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Safe Interaction of Technocratic Societies Through Standardy Ensemble of Intellectual Virtual Agents

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Abstract: Humanity, as far as possible, must to act ahead of schedule, predict the possible dangers that may arise when introducing technologies using artificial intelligence. Experts say this today. Hazards are technological, legal, legal and ethical. New technologies pose both technical and ethical challenges. Experts express various approaches to the principles of establishing responsibility for the actions of artificial intelligence: the responsibility of a particular subject - a manufacturer, developer, owner, user, expert or programmer. Human ingenuity and the desire for perfection, combined with the capabilities of new technologies, can solve the problems of mankind. Standardization of artificial intelligence can ensure security solutions. ISO focuses on standards relevant to the information and communication technology (ICT) industry. International Standards Association is focused on reaching out to government and industry in all of the locations around the world where its governance meetings are held. ISO pioneered work on standards related to ethically aligned design, this area is still in its infancy. The integration of AI enabled technologies in the daily lives of ordinary people is rapidly increasing. An appropriate standard could provide consumers with a reasonable level of comfort and assurance that AI has been developed conforming to ethical principals that protect their rights, e.g. privacy, transparency, and inclusiveness. 99 percent of people don't know how standards make modern society work. Standardization professionals, as well as those that understand the profession and its impact, are only one percent of the population. General population 99 percent expect everything to work, often with little interest in the details. They only notice when it does not work, and then it's a manufacturer or a government that are held to task when this happens (not standards). Standards are mostly voluntary, with the ones that governments adopt become regulatory. By driving greater informed choice for consumers, there is heightened competition between developers and companies to gain market share in new areas so everything just works. Standardization in these areas will ensure that. If there is truly one percent that are aware of the impact, then this is indication of the huge responsibility that standards professionals have to benefit humanity to ensure everything works. The importance of standards to the work and careers of ICT practitioners continues to motivate the content of new innovative standardization. Russia recently formed an AI standardization committee to become involved in existing international AI work at the ISO.

Keywords: Technocratic Societies, High-Tech Synergies, Intelligent Interoperable Agents, Utility and Preference Criteria

1. Introduction

The main engine for the development of mankind is the change of technology, which, in turn, causes a change in the way of communication. The type of society is largely determined by its dominant type of communication. Modern futurologists predict the onset of high-tech interaction between technocratic societies. In fact, this is a new type of civilization, which is characterized by accelerated automation and computerization of production and management processes, new technical systems for obtaining, processing, transmitting and storing information, intellectualizing production activities, informatization of all spheres of public life, improving the quality of life, dividing the social structure into various societies. Due to the increasing role of knowledge, information and communication, such societies are called technocratic. The nature of human work is acquired by a technocratic way, based on telecommunications, which allows to identify certain patterns from large sets, to obtain optimal solutions from various alternatives. All of them make it possible to put in place intuitive judgments algorithms that can be embodied in a computer program.

Intelligent technologies are becoming the main tool for managing organizations and enterprises. Standardization of electronic-communicative development and intellectual technologies will help technocratic societies form high-tech technocratic civilization.

Technocracy is a society in which power belongs to scientific and technical managers who are well versed in pressing problems and are able to use the achievements of science and technology for the benefit of the whole society. Technocrats believe that the state should fully control all spheres of social and economic life of the country. Proponents of technocracy consider it the most impartial and rational form of government, in which society does not waste its strength on the inter-party struggle for power. Currently, in education, we can talk about the complete victory of technocracy with artificial intelligence. Artificial intelligence was created to allow people and machines to work together and change the world for the better.

Artificial intelligence has important advantages over humans: impartiality and comprehensiveness. Artificial intelligence does not have a conflict of interest, so the decisions made will be regulatory fair. As computing power grows, artificial intelligence will be able to take more factors into account and predict more scenarios, improving the quality of its work and providing better results for more people.

