and management methods. Agile methodology is a project management framework that breaks projects down into several dynamic phases, commonly known as sprints. The Agile framework is an iterative methodology. After every sprint, teams reflect and look back to see if there was anything that could be improved so they can adjust their strategy for the next sprint (Agile. 2025).

Reduction: rewriting an abstraction (intention, design) or its implementation (expression) into a simpler form; (complexity), transforming one problem into another; simplifying data to facilitate analysis; a technique for reducing the size of the state space that a model checking algorithm needs to search; reduction strategy, the use of rewriting systems to eliminate condensed expressions. The arrow **reduction** procedures are performed as a Defined procesess in the constructions of our theory.

Defined Process (DP): A process (Process, project area) that can be used step by step to achieve a defined aggregation (combinations, sets) of IGT objects (IGT: <IGT-content>, <I-content>, <G-content»); I-content: Content that defines one or more conceptual idea; T-content: Content that defines one or more I Tasks; C-content: Content that defines one or more goals. **Step**: Structure of work process tasks such as Regulations, Automated conversion of structures, Testing and evaluation; Information processing, Real Time Analytics, Export-Import, Self-assessment, Interaction-communication; Visualization of patterns and clusters; Ensuring evolvability, interoperability, scalability, protection and confidentiality. A structure of activities that is defined to aggregate IGT objects. Explanation of the definition and understanding of the concept of "DP step": 1). Definition of one or more activity structures described within the established model; 2). Value chain in the organization; 3). Current best practice understanding of the essence of the steps: value adding and e-knowledge sharing network; 4). Establishment of a clear strategic framework that is implemented step by step. Example of the goal of building our system: Satisfied People with AI skills and competencies for lifelong learning, work, socialization. DP resources: guidance materials (rules, standards, methodology, strategy, best practices, guidelines); procedures, training, tools, services, methods; - role structure. Roles can be performed by a person and/or a machine (e.g. a service). The key conceptual understanding of the role structure is that a person is described and viewed as a virtual entity that can perform roles that are actually performed by a group, organizational units, organization as a whole, etc. The term organization is used in the sense of ISO standards. High-level roles in a certain hierarchy of roles are used in reference metadata sets to describe resources: Creator, Contributor, Publisher - an entity responsible for making a resource available in a given form. Examples of values: a person, an organization or a service. The performance of roles is improved on the basis of lifelong learning, acquired experience and critical thinking.

Process, project area: a set of related practices , entities that, when implemented together, satisfy a set of goals that are considered essential for improving and optimizing a process, project. Where practice: an activity (functions, work, operations) that contributes to the goals or outputs of a process, project or increases its capabilities; acquired experience, a set of skills, specific knowledge in a certain field of activity. A process, project area is also a means of grouping activities (inputs-outputs, works, activities, functions, operations, etc.) according to their contribution to the possibility, potential, maturity of the process, project. A area is a basic construct of the description <Y>: a set of related entities, events, practices that, when carried out together, satisfy a set of goals, tasks that are considered essential for improving something. An example of a practice: an activity (function, work, operation) that contributes to the goals (outputs, results) of a process or increases its capabilities; acquired experience, a set of skills, specific knowledge in a certain context. A area is a means of grouping and focusing activities, scenarios of events, options for arrow trajectories, inputs and outputs, works, activities, functions, operations, etc., in order to improve something and increase potential; this basic construct is an effective mechanism for focusing on improving the process, increasing the quality level of specific products, services.

Task: goal-oriented activity undertaken by an individual or a group. When such an activity is the subject of observation in an experimental setting (e.g., in problem-solving and decision-making studies), the researcher may set particular objectives and control and manipulate those objectives, stimuli, or possible responses, thus changing

task parameters to observe behavioral adjustments. See also *search* (APA, 2018). **Project:**A unique process consisting of a set of coordinated and controlled activities with start and end dates, performed to achieve a goal that meets specific requirements and that has limitations in terms of time, cost, and resources (Agile. 2025).

