



# Identification of National Research Priorities in AI: a Foresight Study

**Alexander Sokolov**

**Danil Yatskin**

**Olesia Maibakh**

Institute for Statistical Studies and Economics of Knowledge, HSE University  
UNESCO Chair on Future Studies

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# Foresight for National Research Agenda for AI

## Overall Objective of STI Policy in AI

- Create an effective system of R&D governance in AI
- 5% BERD on research in AI
- 15% BERD on research using AI



## Goals of AI Research Programme

- Increase research in AI
- Transparent allocation of budget R&D funding
- Focus resources on high priority research areas
- Create a system for reviewing research applications and assessing their effectiveness

## Role of Foresight

- Identifying structure and priorities of National AI Research Programme
- Building Agenda for the National Network of AI Research Centres

# Project Focus and Objectives

## OBJECTIVES

- Conduct a **comprehensive analysis** of the artificial intelligence (AI) field to identify growth points and potential scientific breakthroughs
- Assess the **demand for AI technologies** and their implementation potential
- Compile a **draft list of priority areas** and research problems

## SECTOR SPECIFICS

-  - High **dynamism** of the AI field
-  - High **speed** of implementation of research results into new products / services
-  - AI technological agendas in Russia and globally are very close
-  - The most important markets in AI are **still being shaped**

## PROJECT FOCUS

**Exploratory research** in AI focuses on discovering new knowledge, principles, and technologies that may lead to breakthrough in AI systems and expand their applications

**Basic research** provides the theoretical and methodological foundation for AI development, including new algorithms, models, architectures, and the study of the general principles underlying AI

*The fields of AI research reflect the most promising domains in the context of AI development.*



## Key tasks of Foresight

- Comprehensive analysis of AI field, choice of points of growth, potential breakthroughs
- Assessing demand for AI technologies and potential of their realization in Russia
- Creation of list of priority directions and research tasks

## Criteria for assessment of research fields

- Opportunity to obtain major scientific results / world-class breakthroughs
- Demand for AI for solving the most important socio-economic problems
- Availability of competent personnel
- Availability of appropriate infrastructure

**50+ key participants**

Science

Business

Government

# Foresight focuses on basic research

## AI products

- Creation of products on the basis of applied research
- Integration into business processes
- Set of requirements for technologies
- Acceptance of results of research

### Examples

- Chatbots
- Recommendation systems
- etc.

## Applied research

- Use of basic research for applied studies
- Expertise for satisfaction of business needs
- Set of research questions for exploratory studies

### Examples

- Creation of a multimodal model for medicine
- Adapting gpt4 for use on iPhone
- Training a model to create music based on user request

## Basic / Exploratory research

- Creation of basic AI technologies and algorithms
- Education and training of highly qualified specialists
- Creation of scientific schools and research teams

### Examples

- Creating a way to process multimodal data
- Elaboration of methods for reducing the dimensionality of a trained model
- Modeling diffusion processes for use in AI

