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THE CONCEPT MODEL OF INFORMATION APPLICATION FOR ACTIONS IN SYSTEM

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Abstract

The author elaborates the concept, models, and methods of information application. The concept is based on system theoretic view of the actions of various type. It is shown in the article that the gap exists between the practical needs to solve problems of information application during systems functioning, based on mathematical models, which can predict results of information application analytically - from the one hand, and absence of needed mathematical models and modelling methods - from another hand. Author suggested the hypothesis of the research, which is: information application can be formalized using system and their results can be measured quantitatively based on concept and modelling methods suggested. Modelling method is based on graph-theoretic models of information application for actions in systems. Models' application illustrated by creation of models of information application in technological systems. Graph-theoretic models are created based on schemas of information application as informal meta-models. Based on such graph theoretic models, which depicts possible sequences of probable actions, information use, events, and states functional models of sates probabilities and characteristics created. Examples of such models are shown.

Keywords: Concept, model, ınformation, application, system

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1. Introduction

Existing process science methods (dos Santos Garcia et al., 2019) allows to build process traces and process models based on processes log-files (such as healthcare systems, telecommunication systems log-files). As a rule, these models are based on Petri nets or Markov Chains formalisms. These models can be used by researchers to enhance existing processes. Such enhancement further allows to achieve higher values of effects characteristics and may happen in various forms. It was shown that "the major ways to enhance processes are providing their flexibility" (Reichert & Weber, 2012, p. 486) and adaptability (Dekkers, 2017). Such enhancements may be "realized as purposeful changes through declarative, imperative, case handling, agent-based, aspect-oriented, variant approaches" (Oberhauser, 2015, p. 8) and other possible approaches to deliver and model adaptation and flexibility of processes. To describe adaptive, flexible processes, change mining from change logs suggested (Reichert & Weber, 2012). The models of such processes require new methods to build and use them. New flexible, adaptable workflow notations and new models developed to address such possible changes of workflows. Among them variability patterns were suggested based on BPMN stereotypes (Yousfi et al., 2016) and basic adaptation patterns using BPMN2 variants (Döhring et al., 2011). Unfortunately, such approaches are not sufficient because of "cause and effects of changes are not investigated and modelled as needed, especially in regard of information actions performed as causes and their material results manifested as effects" (Geyda & Fedorchenko, 2022, p.103). Such causes lead to information obtained or transmitted because of information actions of various kinds. The list of possible kinds of information actions and of information they produce is still subject for the discussion – for example, includes sensing (including monitoring, identifying, formulating), organizing (aligning, sourcing, combining), and restructuring (innovating, coordinating, facilitating) according to (Yu et al., 2022) or sensing, seizing, transforming according to other sources (Teece, 2007; Teece et al., 1997; Yeow et al., 2018). Other information actions kinds mentioned are,

> sensing, measuring, checking, monitoring, testing, identification, organizing, research, investigation, restructuring, transforming, intelligence, and predictions. Depending on information action kind such actions produce various kinds of information which may cause various kinds of potential change such as necessity, reasonability, or possibility of purposeful change. (Warner & Wäger, 2019, pp. 41-42)

Despite of differences in information actions kinds which is subject for further investigation, information actions have commonality, and it is potential purposeful change of various kinds because of various information obtained.

2. Problem Statement

Purposeful changes discussed are possible if alternatives for further actions in system exist to choose, so there is a variety of possible actions ways and modes, and information obtained allows to change conclusions about different alternatives quality expectation – in case this alternative chosen. As a result – variety of decisions, which can provide best quality shrinks – and estimated future efficiency of the process grows. The hypothesis of the research discussed is that such decisions variety can be modelled based on