Examples of detailed descriptions of concepts: arrow theory (Manako, 2006); artificial intelligence (apolitical. 2025); assessment (ISO, 2023);. best first search, BFS (Koenig, 2004); concept (Goguen, 2005). consciousness, intelligence (Cleeremans, 2025), (Futurepedia, 2025) (Wrike, 2025), (Vieriu, 2025); best practice (Howard, 2019), (Lopes, 2024); deep learning (Mehta, 2024); digital transformation (Varlejs, (2016). IFLA (2018), (Gong, 2021, p. 10) , (Farrell, 2024), (Radu, 2024); Leadership(Fotso. (2021).), lifelong learning (SEC, 2000), (Nygren, 2019), (Webb. 2019); literacy and competencies (Council, 2018), (Fotso,2024), (OECD, 2022), (Vuorikari, 2022); mathematical object (Sharma, 2024); metadata (ISO 2025); metaphor (Cakhnyuk, 2019), (Pappas; 2023); modeling (EML. 2007), (Kritz, 2023), (Vieira, 2023); project, program (ISO, 2021), (Dawood, 2017), (Endres 2019); project management structures (ISO. 2023); project-based learning (Condliffe.2017), (Hart, 2019), (Howard, 2019), (PBLWork, 2025); psychological object (Brock, 2015); Real-Time Analytics, RTA (Chen, 2023); status quo (Haas, 2023). (Zuurmond, 2024). Verificatio (xVerify, 2025); vision paper (Hodgins, (2000). (See also https://dictionary.apa.org/; https://leadschool.in/school-owner/edtech-glossary/, https://leadschool.in/school-owner/edtech-glossary/; https://glossary.sil.org/term/l; https://dictionary.cambridge.org/ru/plus/; https://www.britannica.com/Science-Tech ; https://uis.unesco.org/en/glossary).

In our arrow theory, "System for the manage exchange of exemplary DT using AI (*S)"* is an evolutionarily complex decision-making system, which is represented from the perspective of fundamental scientific disciplines in different natural languages, cultural environments and spaces. The key subsystems are Virtual Research Laboratories, Master classes learning and Trainings using situations and contexts simulators, as well as a Real Time Analytics of unique personal projects. The basic scientific disciplines of representation *S* are mathematics, psychology, linguistics, lifelong learning, pedagogy, computer science, project management. The mathematized representation of *S* is written as:

<*S*>=<<*S*mat><↔ ↕><*Si*nt>>,

<*S*mat> i <*Si*nt>: mathematized representation of *S a*nd its meaningful interpretations in the form of content aggregations; <> is the designation of the combination of what these brackets contain. A general example of a modeling construct <>: these are concepts, ideas; visualizations; arrow shapes: "→, or with the opposite direction ←"; a set <>, the brackets of which have the properties "existing, new, mixed. For example, not quite accurate or defined"; the arrow "person" has or may have a set of arrows, called an e-portfolio with the history and plans of the person's practices or experiences in time and space; "arrow content": structured information about the existing or imagined properties of the arrows, which is presented as an "Information Model"; at a higher level of abstraction, <S > is defined using a mathematical theory of categories, often called "arrow theory" and "arrow sets", which are described in the RDF language for presenting information about resources on the web (resource: something that can be identified by a URL). RDF conceptual idea: using sets of simple statements (subject, predicate, or object) about (a resource, a resource property, or a property value) to describe things.Thenotation $X \rightarrow Y$, where X, Y denote the ends of the arrow, expresses the relative presence of the properties of object X in the properties of object Y. In particular, that in the relations "form-content", "subject-object" from the old, progressive, successful has passed into the new or, conversely, during the life of the subject or from standards, etc. Examples of visual forms of the arrow object: straight, arc, dash-dotted, thick, colored, with sound. Examples of other interpretations of the arrow object: relation, reflection, Cartesiansquare., function, functor, operator, procedure, algorithm, process, event, activity, arrows from traffic rules, on the streets or from a monograph.

The basic constructs of the arrow representation, for example, are: representation in the form of triangles with arrows between the vertices. For example, Δ with the vertices <Stakeholder>, <Task>, <Metaphor>, and ideally all Δ are commutative., i.e., any result of traversing the vertices will be the same; □ square with arrows between the vertices. For example, with the vertices <Stakeholder>, <Task>, <Metaphor>, <AI>, and if any result of traversing the vertices will be the same, then this is a Cartesian square. Ideal case: all squares are Cartesian. Catastrophe: valuable squares are missing or not identified or not taken into account. If the Stakeholder makes a decision without AI, then this is described in the Escalator by a triangle, and if with AI, then by a square.

The arrow ↔ denotes the transition from one representation (state) to another at a given level of abstraction (intention, design) or its implementation (expression of design), manifestation (the implementation of the design becomes available to users) and instances of manifestation - just like a unique personal project. The arrow ↕ denotes the transition between these representation s in the directionAbstraction-Implementation and vice versa
The arrow ↔ ↕ denotes proposed method of horizontal and vertical reduction procedures. These procedures are performed as a Defined procesess in the constructions of our theory.
In the arrow theory at the highest level of abstraction, the axiomatic method of formalization is used to construct <Smat>, and the rules of inference and logic are explicitly introduced. Viewing S as a certain type of mathematical category expands the possibilities of the modeling method, gives a unified view of the concept of a model. Note that there is a certain selection of approaches for the axiomatization of the minimal formalized structure and construction "category". In particular, in the work of (Hatcher, 1968), a simple approach was proposed, the essence of which is to replace category objects with single arrows, i.e. all individuals (predicate letters) are recognized as arrows (in contrast to approaches in which two types of variables are introduced: one for objects, and the other for category arrows).