Microsoft has set itself an ambitious goal - to democratize artificial intelligence and make technology, which is now considered the privilege of a limited circle of voters, accessible to everyone. Microsoft creates powerful supercomputer based on artificial intelligence technologies in the world, and with the help of cloud technologies we provide everyone with access to it in order to maximize its power to solve problems related to artificial intelligence at all levels. Intelligent virtual agents can now obtain more information using self-learning algorithms. This was a breakthrough for virtual assistant developers. Artificial intelligence experts train intelligent virtual agents to see, hear, predict, learn, and act. For example, the Cortana Intelligence Suite service is used in a wide variety of industries: economics, healthcare, medicine and agriculture, and it is used by companies such as Ecolab, Schneider Electric and Rolls-Royce. If the augmented reality device HoloLens be combined with Azure's cognitive abilities and with preference system, as in Pinterest, then thanks to machine learning and HoloLens, you can create house layout project and immediately order suitable building materials.

For the efficient operation of services based on artificial intelligence technology, higher-level components have been developed. Microsoft has placed many programmable gate arrays (Field-Programmable Gate Arrays, FPGA) in the Azure cloud that can communicate directly with networks. FPGAs are programmable hardware that not only increase speed and productivity, but also provide the necessary flexibility. Azure cloud technologies have become only the basis for the world's first supercomputer based on artificial intelligence technologies. At the moment, Microsoft has a global cloud infrastructure of huge scale, which we continue to develop in a number of areas, including performance, scalability and upgrading of the most advanced services that execute scenarios that could not even be imagined before. The safety of new scenarios can ensure the standardization of artificial intelligence.

Standardization of safe interaction of technocratic societies through intellectual virtual agents is productively facilitated to high-tech synergies of technocratic societies [1-27]. The author of the article proposes standard case ‘Application of ensemble intelligent interoperable agents’ for safe interaction of technocratic societies through intellectual virtual agents.

2. Synergies of Interaction of High-tech Technocratic Societies

The overwhelming structural crisis of the world financial and economic system raises the question of a technocratic model for managing economic and social development. The experience of the formation of the modern economy in different countries of the world shows that success is achieved where technocracy plays a prominent role in the decision-making system, where an optimal relationship arises between financial success-oriented management (entrepreneurs) and technocrats. This kind of optimum seems necessary for the development of a knowledge-based economy - the economy of the 21st century.

Technocracy should be considered in modern conditions as a social economic phenomenon. Technocracy is already involved in making decisions in the field of industrial and economic development, ensuring the health of the nation, environmental problems, defense issues, etc. Technocracy successfully confronts as liberal fundamentalism. The true modern technocrat measures any decisions related to the development of certain knowledge-intensive industries with potential ecological, climatic and biomedical consequences due to the gigantic size and complexity of the technosphere created by man. The combination of scientific, engineering and environmental knowledge, on the one hand, and the understanding of the laws of the development of society, on the other, is another distinguishing feature of modern true technocracy.

The example of a technocratic approach to solving many complex problems in the United States was the large interdisciplinary research organization RAND Corporation, which works on both national security and purely civil issues. The principles and specific methods of operations research and system analysis (analysis of complex systems) were developed precisely in RAND and in the last 30-40 years have become widespread in many countries.

The basis of the technocratic strategy is the scientific justification of effective management. For technocrats, the main role in a technocratic society is played by technology, as well as scientific knowledge in the management of

production and socio-economic processes, as well as the importance of scientific and technological progress for the development of modern society as a whole. The main hopes are placed on science, high technology and technology.

Information processing and very important decision-making play an increasingly important role from year to year. The creation of a centralized database, taking into account all the risk factors, not only for one industry, but also for the whole state, as well as the world, is the closest future.

All the troubles of the current capitalist system are that it can no longer qualitatively process all information and use it. Too much of it and no human strength is enough to add the overall picture from individual pieces of mosaic. The transition to a new management system based on a comprehensive information collection and processing system is already a reality. Without such a system, the future can no longer be imagined.