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suggested diagrammatic and formal models of possible chains changes and then, measured by entropy of possible decisions, and quality of projected possible outcomes – by outcomes efficiency and possibility to actualize. The article describes such quantitative measures and models which can be used for measuring information application for actions in system. They differ from known models in that, purposeful changes of actions course reflected by models. Purposeful changes are realized based on approaches to deliver the adaptation. However, the role of information actions and information obtained by them for such mechanism's realization was not yet studied in needed details. Article suggests information application formalization for actions in systems. It explains adaptation and flexibility as forms of choosing one or some possible ways of action due to information obtained. As a result, corresponding possible outcomes chosen effectively in the form of predicted possible chains of states and events (as chosen actions results), among possible alternative chains of such states and events. Due to choosing some such chains among others,

> the entropy of possible events and states chains sequences variety shrinks, but it leads to a possible increase in quality of functioning because of better correspondence (to the changing conditions) of purposefully changed state characteristics in the chains of changes. Once possible purposeful changes are chosen among possible ones and fulfilled according to the approaches used, the events and states which happens may be recorded in the change logs. (Geyda & Fedorchenko, 2022, p. 103)

This makes it possible to design mining techniques for models of information application for actions in the form of purposeful changes of chains described. For such mining information application shall be schematized and then formalized.

The usual way of information application should be formalized with mathematical models use. Such formalization shall reflect cause-and-effect changing chains formation between information, activities, various events, and resulting states: "information action – information obtained – new possibilities discovered – choosing the way for change i.e., by using new possibilities – fulfilling the change chosen – checking the results – possible record in change log".

> Not all stages of these chains of cause-and-effect relationships between actions, events, and states are described in modern process-aware information systems and not all actions, states, and events are recorded in modern change logs. However, models of such chains of cause-and-effect relationships are required to solve many urgent practical problems, for example, of information technology design, systems digital transformation planning. As well, such chain description, actions, states, and events recording are required to build models of the described chains based on big data about chain elements and their relations to be collected in future. (Geyda & Fedorchenko, 2022, p. 104)

For example, such changes can be recorded in so-called change logs, or "information application actions, events, states logs". They "can help to automate the modelling of information application for actions in systems and to solve the mentioned practical problems" (Geyda & Fedorchenko, 2022, p. 104), based on the models built. But "such models, methods of their creation, use, automation, and software for using models of information application for action in systems have not yet developed as needed" (Geyda & Fedorchenko, 2022, p. 103). This leads to the known gap. It exists between the need to solve several urgent practical problems with the use of mathematical models and methods and mathematical models and

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methods ready for use to decide such problems. To overcome this gap, the author proposed schemas to model changing chains of cause – and effect relations of information, actions, states, and events and methods to measure such changing chains. Information application illustrated for systems, which functioning can be represented with networks, workflows, and diagrams.

3. Research Questions

The article is based on the review of the literature performed on digitalization, digital economy, and various types of organizations. A few thousand articles was reviewed as a result of recursive searches with the following major keywords: digital capability, digital platform, digital entrepreneurship, emerging systems, business value of IT, digitalisation capability, organisational capability, circular economy, digital capabilities, dynamic capabilities, sharing economy, action theory, network science, language-action approach, dark side of IT, real options, constructor theory of information, sustainable economy, emerging systems, system of systems, digital culture, action research, Industry 4.0, blockchain technologies, AI digitalisation, Labour digitalization, Digital innovation (Borges et al., 2021; Feldman, 2004; Zhang & Hartley, 2018).

As a result, theories, and mathematical formalisms we identified which are suitable for information use modelling in various systems activities. Major sources of publications on the theme considered.

> The systematic literature review on the problems of digitalization of the economy and society concluded that the new theoretical formal discipline of information application for actions in systems is urgent nowadays. This discipline shall incur using information for actions in systems mathematical modelling, big data about actions performed using the information of the various kind, and machine learning algorithms to build models of information application for actions in systems. (Geyda et al., 2022, p. 409)

Such models could be used to solve wide range of problems concerning information use for actions in systems and digital transformation of systems functioning. The author shown that:

> information technologies' role in system action is that - they allow to justify, predict, and then organize and implement various types of changes in actions of economic, social, and societal systems in general, whereas such need in change manifested. As a result, digital technologies make it possible to implement possible system activities changes or corresponding modes of functioning changes that were previously not implemented, impossible or not justified. (Geyda & Fedorchenko, 2022, p. 103)