The first steps of our Strategy (long-term action plan) for solving the above problems and sustainable development of our arrow theory, innovative approaches, models and a pilot project:

- Data analysis models of the subject's lifelong learning consisting of: a general model, inheritance models and a Task Register in order to improve the understanding of the properties and qualities of ways, patterns and making informed decisions by stakeholders based on the toolkit of data analysis of the subject's learning using an management system (Manako, 2024);
- Paradigmatic model of understanding and using artificial intelligence in lifelong learning" consisting of a model of learning metaphors and artificial intelligence, a model of paradigms of academician V.M. Glushkov and psychology (Behaviorism (Body, Mind); Information processing and cognitive psychology; Individual constructivism; Social constructivism and situational learning), model of "Action. Task Register" (Manako1, 2025);
- One of the ways, methods, and means of promoting sustainable development of stakeholderss is our "System for the manage exchange of exemplary DT using AI (*S)*" (Manako2, 2025), (Manako3, 2025). The best strategy, long-term plan is the balanced implementation of personally-centric projects with the support of a powerful ecosystem and scientific and educational infrastructure of management systems, including: the evolutionary, RTA on the sustainable development of projects, patterns, insights, regularities; Complex system *S* contened of Virtual laboratories with Virtual schools, Master classes learntng and training with smart Simulators of environments, situations, scenarios, procedures, which are sustainably improved on the basis of existing packages of international and national guidance documents, laws, and standards.

The paper (Manako3, 2025) describes the formulation of the hypothesis, the *conceptual i*dea, categories of arrow criteria for the evaluation models, the general statement of the problem, arrow strategy for problem solving, arrow principles. Metafor arrow Escalator task register model and indicators of pilot project scope.Figure 1 showthe simple visualization example ehe metaphor of an escalator in the form of an Euler spiral (Levien, 2008), various visualizations that represent and explain the trends of the impact of rapid change on a stakeholder, group and in general in different status quos, from different points of view and perspectives. But there is no ability or means to timely consider, evaluate, monitor, and predict personal best trajectories.