The growth of large companies in the field of IT has long been noticeable in the market. When the influence of such IT corporations in a single country grows to 30% or more, high-tech technocratic societies are formed. Their innovative potential should be seen as multidimensional productive and economic international activities.

In high-tech technocratic societies, problems of effective implementation or management arise because the necessary tools for managing their multidimensional nature are not yet developed. Therefore, multidimensional high-tech technocratic societies come to interact. The interaction of multidimensional high-tech technocratic societies requires tools to effectively manage their interactions. The article suggests using ensemble of intelligent virtual agents to synergistically manage their multidimensional interaction.

3. Ensembles of Intelligent Interoperable Agents

Ensembles of intelligent interoperable agents are the focus of distributed artificial intelligence of multiagent systems. The technology of multi-agent systems, although it has more than a decade of active development, is still in the process of being developed. Active research is under way in the field of theoretical foundations of formalization of basic concepts and components of systems.

The current section of the article discusses a creative ensemble for solving one problem by several intelligent interoperable agents. The task is divided into several subtasks, which are distributed among the agents. Another area of consideration is to provide interaction between agents when one agent may generate a request to another agent to transmit some data or perform certain actions. And also ensure the ability to transfer knowledge. For example, social processes in which each of the agents performs its function in a subject area represented as a set of agents, then independent tasks can be performed by different agents when control and responsibility for the actions performed are distributed among the agents.

Agents in creative ensembles are parts of a single system and solve subtasks of one common task. However, the agent cannot work outside the system. It is believed that one agent has only a partial view of the global problem, which means that he can solve only some part of the overall problem. Therefore, in order to solve the difficult task, it is necessary to create some set of agents and organize effective interaction between them, which will allow build a single creative ensemble of intelligent interoperable agents. The efficient interaction of intelligent interoperable agents provides a smart interface.

Ensemble is a complex of intelligent interoperable agents interacting through a smart interface, implementing either technological process, social services, multi-inter- trans-disciplinary research, or production cycle. The scheme of ensemble with smart interface is shown in Figure 1.

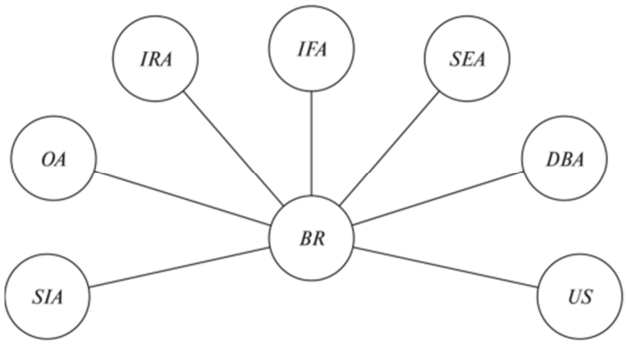

Figure 1. *Ensemble Scheme with Smart Interface.*

In the ensemble of intelligent interoperable agents, the whole range of tasks by certain rules is distributed among all agents. Job allocation means assigning each agent a role whose complexity is determined by the agent's capabilities.

To organize the task distribution process, the creative ensemble creates either a distributed problem solution system or decentralized artificial intelligence. In the first version, the process of decomposition of the global problem and the inverse process of composition of the found solutions takes place under the control of some single "center." At the same time, the creative ensemble is designed strictly from top to bottom, based on the roles defined for the agents and the results of dividing the global task into subtasks. In the case of decentralized artificial intelligence, task distribution occurs during agent interaction and is synergistic. Synergy of creative ensembles with man is formed in production and social sphere [8-19].

The safety of systems with artificial intelligence is relevant for smart factories, cafes, services, vehicles, agro-industrial complex and defense industry of high-tech technocratic societies [1-27].

Modern artificial intelligence methods (neural networks, machine learning) and science cannot explain how a trained system makes a decision. Because of this, the price of error in the areas: transport, medicine, defense, etc. Artificial

intelligence specialists configure artificial neural networks using coefficients in the process of their training with formalized data to obtain the necessary result. For the safe use of an artificial neural network, it is necessary to determine the range of changes in the attributes of the input data.