> Models of information application allows,

> making progress in solving the various practical problems of the system activity organization and performing. In the future, based on concepts and models developed, it is possible to automatically implement new information technologies for better forecasts of system activities with better accuracy for longer planning horizons with digital technologies, such as but not limited to: big data, internet of things, and machine learning. Based on the conducted review, the authors concluded that the existing theoretical means of studying digital technologies for actions in systems (especially

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> mathematical models and methods for solving problems of such technologies used for actions in systems) are developed insufficiently well. (Geyda & Fedorchenko, 2022, p. 104)

4. Purpose of the Study

Within the theory of the information application for actions which is in its creation,

> theoretical means of studying digital technologies use in system action based on mathematical models and methods should be created. According to the review results, these tools, and the means of the theory of the information application for actions in systems could be based, among other theoretical tools, on the process science and the theory of activity. (Geyda & Fedorchenko, 2022, p. 103)

Within this theory, system actions are divided into a few classes. Its "effects execution actions and information actions. They differ in their goals: effects execution actions intended to obtain changes in substance and energy, and information actions designed to obtain information changes" (Geyda & Fedorchenko, 2022, p. 103).

> Effects execution action is an action made by humans, organized by humans, or – under their control to obtain material results demanded by humans. Such effects manifested due to the exchange of energy and substance according to human's desire, or/and under human's control, or/and according to human's plan performed. Such exchange shall be considered in time and space. (Geyda & Fedorchenko, 2022, p. 104)

According to the concept suggested, for such action to be executed and effects obtained, information of various kinds is required. Such information is required due to human actions' nature, which requires operation and/or exchange of various facets of reality reflections to conduct action successfully.

For the execution of actions to be success,

> humans need to be sure: to begin action with required objects of the required quality, which set in required relations with other objects of interest; to begin action in certain conditions, represented as requirements to descriptions and measurements of objects used in action, and to prescribe information required to act; to check states during action execution and their conformance to action prescriptions; to provide required impacts on objects and their relations during action fulfilment, according to checked states and relations of the objects used for action; to predict effects of action execution and their correspondence to requirements; to move effects received for the possible use in other actions or by other humans, through space and time. (Geyda & Fedorchenko, 2022, p. 104)

Requirements met with information processing during action execution. They,

> classify into three main classes: obtaining descriptive information about objects of action, about their relations, and characteristics, receiving, operating, and sending information from/to the information sources, using the information to provide required impacts on objects, and their relations during action fulfillment, described by this information. (Geyda & Fedorchenko, 2022, p. 104)

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Then, three kinds of information processing for the execution of action effects are distinguished. As a result, three kinds of information processing distinguished.

These information processing classifies as the processing of three kinds of information. They are descriptive, prescriptive, predictive information, and combinations of them.

> Predictive information processing differs because it does not necessarily produce information about particular action objects used for effects execution. It makes higher-level information. Predictive information is general information about why effects manifest and how – not only in specific action execution cases and with objects and information used for that. There could also be other higher-level types of processing information, which do not necessarily reflect the effects of actions. Such higher-level information processing is a kind of information processing for obtaining explanations, rules, peculiarities, and prediction of use of objects results formation, general laws of nature functioning, their descriptions, and so, predictions formation as of different actions fulfillment, different human requirements formation rules, as well as, probably, other levels of explanations. Such explanations formed as knowledge about different ways of human and nature activities and other phenomena' formation, their details, because of actions of humans and nature. (Geyda & Fedorchenko, 2022, p. 104)

5. Research Methods

Information processing at the time of effects execution actions can be determined in the time and as well, in the space. Various kinds of synchronization models were suggested. To represent sequences of actions, possible modes and possible realizations of actions flow diagrammatic models used.