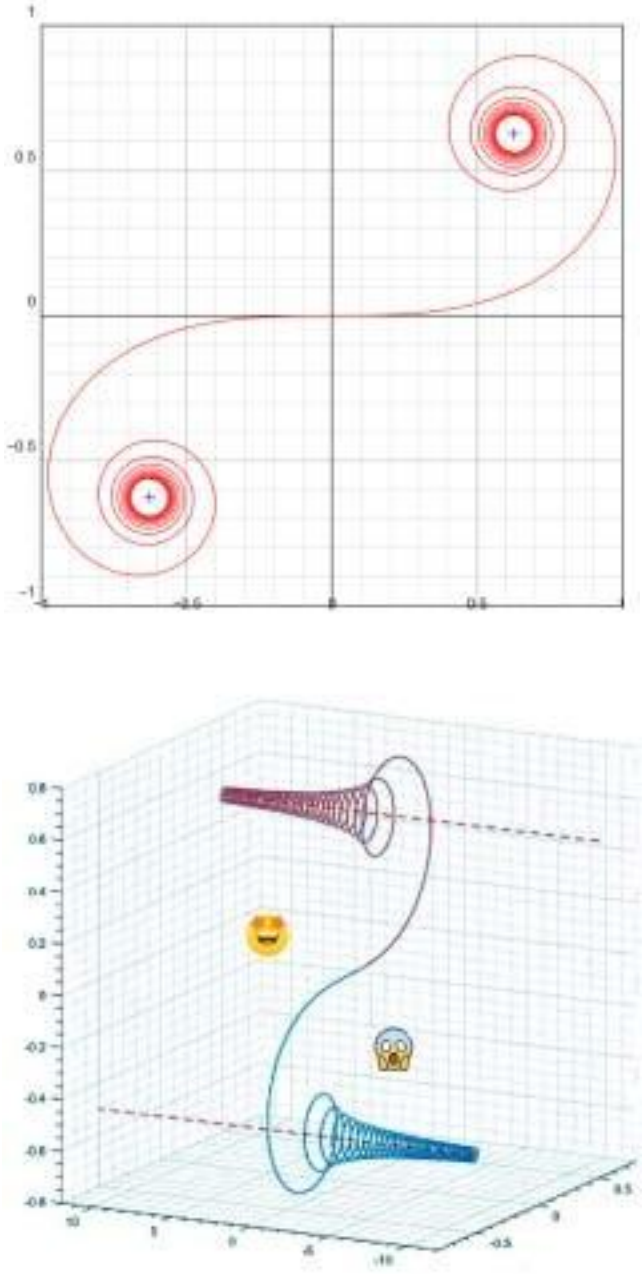

Figure 1 Euler spiral visualizations

Figure 2 showthe more complex examples of visualizations in the form of Chinese dragons, images of which have been part of Chinese culture since ancient times. The skins of various dragons represent the evolution of the Escalator and consist of basic constructs, i.e., triangles, squares.

Figure 2.Chinese dragon visualizations (https://en.wikipedia.org/wiki/Chinese_dragon).

The dragon scales are different commutative triangles or Cartesian squares of arrows. Examples of vertices: points in the digital, learning and innovation space; points in the conceptual and physical (visual) spaces; in the conceptual internal and external user space.

Despite significant achievements and potential in basic sciences, DT and their applications, there is still no comprehensive solution to these problems for each stakeholder from different points of view, perspectives and contexts. Among them are such as conceptual uncertainty even in verbal form, for all and each participant: the evolutionary set of competencies of the 21st century; a scaled personal strategy for managing digital transformation; timely alignment of the impact of current and perceived changes; and contexts and a number of similar ones. These issues are complicated by the fact that their separate, local solution at each step of vertical and horizontal reduction generates a number of complex new problems. Therefore, there is a need to formulate a generalized representation

of the set of technologically implemented S and an effective and as universal as possible toolkit for their construction, starting from a higher level of abstraction.

"We all have a skills gap, all the time.
When new knowledge is created at a rate faster than workers can learn it, a shortage results, no matter what the subject matter. This is not a problem that we need to fix. The skills gap is a ubiquitous characteristic of life in the future we envision, because everyone will have needs for new technology(and other) skills. Creating support for lifelong learning in a variety of forms is imperative to successfully addressing this fact". (Hodgins, 2000).

Research question: "How can we best overcome this barrier and knowledge gap?"

The problem:-

Example of arrow sets <*S*>: arrows from the monograph [22—23] and its foreign-language editions; arrows from textbooks; arrows on the streets or at traffic rules courses; concepts, their forms and content; a means of constructing successful scenarios for the development of educational events, options, trajectories, measures to improve skills, communications "Stakeholder is an object"; artificial neuron, deep machine learning neural network, a set of a AI educational tools or services "arrow is an educational unit": didactic method, step, situation, resource, measurement, stimulus, reaction, experience of practices, result, educational task, test (question, answer), exam, stage, change, section of educational space or environment, lesson, triangle teacher-stakeholder-class, square, polygon, pyramid, pattern, function, taxonomy, forecast, input-output, means of survival or not (catastrophe); a means of improving life or not.

General Model *S* is written as: <*S*> = << Metaphor>< Paradigm>>, where: <> — denotes a set of arrows. Metaphor of knowledge gap**:**

"In order for a person to be able to grasp mentally; understand even a single word (=<Exemplary Double>, ED), the entire language as a whole (= all ED representations of <*S*>; <<EDmath><↔ ↕><EDint>> all its relationships must already be embedded in him" (Wilhelm von Humboldt).

Metaphorical representation of the <Paradigm> system. Metaphors of learning" [28—30]. One way people communicate with each other about their separate and different experiences in the world is by using figurative language to describe or understand one thing from the perspective of another thing. The three most common metaphorical systems that students use to describe their learning experiences are: "learning is construction", "learning is growth", and "learning is movement".

Infinite or finite set of arrows for ED? An example of an answer is the Löwenheim-Skolem theorem — any consistent first-order theory that has an uncountable model also has a countable model. This is a statement from model theory: if a set of sentences in a countable first-order language has an infinite model, then it has a countable model. That is, this means that an infinite set of arrows <*S*> has a countable set of arrows — a mode l<*S*> that contains all the information (Kolmogorov,1987) about the infinite set of arrows <*S*>. An example of understanding concepts**. Information**, in its most general sense, is a measure of the heterogeneity and distribution of matter and energy in space and time, a measure of the changes that accompany all processes occurring in the world (Glushkov, 1964). **Information** available to a computing machine consists of some data about reality — such data that are considered relevant to the task at hand and from which, as is assumed, the desired result can be obtained (Virt, 1985),**Information:** 1. knowledge about facts or ideas gained through investigation, experience, or practice; 2. in information theory, a message that reduces uncertainty; that is, information tells us something we do not already know. The bit is the common unit of information in information theory (APA, 2018); **Metadata:** data about data or information that describes other information; the difference between data and metadata is not absolute and arises mainly from their application — the same resource can be interpreted as both data and metadata (Norris, 2003), (IEEE, 2020).