In order to apply artificial intelligence safely everywhere, it is necessary to standardize the use of artificial intelligence.

Consider briefly the approach to national standardization of the safe use of artificial intelligence by category: classification 1.11.022-1.021.19 "GOST R. Intelligent data processing technologies" and by case: A. 111 Application of Strong Artificial Intelligence - "ISO/IEC JTC 1/SC 42/WG 4 NO 254 TR 24030 working draft v10" – iso [26-27].

Must enter the term and definition intellectual ensemble:
intelligent ensemble - complex of compatible intelligent systems interacting through an intelligent interface, implementing either a technological process, social services, multidisciplinary interdisciplinary research, or a production cycle.

It is necessary to add types of classification diversification and mobility in 1.11.022-1.021.19 "GOST R. Intelligent data processing technologies, Classification", Section 5.3 Association of Classification Types with AI Life Cycle Stages:
diversification - expanding the functions of artificial intelligence and mastering a new type of functionality in order to increase the efficiency, quality and functional diversity of the intellectual system;
mobility - the ability of the ensemble of intellectual agents to quickly functional retraining and the development of its intelligence.

Definitions diversification and mobility align with life cycle definitions and life cycle model.

Life cycle - development of a system, products, service, project or other human-made entity from design to write-off.

Life cycle model - the structural basis of life cycle processes and actions, which also serves as a common reference for linking and understanding.

Images and numbers are used as simulation data. The environment is perceived through images and scenes. Scenes consist of a number of images. Scenes are static (paintings) and dynamic. Dynamic scenes are characterized by patterns of behavior of objects and objects. The patterns are either described by formulas or presented in a graph (numerical way). The safety of behavior depends on spatial, temporal, subject, visual and sound sensitivity. Behavior security is ensured within the boundaries of image similarity in a safe environment.

Modeling shows that the development of behavioral skills (mobility) and professional skills (diversification) increases the sensitivity of environmental perception, reduces risks, and increases safety.

Define the basic concepts:
artificial intelligence - the ability of the system to acquire, process, apply and diversify knowledge based on previous experience in solving specific problems related to the processing of data attributes and the mobility of an intelligent system.
attributes of data - objects, objects, materials, things, processes, the phenomena and other aspects of the physical world have various properties and characteristics.

Properties are represented by qualitative attributes. Characteristics appear to be meaningful attributes. The qualitative attribute can be visual or sound. The meaningful attribute may be represented by a number, a language sense, a visual or sound image, a mathematical or behavioral action, or an algorithm. Meaningful qualitative attributes are big clever data of artificial intelligence.

Big Smart Data (Big SD) is collection of qualitative and quantitative attributes associated in time, space, and subject area.

The attributes of smart data (numbers and images) form an idea of the world. Big SD attributes of the fields of economics, industrial industries, technologies and professions help to build and train artificial neural multilayer artificial intelligence networks for managing, making decisions and making recommendations to specialists and managers. Applied research modeling helps to accumulate Big SD scientific attributes in real time and simultaneously use them to deeply train multilayer artificial neural networks of intelligent modeling management agents, make decisions, and make recommendations to researchers. By modeling, the optimal (equilibrium safe) state of artificial neural networks of intelligent agents and the limits of attribute values relative to this state are determined. Numeric attribute values define numeric limits. For visual and sound images, limits of similarity to the optimal image are revealed.

Safety standards of artificial intelligence should also ensure reliable control of the conservation of nature and the ecology of living spaces by used industrial technologies.

For the safe synergistic interaction of multidimensional high-tech technocratic societies, standard case "Application of ensemble of intelligent interoperable agents" has been developed through the ensembles of intelligent virtual agents [8].