In Figure 1 "effects execution action represented with rectangle in the center with ovals segments attached, which represents information processing parts of effects execution action and circle outside which represents the attached effects prediction information operation" (Geyda & Fedorchenko, 2022, p. 105):

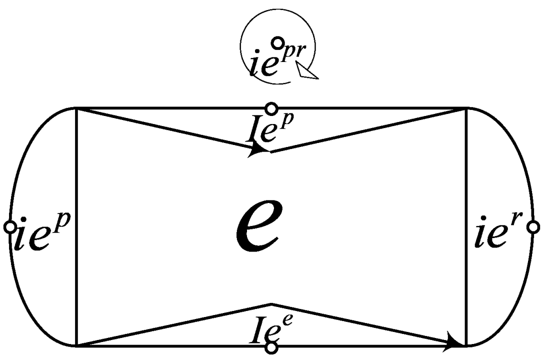

Figure 1. The effect execution action structure schema

ie^p −Execution prescriptions information (Ie^p) processing can be performed before the start of the execution process. This kind of information processing is shown as an oval part. Its result consumed during the action is shown as a triangle with direction toward action.

ie^r −effect execution monitoring and reporting information (Ie^e) processing can be performed after the finish of the execution process. This kind of information processing is shown as an oval part in the end

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of action. Its result (Ie^e) formed during the action and its end. Such result is shown as a triangle with direction outside action.

$e -$ effects execution action, between $ie^p$and ie^r; Information processing for executing action is required (Geyda & Fedorchenko, 2022) in the case when action is either new or it shall or could be changed at or after the action start.

ie^{pr} $-$effect execution prediction information (Ie^{pr}) processing can be performed at any time with or without effect execution action. This kind of information processing is shown as a circled arrow above effects execution action. This information processing can consume all kinds of information considered before. Its result can be consumed during any information processing considered before. If action is new, information about its various aspects shall be obtained to fulfill an effect execution action. If such information is already known and received before the action starts and is not subject to change, other information is unnecessary. If action shall or could be changed at its start information to fulfill an effect execution action still required, like in new action case.

As a result, information processing could be classified, based on information processing for effects execution actions classification suggested, as five main ways of information processing for effects execution action and their combinations for the first level of information use. Among these two information processing kinds are, in fact, information "in" processing and information "out" processing – i.e., information processing "on the border" with effect execution action objects. The other three kinds are descriptive, prescriptive, and predictive information processing. But descriptive information processing is related to sensing information processing because descriptive information could be obtained through sensing information processing and from other sources outside action considered, for example, through information exchange. Similarly, prescriptive information processing is related to actuating information processing because such information is used by actuators but can be processed not only by actuators. Thus, among three kinds of information processing for effects execution action, two caused by other two, related information processing on the border (Geyda & Fedorchenko, 2022).

The application of information in the case of effects execution actions is illustrated by the schema in Figure 2.

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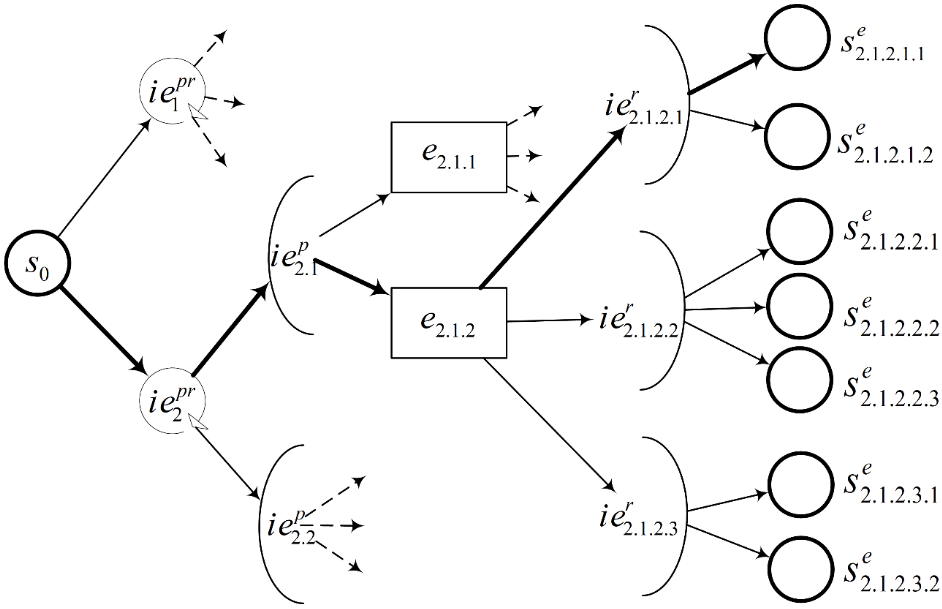

Figure 2. The application of information for effects execution action schema

In the Figure:

s_0 – given initial state of effects execution action.