The problemformulation: How purposefully to improve representations of a DT and L21 way, path, a trajectory for everyone?

The hypothesis formulation: The status quo S has a basic arrow metaphor. The mathematical metaphor we have developed is simple – it is the " <Exemplary Double >, EDthe promotion of of sustainable development of unique human-centric projects", which represents the individual trajectories of project participants relative to the

established planned results and tasks. It is defined in the mathematical constructs of our arrow theory (Cartesian square, commutative arrow triangle) and ensures the implementation of the BFS exemplary solution in practice.

The *conceptual i*dea and principles:-

What do we see in the context of DT and L21? Example:

> "A classic and historical problem in most approaches to education and training has been to understand learning as something complete in itself, as an activity that is designed and learned independently of the learner and, most importantly, independently of the entire system within which it operates.… There is a shift from education and training to knowledge management …The future isn't just happening to us any more; we make decisions every day that determine what decisions we will be able to make tomorrow … None of us is as smart as all of us - That's good, because the problems we face are too complex to be solved by any one person or any one discipline". (Hodgins, 2000).

Within the framework of our arrow theory, the conceptual idea is proposed: <Exemplary Double >, ED of sustainable development of unique human-centric projects is a personal decision-making system.Constructive properties of representations of VLE, ED systems:

1. A VLE, ED are represented by a stack of fundamental arrow elements – projects DT and L21in a problemathical, metaphorical and innovational spaces.
2. A VLE system instance includes all ED system instances (and vice versa), each of which has all the information about the entire system based on Real Time Analytics.
3. The promotion of sustainable development of ED is carried out on the basis of arrow principles, criteria and a common arrow Strategy.
4. VLE, ED systems function in the form ofadaptive virtual organizations.
5. The metaphor of VLE, ED is the arrow Exemplarycompanion, which is represented by aggregations of commutative triangles, Cartesian squares in a problemathical, metaphorical and innovational spaces.

The main principle of VLE, ED is formulated in verbal form: It is not the subject that "runs after exemplary DT, L21 and AI " but on the contrary – they should run after the client, the user". All arrow patterns VLE, EDare made as person-centered, metaphorical, known, practical as possible, and move in a timely manner with the best practices. The content of the main principle is revealed and interpreted by the following arrow principles.

The "MiniMax" principle. This is the principle of unity of close and distant goals sustainable development of *VLE, ED*. It is practically implemented by the method of integrating the results of horizontal and vertical reduction method according to rules such as: Minimal options are implemented top-down, starting from the maximum; And vice versa, Maximum options are implemented bottom-up, starting from the minimum. Given the acceleration of DT and their impact on change, it is advisable to update projects in real time.

The principle of "Personal-centricity": The minimum unit of projects is a unique personal project of each participant in a joint project; AI is an additional reliable means of survival and sustainable development. The decision is made by a person. All arrow patterns are timely made as personally-centric, metaphorical, known, practical as possible and timely "run" after individuals with best practices, samples.

The principle of "BFS based on best practices". An example of a verbal definition of**Best FIrst Search, BFS**: an process or arrow strategy based on best practices in which various possible paths to a solution are evaluated in terms of the likelihood that they will prove successful and the path judged most promising is attempted first; a search algorithm that works according to a certain rule and uses a priority queue and heuristic search. It is ideally suited for computers to estimate the appropriate and shortest path through a maze of possibilities.An example of a mathematized definition of BFS in constructs of arrow theory: a search algorithm on a graph whose edges are arrows. **Search**: the process or task by which the Doubles attempts to find the correct answer or best solution from among a range of alternatives in a problemathical, metaphorical and innovational spaces by arrow ctrategy the systematic evaluation of status quo or states. **Heuristic search**: a mental process of the search through a problemathical, metaphorical and innovational spaces that is optimized by the use of arrow Strategies that reduce the number of possible paths to a solution that need to be attempted. Examples of approaches to the search: backtrack search, depth-first search, breadth-first search.

The principle of "Duality". This is the famous mathematical principle of Duality (https://en.wikipedia.org/wiki/Duality_(mathematics): If there is an entity, then there is usually its double (and vice versa), which is represented in convenient forms. The construct Double is defined in a formalized dictionary with the meanings: Contextual. Digital, Mathematical, Metaphorical. Artificial, Psychological, etc.