4. Standard Case Application of Ensemble of Intelligent Interoperable Agents

Standard case Application of ensemble of intelligent interoperable agents defines parameters, characteristics, methods, and other attributes of intelligent virtual agent interaction (Table 1 - Table 7). Intelligent virtual agent interaction uses categorical method of utility and preference [25].

Table 1. *General.*

Use case name	**Application of ensemble of intelligent interoperable agents**			
Application domain	Hi-Tech Labor Market			
Deployment model	Human digital double			
Status	Results of research: Strong Artificial Distributed Intelligence			
Scope	Economic and technical sectors and social services			
Objective (s)	Find accurate and universal application of strong artificial distributed intelligence			
Narrative	Short description (not more than 150 words)	Ensemble is complex of intelligent interoperable agents interacting through smart interface, implementing either technological process, social services, multi-inter- trans-disciplinary research, or production cycle.		
	Complete description	Ensemble is complex of intelligent interoperable agents interacting through smart interface, implementing either technological process, social services, multi-inter- trans-disciplinary research, or production cycle. In the creative ensemble, the whole range of tasks by certain rules is distributed among all agents. Job allocation means assigning each agent a role whose complexity is determined by the agent's capabilities. To organize the task distribution process, the creative ensemble creates either a distributed problem solution system or decentralized artificial intelligence. In the first version, the process of decomposition of the global problem and the inverse process of composition of the found solutions takes place under the control of some single "center." At the same time, the creative ensemble is designed strictly from top to bottom, based on the roles defined for the agents and the results of dividing the global task into subtasks. In the case of decentralized artificial intelligence, task distribution occurs during agent interaction and is synergistic.		
Stakeholders	Highly technological producer			
Stakeholders' assets, values	Reputation			
System's threats and vulnerabilities	Legal and ethical aspects of interaction with society.			
Key performance indicators (KPIs)	ID	Name	Description	Reference to mentioned use case objectives
	1	AI management of professional cooperation process	The technology of creative processes control can itself predict optimal terms of execution of certain stages on the basis of accumulated information about their labour intensity, selection of the route of staff load and competences of employees. Optimize processes during their execution - automatic delegation of tasks taking into account the load of employees and their competences.	Improve accuracy
	2	Productivity and quality AI	Strong artificial intelligence works with fewer mistakes and is safer. Strong artificial improves the quality of life of man and society in daily concerns, as well as productivity in high-tech industry and production.	Improve efficiency
AI features	Task (s)	1. Safe interaction of technocratic societies. 2. Building high-tech synergies of technocratic societies.		
	Method (s)	Criterion method of utility and preference		
	Hardware	Supercomputer with Strong Artificial Distributed Intelligence		
	Topology	Distributed Modular Interconnect Topology		
	Terms and concepts used	technocratic societies, high-tech synergies, intelligent interoperable agents, utility and preference criteria.		
Standardization opportunities/ requirements	Strong artificial distributed intelligence requires process standardization, as does every human activity.			
Challenges and issues	Qualitatively new type of thinking not available to humans.			
Societal concerns	Description	Security and ethical and legal aspects		
	SDGs to be achieved	Universal approach to big data processing with smart cognitive systems		

Table 2. *Data.*

Data characteristics	
Description	Strong Artificial Distributed Intelligence Data
Source	Model and technology of Strong Artificial Distributed Intelligence
Type	Strong
Volume (size)	Hi-Tech Labor Market
Velocity (e.g. real time)	Supercomputering Velocity
Variety (multiple datasets)	streams of multiple datasets
Variability (rate of change)	Retraining
Quality	High

Table 3. *Process scenario.*

Scenario conditions					
N.	**Scenario name**	**Scenario description**	**Triggering event**	**Pre-condition**	**Post-condition**
1	Training	Train a model (deep neural network) with training data set	Technological process raw data set is ready	Formatting of data	Management of safety
2	Evaluation	Expansion of the trained model	Development of technological thinking and behaviour	Cognitive thinking patterns and psychological behaviors	Meeting KPI requirements is condition of development
3	Execution	Model and Technology Tooling	Interaction	Activization of Model	Completion of interaction
4	Retraining	Retrain a model with training data set	Certain period of time has passed since the last training/ retraining	Additional data and knowledge	Combining Data and Knowledge