$s_{2.1.2.1.1}^{e}$: $s_{2.1.2.3.2}^{e}$ – states, resulting from chains of information use for effect execution action. Transitions correspond to cause-and-effect relationships between actions parts of different kind and resulting states, corresponding to transition realization.

Chains of actions parts from start state to finish state corresponds to possible traces of information application for effect execution action.

Selected trace, which leads from s_0 to $s_{2.1.2.1.1}^{e}$ shown in bold.

In the Figure 3 the comparison of states illustrated. States obtained with information application for effects execution action and without it. The difference illustrated for the trace, selected in Figure 2.

When information used for effects execution action, "only subset of possible states can be realized, or – subset of states with probability distribution which differ from probability distribution of resulting states when information was not used. Probability distribution of resulting states due to information application parts ie of the action shall have lower entropy" (Geyda & Fedorchenko, 2022):

$$E(ie) \leq E;\ E(ie) = -\sum_{s_i(ie)\in S^e} p_i(ie) log p_i(ie). \quad (1)$$

Here:

$E(ie)$ –entropy of the set of possible states in the result of functioning in the case information application parts ie of the effects execution action applicated. It reflects possible changes of action states as a reaction to changes of system and its environment states during effect execution action. In this case effects execution action can change because of varying conditions and information application for effects execution action. The results of such changes are states which was possible before conditions changed but more preferrable than others in changing conditions.

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E −entropy of the set of possible states as the result of functioning of the effects execution action in the case information not applicated to change possible states of effect execution action. In this case no reactions possible if conditions changed during action execution. The difference between entropy $E(ie)$ and E, $\Delta(E)$ is that difference which caused by information application. But it is not the goal – to decrease entropy, but the mean, by which it is possible to reach the goal. The goal is – to increase measure of effects correspondence to requirements when conditions changed and so, mode of action could be corrected – to reach better correspondence of effects to the requirements in changing conditions. Thus, entropy may be considered as that "resource", which "used" to increase correspondence of effects to the requirements in changing conditions (Geyda & Fedorchenko, 2022).

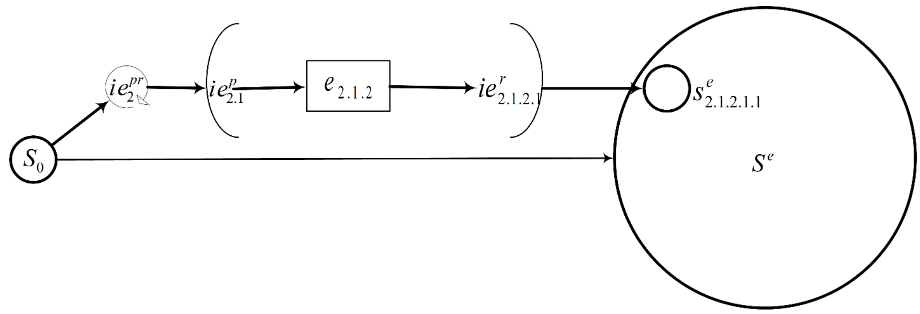

Figure 3. The comparison of states obtained with information application for effects execution action and without information use

The goal of such use is "to decrease measure of correspondence $\mu(e, ie)$ of execution action effects $w(e, ie)$ to their requirements $r(e, ie)$. We consider both effects and requirements as probabilistic values and as functions of time, i.e., as $\hat{w}(e, ie, t)$ and $\hat{r}(e, ie, t)$. Then, such measure of correspondence can be defined as" (Geyda & Fedorchenko, 2022):

$$\mu(e, ie) = Poss\big(\hat{w}(e, ie, t) \sim \hat{r}(e, ie, t)\big). \tag{2}$$

Here, ~ means one or any combination of the relation signs: $\{<, \leq, >, \geq, =\}$.