The principle of "Partial understanding". If something is not defined, then it refers to something more generalized.

The Metaphorical Task Register Model (MTRM):0

The basic Task Register model is defined as follows:

<MTRM> = <<S>< MS ><PROC>< PS >< CR >>,

<*S*> = << Metaphor>< Paradigm>>

MS— the metaphoricalrepresentation associated with S;

PS—the representation of the statement associated with S;

PROC — the procedure (operator, algorithm, process, etc.) that calculates the value of PSand can be performed (calculated) by a person or automatically by a device;

CR — the criterion associated with the task.

Solving the task means determining the procedure PROC that calculates PS and satisfies the criterion CR. If a set of PROC procedures is created, it turns into a task of selecting a PROC or a set of procedures with <PROC> according to the criteria CR. Example CR: selection of an seach algorithm for calculating the extremum of a certain objective function or quality function. The definition and use of additional structures for PS objects and their elements provides many opportunities to define and describe various classes of tasks in the MTRM, as well as to interpret them in an appropriate way. Example.*CR*, Levels of assessment of sets of sections: experimental set; controlled set; exemplary set (proven, optimized, best practice); changes (innovations) of the process are managed; the process is optimized. Process improvement indicator (IND): a discrete measure (degree) of process improvement in a predefined set of process areas, in which all goals from the set are achieved. To determine the IND, it is necessary to establish the appropriate CR criteria and sets of areas. Let the following IND gradations and names be established: IND1 — experimental. IND2 — controlled, IND3 — typified, IND4 — predicted; IND5 — exemplary (proven, optimized).

Model of representation n of the MTRM as aninput—output, a decision—making system".

< MTRM> = <Δ>=<<MScon>< MSint><MSext>> (**con**ceptual,**int**ernal,**ext**ernal):

<<metaphor generator>↔↕ < Δ> ↔↕ <metaphorreceiver >>

<Δ>(commutative triangles): defined process area of cycles:

<<DT>↔↕ <visualization> ↔↕ < assessment>>;

<**DT**> – a set of current or planned projects; narrowing down sets of events such as observations, adaptation, creation of new variables, functions from existing variables, or calculation of a set of summary statistics, decision-making, feedback;

<**assessment**>– a representation of actions or events of making a judgment about something; assessment. threats. achievements and progress.

<**visualization**>: 1. a defined process of providing answers (reactions, to questions (stimuli) or new questions about projects in convenient visual forms; 2. an interactive metaphorical dashboards, a metaphorical object constructed using defined templates of actions and events– a user interface based on predefined flows of measured data and data exchange, to which the end user can apply filters and graphical display methods to improve (understand, optimize) activities (functions, works, operations) to achieve set goals (results, outputs) and which is suitable for regular use with minimal training. Explanation of dashboards in a virtual laboratory: this is a user interface of a specific process <monitoring>, designed for long—term tracking by users of various indicators related to distributed processing of registry units and their structural elements; the user interface of the <communication> process, designed to document interactions between users, in particular, provides for adding, processing, storing, filtering comments (explanations) to registry entries, creating and providing messages (corrective actions). Examples of explanation of the essence of <visualization>, the use of which contributes to the definition and assessment of sustainable development, the impact of changes, since various images, animations, videos are easier and better understood by end users intuitively or logically than verbal or mathematical descriptions in the context of basic disciplines.

The Management model of samples for project teams:-

Research question: How to better identify and manage of samples for project teams?

An example of presenting examples of competencies. Let <Sc> be all combinations of competences that are known to project teams in the current status quo S. Then the competence space <Sc> = << Sc1 >< Sc2 >… < Sci >>, i = 1, 2, , n. Each Ssi has its own discrete scale of various metrics, such as a partially or linearly ordered set of values. The order of these values is determined by a certain class of relations, events such as is-part-of; has-part, is-based-on; is-basis-for, requires; is-required-by. Competencies are then defined in the form of <Sc> → Sci based on current best practices, guidance materials, standards and laws, which are also rapidly changing.

An example of presenting instances of project teams (pt). Let's define the manifestation (representation) S, the resources of which were or can be accessed by end users. The starting manifestation of S is usually determined

taking into account the established context of S, in particular, scope, goals, etc. Let Spt(k) be the description of entities (objects, processes, components) of k manifestations of S. Then the next manifestation of Spt(k+1) is defined as follows:

<Spt(k)> = << Spt1 >< Spt2 >… < Spti >>, *i = 1, 2,…*, m*(k).;* <Spt(k)>→ Spt (k+1)i;

<Spt(k)>ij → Spt (k+1), i = 1, 2, … *m(k)*, j = 1, 2, … *e(k)*}

where: Spt(k+1)i is a representation of the i-entity of (k+1) manifestation; Spt(k)ij is the representation of j-manifestation i of entity in (k) manifestation S; → dreflection (the process of forming a description). All entities with Spt(k+1)i representations are integrated, i.e., inherited in (k+1) manifestations of S. An example of entity definition is processes, people, virtual organizations that are used to represent a specific service. The implementation of entity with its access points to the service is called a component of the integration process S.