Table 4. *Training.*

Scenario name	**Training**				
Step No.	**Event**	**Name of process/Activity**	**Primary actor**	**Description of process/activity**	**Requirement**
1	Sample raw data set is ready	Specification and classification	Manufacturer	Transform sample raw data	Distributed AI Software
2	Completion of Step 1	Creating Set of Experimental Data	Manufacturer	Development of set of experimental data through job modelling	Software of modelling
3	Completion of Step 2	Model training	AI solution provider	Train a model (deep neural network) with experimental data set created by Step 2	Big SD

Table 5. *Evaluation.*

Scenario name	**Evaluation**				
Step No.	**Event**	**Name of process/Activity**	**Primary actor**	**Description of process/activity**	**Requirement**
1	Completion of training/retraining	Research	Manufacturer	Train model (deep neural network) with experimental data set created	Big SD
2	Completion of Step 1	Identification	AI solution provider	Based on data, detect execution using a deep neural network trained in learning scenario	Big SD
3	Completion of Step 2	Evaluation	Manufacturer	Comparison of phase 2 results with human performance	Efficiency and quality
Input of evaluation		Productivity			
Output of evaluation		Efficiency and quality			

Table 6. *Execution.*

Scenario name	**Execution**				
Step No.	**Event**	**Name of process/Activity**	**Primary actor**	**Description of process/activity**	**Requirement**
1	Completion of comparison of modeling results with human performance	Research	Manufacturer	Development of a set of experimental data through job modelling	Quality
2	Completion of Step 1	Identification	Manufacturer	Based on modified data train model (deep neural network) with experimental data set created	Compatibility
Input of Execution		Modification			
Output of Execution		Compatibility			

Table 7. *Retraining.*

Scenario name	**Retraining**				
Step No.	**Event**	**Name of process/Activity**	**Primary actor**	**Description of process/activity**	**Requirement**
1	Certain period of time has passed since the last training/retraining	Research	Manufacturer	Additional data and knowledge	Completeness
2	Completion of Step 1	Experimental data set creation	Manufacturer	Combining Data and Knowledge Based on modified data train model (deep neural network) with experimental data set created	Compatibility
3	Completion of Step 2	Model training	AI solution provider	Comparison of phase 2 results with human performance	Efficiency and quality
Specification of retraining data		Retraining data set has to include recent data			

5. Conclusion

The scientific and technical sphere of activity really becomes dominant in consciousness, which determines thought processes, an explanation of all phenomena in life and the world around it. The term "technocracy" is generalized and serves as a way of determining the phenomena of modern society. This method is entrenched in thinking and distributed to other spheres of human life. Technocracy is an undeniable good for a successful modern society. The development of technocratic society is very relevant in the modern world, and influences the thinking of the younger generation. The value of highly technological development now, of course, is not disputed by anyone. Highly technological development forms technocratic societies. The emerging need for synergistic, efficient, and secure interaction between technocratic societies activates the development of intelligent tools, such as intelligent virtual agent ensembles. Ensembles of intellectual agents will be able to compare and choose opinions, images and outlooks on criterion of preference: either equivalent, or equivalent, or similar. Ensembles of intellectual agents will be able to use opinions, images and worldviews according to the criterion of utility for good. Ensembles of intellectual agents will be able to identify novelty in a recurring way according to the principle of opposite (optimal - not optimal; effective - not effective; dangerous - safe, etc.) method from nasty based on objective conditions based on communicative associative logic [25]. International standardization of the creation and use of intelligent agent ensembles will allow the production of secure intelligent systems with human cognitive abilities. Standardizing of intellectual instruments of interaction, in turn, accelerate the evolution of high-tech technocratic societies and form technocratic civilization.

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