Thus, application of information results in the system of following changes:

$$\Omega(e, ie) = \{\mu(e, ie), \Delta E(e, ie)\}. \tag{3}$$

The third information processing kind, predictive information processing, ie^{pr} differs from the four kinds considered above. It is information processing of (meta-),ie^{M} level, $ie^{pr} \in ie^{M}$ as the author described earlier. Such information processing may use information of all possible kinds and probably, information from outside of the system, to synthesize foresight information to predict future effects. Predictive information can be further used to synthesize new descriptive and prescriptive information and to synthesize new descriptive and prescriptive information for corresponding information processing. Like with other information processing cases, such information can be used in case action changes or could be changed. (Geyda & Fedorchenko, 2022, p. 107)

We show that "such possibility with an external circled arrow which may connect each information processing kind. Information processing ie^{M} of meta- level kind may lead to various results. One of them is expanding set of possible states S^e obtained because of effect execution action. Such expansion is

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possible, for example, due to changes in possible action modes, changed technological possibilities, changed natural laws and mechanisms used for performing possible action modes. These new possible outcomes of effects execution action results in new set of possible states $S_2^e(ie^M)$ because of ie^M, and it is overset of initial one (Geyda & Fedorchenko, 2022): $S_2^e(ie^M) \supseteq S_1^e$.

As a result of updated, because of conducted ie^M, information action part ie_2 for effects execution $e(ie_2)$, with the resulting set of possible states $S_2^e(ie^M)$ because of action $e(ie_2)$ is fulfilled.

The result of action $e(ie_2)$ is the state $s(ie_2)$ or the set of states $S(ie_2)$ with upgraded probability distribution $F_{S(ie_2)}(s)$on the set specified. Because of $S_2^e(ie^M) \supseteq S_1^e$:

$$E(ie_2) \leq E_1;\ E(ie_2) = -\sum_{s_i(ie_2)\in S_2^e} p_i(ie_2) \log p_i(ie_2). \quad (4)$$

So, again, “the information application for actions in systems results in decreasing entropy. Now, by enlarging set of possible outcomes. But, again, such decrease is not a goal, but it is mean or “resource” which is possible to use to obtain the system of possible changes as the reaction to changing conditions” (Geyda & Fedorchenko, 2022):

$$\Omega(ie_2) = \{\mu\big(e(ie_2), ie(ie_2)\big), \Delta E\big(e(ie_2), ie(ie_2)\big)\}. \quad (5)$$

Depending on the results of the classified information processing results (i.e., information of various kinds), required if action is new, or changed mode, or could be changed after particular action with certain mode starts, the action will result in different effects. Further, various correspondence of that effects to the changing demands will manifest differently. But this correspondence is required to obtain the needed quality of the action. Thus, the quality of effect execution action depends on entropy: the effect execution action of necessary condition, changed as a reaction due to changed environment, changed action objects, changed characteristics, or changed relations between objects as well as due to changed goal. As a result, dependences of the $\Omega(ie)$ kind, constructed with use of mathematical models, opens the road to choose characteristics of information operations $ie -$ for example, during digital transformation. Models for building $\Omega(ie)$ shall describe a series of effect execution action possible changes, chains of such changes due to different information processing results. Such chains of possible changes and their characteristics could be modeled as effect execution – information actions chains (Geyda et al., 2022).

6. Findings

As a result of the findings and results obtained, information actions and execution effects actions can be modeled as sequences of dependent actions. This is done with construct of port: “port is the element of action schema with the required information, or substance/energy exchanged between objects inside and outside the port. Information and material ports are possible” (Geyda et al., 2022, p. 411). The concept of the information port concept illustrated by the schema in Figure 4. At the schema, the predictive information processing (i^{pr}) “connects information ports of various kinds. Such connection made because predictive information processing generally requires all kinds of information about information action used, and its results can be sent as a result to each information port” (Geyda et al., 2022, p. 411).