An example of the process of inheritance of the input-output system, decision-making < S> = << Spt><STpt>>, STpt is a set of problems associated with Spt. If the pairs (<< Spt><STpt>>, ≤), where ≤ is a relation of partial order, satisfy the conditions of reflectivity, transitivity and antisymmetric, then the set X ⊆< S> is "inherited" if it is closed during the movement "up" with respect to ≤, that is, if x ∈ X and x ≤ y imply that y ∈ X.

Sample management in < S> is carried out to achieve the multiple goals of various project teams. A certain goal is considered achieved if a certain set of problems (tasks) Z associated with it is solved. Then, to define a strategy (long-term plan) for sustainable development S, it is appropriate to mathematically represent it in the form of hierarchical structures, which may not be the best in a certain context or situation, but the crucial thing is that they are much easier for people to understand and use. The **idea**: to define and use an evolutionary Stack Register S. Examples of stacks: innovative, unexplored or obsolete designs, long-term or short-term project teams. Let {O, Z} be the set of stacks S, where {O} is the set of objects S, and {Z} is the set of tasks S. If we analyze examples of problems S, then their typical components are the following processes, events:

a) For a given set of problems Z* with {Z}, construct the entire set of objects O* that are necessary and sufficient to solve Z*. Mathematical definition using the inference operator (a procedure called a fuzzy inference system):

$$B \subseteq Z \rightarrow B^{+} = \{o \in O \mid (o, z) \subseteq (O, Z, P) \ \forall \ m \in B\} \qquad (1)$$

This derivation operator is computed to establish a correspondence between a set of problems B and the set of all objects from O that are necessary and sufficient to solve B;

b) For a given set of objects O+, compute the set of all problems Z that are common to O+. Mathematical definition using the derivation operator:

$$A \subseteq O \rightarrow A^{+} = \{z \in Z \mid (o, z) \subseteq (O, Z) \ \forall \ o \in A\} \qquad (2)$$

This derivation operator is computed to establish a correspondence between a set of objects A and the set of all tasks associated with each object A. Applying the derivation operators (1)—(2) twice, i.e. A++, and vice versa, i.e. B++, allows us to compute the closure of the operators (1)—(3) on {O, Z}. The concept of stacks on {O, Z} is the pair (A, B), where (1)—(2) on{O, *Z}*. The concept of stacks on {O, Z} is the pair (A, B), where $A \subseteq O$, $B \subseteq Z$ iA^{+}= B, B^{+}= A. Between the concepts (A, B) on {O, Z}, ≤ -subconcept-superconcept relations with partial hierarchical order are established:

$$(A1, B1) \leq (A2, B2) \Leftrightarrow A1 \subseteq A2 \ (\Leftrightarrow B2 \subseteq B1) \qquad (3)$$

The set of all stacks on {O, Z}, which are ordered by the relation (3) subconcept–superconcept in lattice theory is called a lattice of concepts.Thus, the application of concept lattices on a certain complex of concepts S in the form of an evolutionary Register of stacks S allows us to define the exchange of exemplary projects of civil servants in the form of a hierarchy of combinations of objects and tasks S.

RESULTS:-

"We all have a skills gap, all the time.

When new knowledge is created at a rate faster than workers can learn it, a shortage results, no matter what the subject matter. This is not a problem that we need to fix. The skills gap is a ubiquitous characteristic of life in the future we envision, because everyone will have needs for new technology(and other) skills. Creating support for lifelong learning in a variety of forms is imperative to successfully addressing this fact". (Hodgins, 2000).

How purposefully to improve DT and lifelong learning for mass project teams in conditions of multilingualism, multidisciplinary, cultural diversity and the impact of increasingly rapid changeat all levels? — In the context of a "shift in understanding" of today's unprecedented opportunities, problems, and challenges for everyone, there is a change in thinking, understanding and explanation of the best DT, literacy and competencies based on the adoption, aligment and integration of the achievements of various scientific disciplines and digital techn0logies in different areas of application and territories. One of the possible ways, solutions, is the introduction and application of a new evolutionary object — the Exemplary double, the management of which will allow all interested parties to best personally manage the exchange of exemplary solutions and the end result of will be people armed with the best competencies of the 21st century in a timely manner.The main result of this research is defined of the evolutionary, science-based complex system and pilot project for Civil Servants teams from the point of view of basic disciplines (such as mathematics, psychology, digital pedagogy, lifelong learning, linguistics, computer science, project management). Proposed the arrow approach and basic arrow models starting from the highest level of abstraction to the level of engineering implementations. See detales: **Arrow approach**:-Background and knowledge gap, The problem, The *conceptual i*dea and principles, The Metaphorical task register model, The Management model of samples for project teams.

CONCLUSION:-

"None of us is as smart as all of us.' That's good, because the problems we face are too complex to be solved by any one person or any one discipline" (Hodgins, 2000).

The acceleration and spread of digital transformations (DT) and artificial intelligence technologies (AI) creates unprecedented opportunities, problems and challenges for everyone. Modeling the targeted development of mass lifelong learning in the era of DT, AI and in the digital and traditional worlds requires solving many complex scientific and practical problems, tasks, such as understanding and explanation, adoptation, management, forecasting, control, evaluation, leadership, evolution or revolution, variability, complexity, scalability, property protection and confidentiality, reliability, elimination of uncertainty, compatibility, harmonization with existing official and actual standards, laws. In the conditions of the "shift of understanding" the current scientific and practical problem is the change of thinking and understanding and explanation based on the integration of scientific and technical achievements of various disciplines in various fields of application, territories. In the context of a "shift in understanding" of today's unprecedented opportunities, problems, and challenges for everyone, there is a change in thinking, understanding and explanation of the best DT, digital literacy and competencies based on the adoption, aligment and integration of the achievements of various scientific disciplines and digital techn0logies in different areas of application and territories.

Our research is the promotion of sustainable development of arrow theory, innovative approaches, models and a pilot project as a practical means of their comprehensive verification. The overall goal, the problem of our evolutionary science-based project "Virtual Laboratory of Exemplary Double of lifelong Learning using AI for Civil Servants teams (VLEDL1)—How can we best promote the sustainable development of VLEDL1 in conditions of multilingualism, multidisciplinary, and cultural diversity and the impact of increasingly rapid change?Integrated VLEDL1 subsystems: Virtual laboratories of research, learning, training with simulators of situations and context, evolutionary Real Time Analytics on unique projects of persons. Each participant of VLEDL1 is a consumer and contributor, co-author of the entire project. We are interested in current research and projects with the participation of international parties, as well as involving project partners or experts in psychology, project management, etc. in our Scientific Council.

How purposefully to improve DT and lifelong learning for mass project teams for Civil Servants teams under conditions unprecedented acceleration of changes at all levels?One of the possible ways, solutions, is the introduction and application of a new object, complex system — the Exemplary Double of project teams (ED), the management of which will allow all interested parties to best personally manage the exchange of exemplary solutions and the end result of will be people armed with the best competencies of the 21st century in a timely manner. Exchange covers many differen defined processes and events patterns, templates such as lifelong learning, joint sensing, measurement, collection, cleaning, processing, storage, visualization of information, evaluation, providing feedback based on the Real Time Analytics. The presents an arrow approach to modeling ED, the conceptual idea, principles, the Metaphorical task register model and Management model of samples for project teams.

Within the framework of arrow theory, is proposed the conceptual idea of personal decision-making system <ED>, for sustainable development of unique human-centric projects. The main principle of arrow theory in natural language — People should not "run" after samples but vice versa, samples should "run" after people. Constructive properties of Virtual Laboratories of Exemplary exchange (VLE) and ED systems:

1. A VLE, ED are represented by a stack of fundamental arrow elements – projects DT and lifelong learning in a problemathical, metaphorical and innovational spaces.
2. A VLE system instance includes all ED system instances (and vice versa), each of which has all the information about the entire system based on Real Time Analytics.
3. The promotion of sustainable development of ED is carried out on the basis of arrow principles, criteria and a common arrow Strategy.
4. VLE, ED systems function in the form of adaptive virtual organizations.
5. The metaphor of VLE, ED is the arrow Exemplary companion, which is represented by aggregations of commutative triangles, Cartesian squares in a problemathical, metaphorical and innovational spaces.

The basic scientific disciplines of are mathematics, psychology, linguistics, lifelong learning, pedagogy, computer science, project management. The basic metaphor system for the Exemplary double is Exemplary companion (Fellow traveler, voyager) among Best FIrst Search trajectories of DT project groups. The main evaluation criterion is the degrees of use of innovative projects for DT project groups

The main steps, the goal of the current research and development: completion of the construction of user interface models and commissioning of the project website demonstrator for Civil servant project teams (vledl1.org).

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