Example of the schema, created from the smaller ones to schematize one of the possible information applications for actions is shown in Figure 5.

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Schema shows three information actions designated i^{env}, i^{sys}, i^{pres}.

i^{env} – is the information action to monitor events in the environment.

i^{sys} – is the information action to monitor events at the system.

The results of these two information actions sent to further information action, i^{pres} repeatedly, synchronized with synchronization Syn part.

i^{pres} – is the information action intended for generating prescriptions for the further use by system actions.

This "information action generates prescriptive information for effects execution action, e, which can be complex. Information about effects of e is further used by i^{sys} with the use of some synchronization to ensure current effects execution action results at each moment of synchronization used to generate further prescriptions" (Geyda et al., 2022, p. 411).

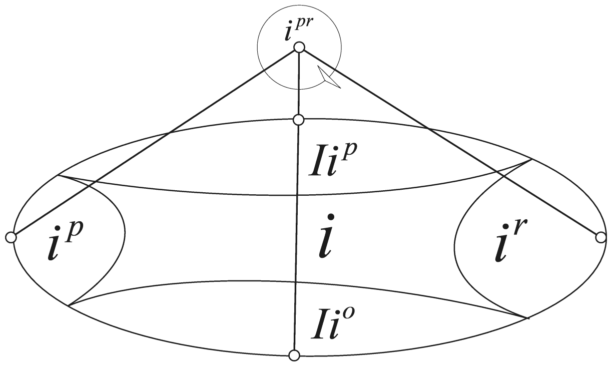

Figure 4. Information action with ports and exchanges schema

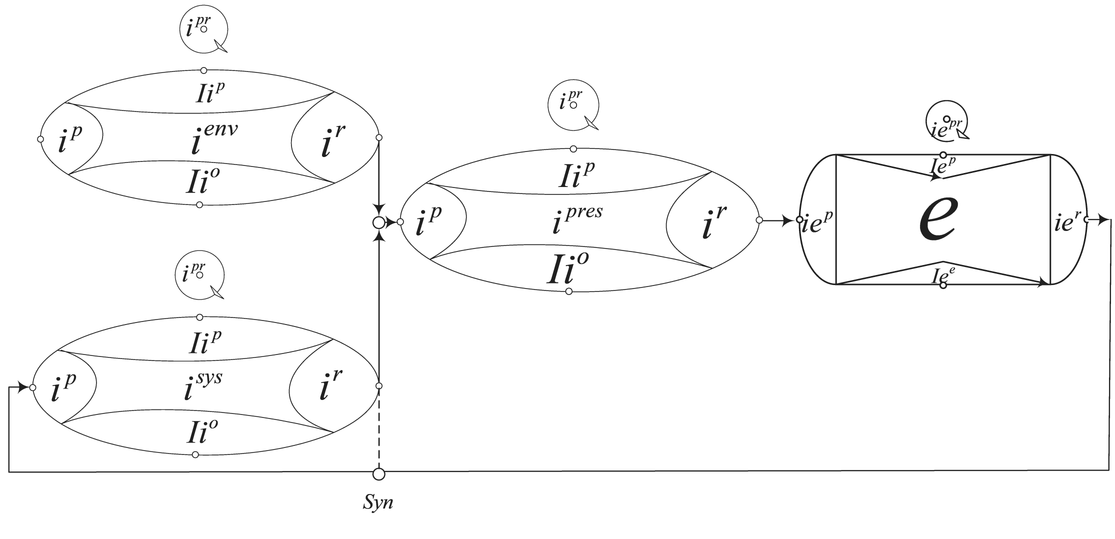

Figure 5. Example of the Schema of the Information Application for Actions

The series of chains of information and other operations of various orders cause larger changes, because of this kind of changes is characterized by addition of changes over sequences of cause-and effect relationships in chains of changes. The entropy of states formed due to possible realization of three actions, ie_1, ie_2, e:

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$$E(ie_1, ie_2, e) = -\sum_{c_h \in Tr(ie_1, ie_2, e)} p_h(ie_1, ie_2, e) \log p_h(ie_1, ie_2, e), \quad (6)$$

$$p_h(ie_1, ie_2, e) = p_i(ie_1) p_j(ie_2; ie_1) p_k(e; ie_2, ie_1). \quad (7)$$

Here, $ie_1, ie_2, e -$ chain of actions.

$Tr(ie_1, ie_2, e) -$ tree of possible states due to chain of actions ie_1, ie_2, e.

$p_h(ie_1, ie_2, e) -$ possibility of $h -$ th possible chain c_h of states: $s_i(ie_1), s_j(ie_1, ie_2), s_k(ie_1, ie_2, e)$.

$s_i(ie_1) - i -$ th possible event of certain outcome of ie_1.

$s_j(ie_1, ie_2) -$ j—th possible event of certain outcomes of the chain (ie_1, ie_2).

$s_k(ie_1, ie_2, e) -$ k—th possible event of certain outcomes of the chain (ie_1, ie_2, e).

Let $\mu(c_h, t_s) -$ the measure of effects corresponding to the changing requirements under condition chain c_h of states $s_i(ie_1), s_j(ie_1, ie_2), s_k(ie_1, ie_2, e)$ were realized, thus, vector $\widehat{w}(c_h, T_z)$ of effects obtained under condition that vector $\hat{r}(c_h, t_s)$ of requirements was demanded at appropriate moments of time synchronization $T_z \in [T^s, T^f]$ according model of synchronization used, from moment T^s of the modelling start to moment T^f of modelling finish. Then it can be measured as:

$$\mu(c_h, t_s) = Poss\big(\widehat{w}(c_h, T_z) \sim \hat{r}(c_h, T_z)\big), \quad (8)$$

where ~ means one or complex of relations from $\{<, \leq, =, >, \geq\}$.

Models built allows to specify system of discrete probabilistic measures on sequences of states $c_h \in Tr\big(N(ie, e)\big)$, where $N(ie, e)$ —network of alternative actions, describing cases of possible sequences of actions. Algorithm A_T of $Tr\big(N(ie, e)\big)$ construction based on $N(ie, e)$ can be found in works (Geyda et al., 2022). System of measures, which describes system S functioning and entropy changes during functioning can be suggested in the form:

$$\Omega(S) = \left\{\mu\left(Tr\big(N_{a(ie,e)}\big)\right), P\left(Tr\big(N_{a(ie,e)}\big)\right), E\left(Tr\big(N_{a(ie,e)}\big)\right), a \in A\right\}, \quad (9)$$

where $a \in A -$ index of possible realizations of alternative stochastic networks $N_a(ie, e)$, $P\left(Tr\big(N_{a(ie,e)}\big)\right) -$ discrete distribution of probabilities $p(c_h)$ of chains of possible states c_h actualization. This system of measures further allows to estimate various indicators of system and IT application quality and to solve problems of system functioning enhancement and digital transformation planning.

7. Conclusion

The concept and models of information application for actions were suggested in the article. The hypothesis of the research is that information application for actions can be formalized and measured quantitatively based on concept suggested. For this reason, the article describes diagrammatic and formal models as well as quantitative measures which can be used for measuring information application for actions in system. They differ from known models in that, purposeful changes of actions course reflected by models in the form of possible changing chains. No demands to changing chain's structure or probabilistic measures used made yet, which make it possible for future research to consider new or existing modelling formalisms variants, like purposefully changeable probabilistic finite state machines,

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purposefully changeable Markov chains or purposefully changeable Petri nets. Then methods, formats and standards to record such purposefully changed chains of cause-and-effect relations in change logs can be suggested in the future works. Decision of appropriate problems which arise in information technologies application, information actions characteristics decision making, and systems behaviour characteristics justification when information application for actions considered are now possible based on system - theoretic models and methods suggested.

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