**01**

**Text mining  
via iFORA:**  
global trends,  
frontiers,  
growth points

**02**

**In-depth  
interviews:**  
A\* scientists,  
business  
leaders and  
government

**03**

**Survey  
of leading  
researchers  
(H-index 7+)**

**04**

**Foresight  
sessions:**  
3 groups of  
research tasks  
+ regulation  
Integrated  
workshop

**05**

**Final survey  
for validation  
of most  
promising  
research tasks**





# AI Development Landscape Mapping

BASED ON INTERNATIONAL RESEARCH ARTICLES

Circle icons – separate topics

Size of circular icons and labels is proportional to the importance of topics

Autonomous control

Optimization algorithms, swarm intelligence

Promising methods and technologies

Natural language processing

Image synthesis

Speech recognition and synthesis

Position of circular icons shows the interrelation of the topics

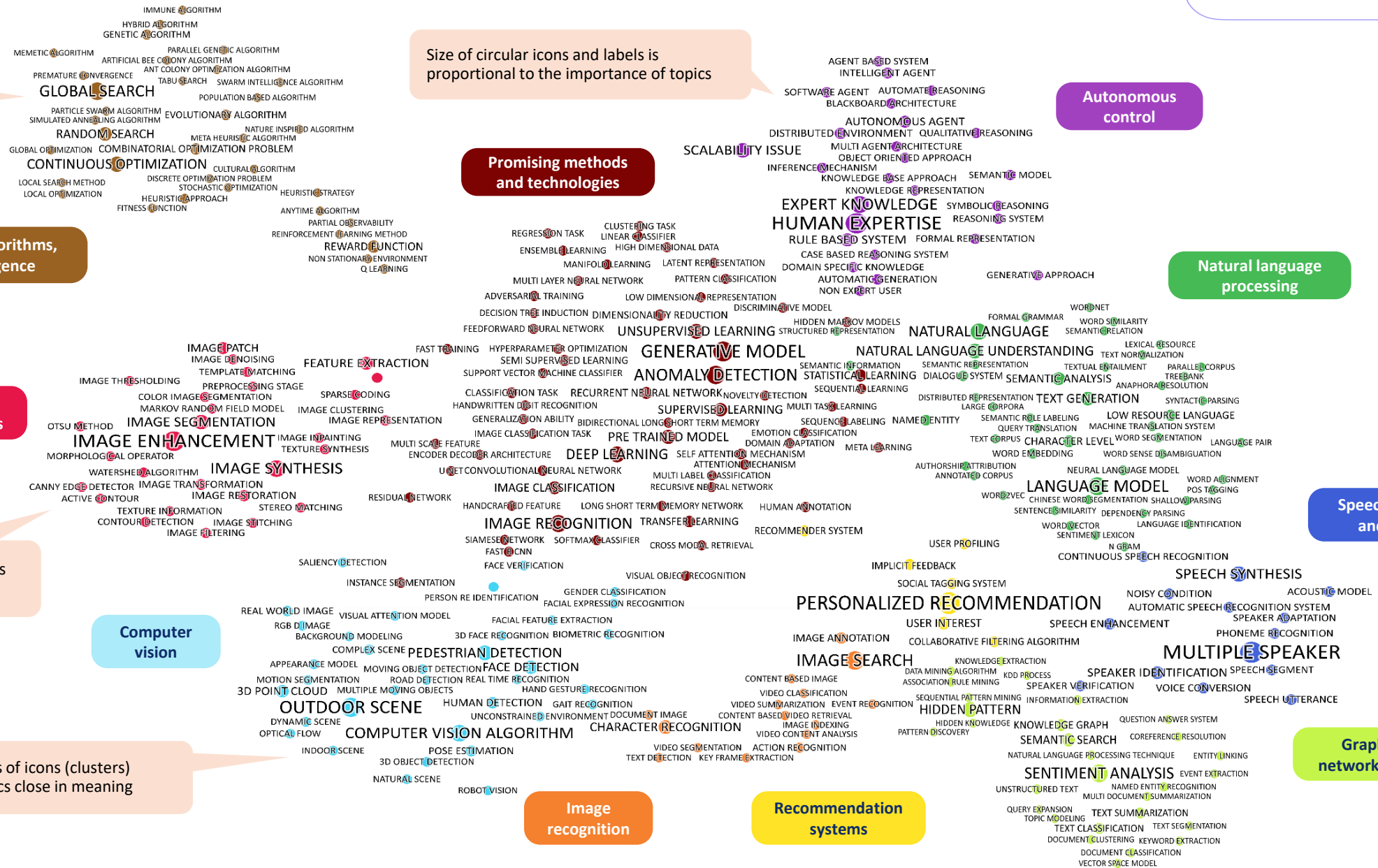
Computer vision

Colour groups of icons (clusters) combine topics close in meaning

Image recognition

Recommendation systems

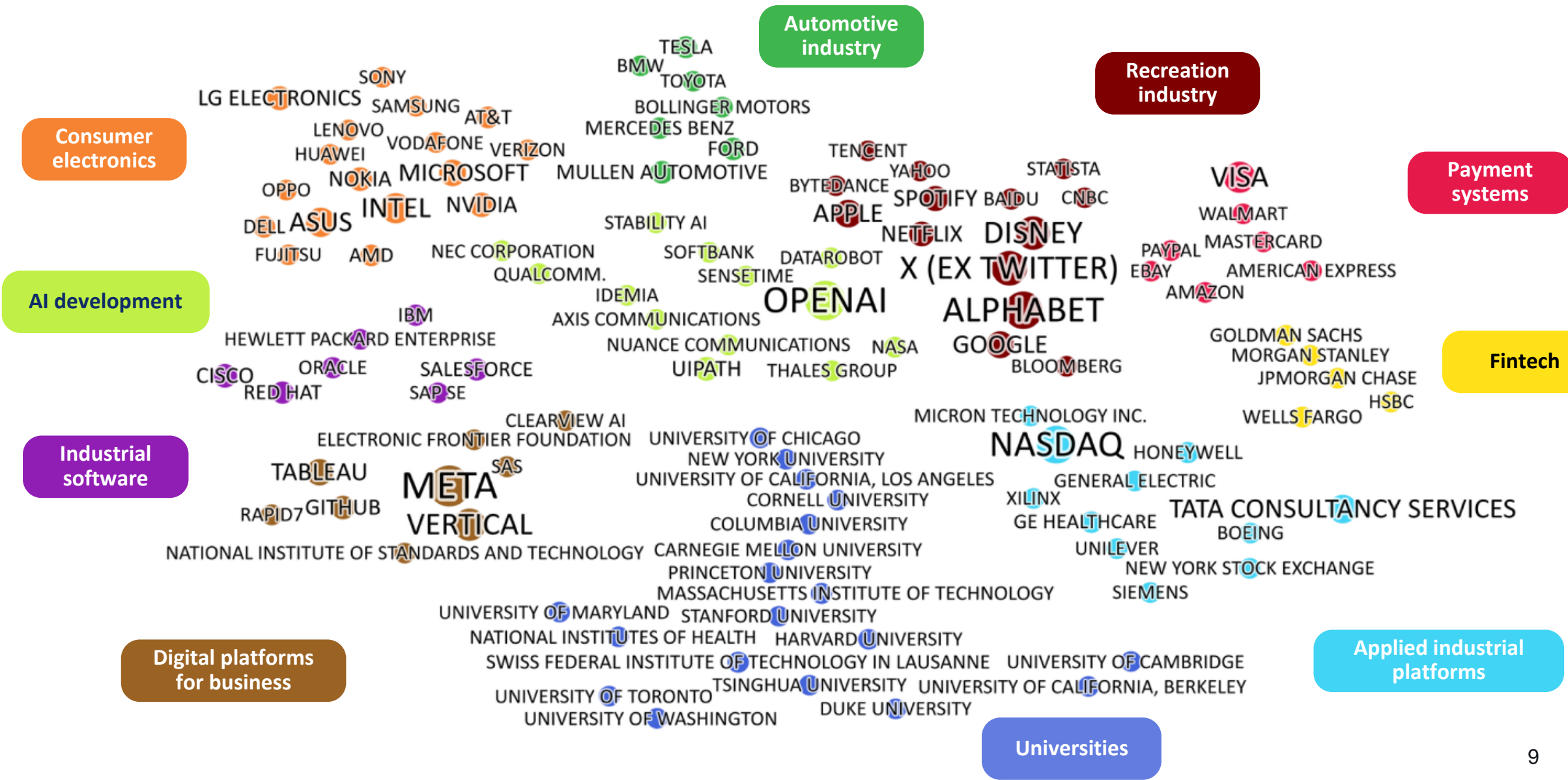
Graph and network analysis





# AI Organizational Network Mapping

BASED ON INTERNATIONAL MARKET ANALYTICS

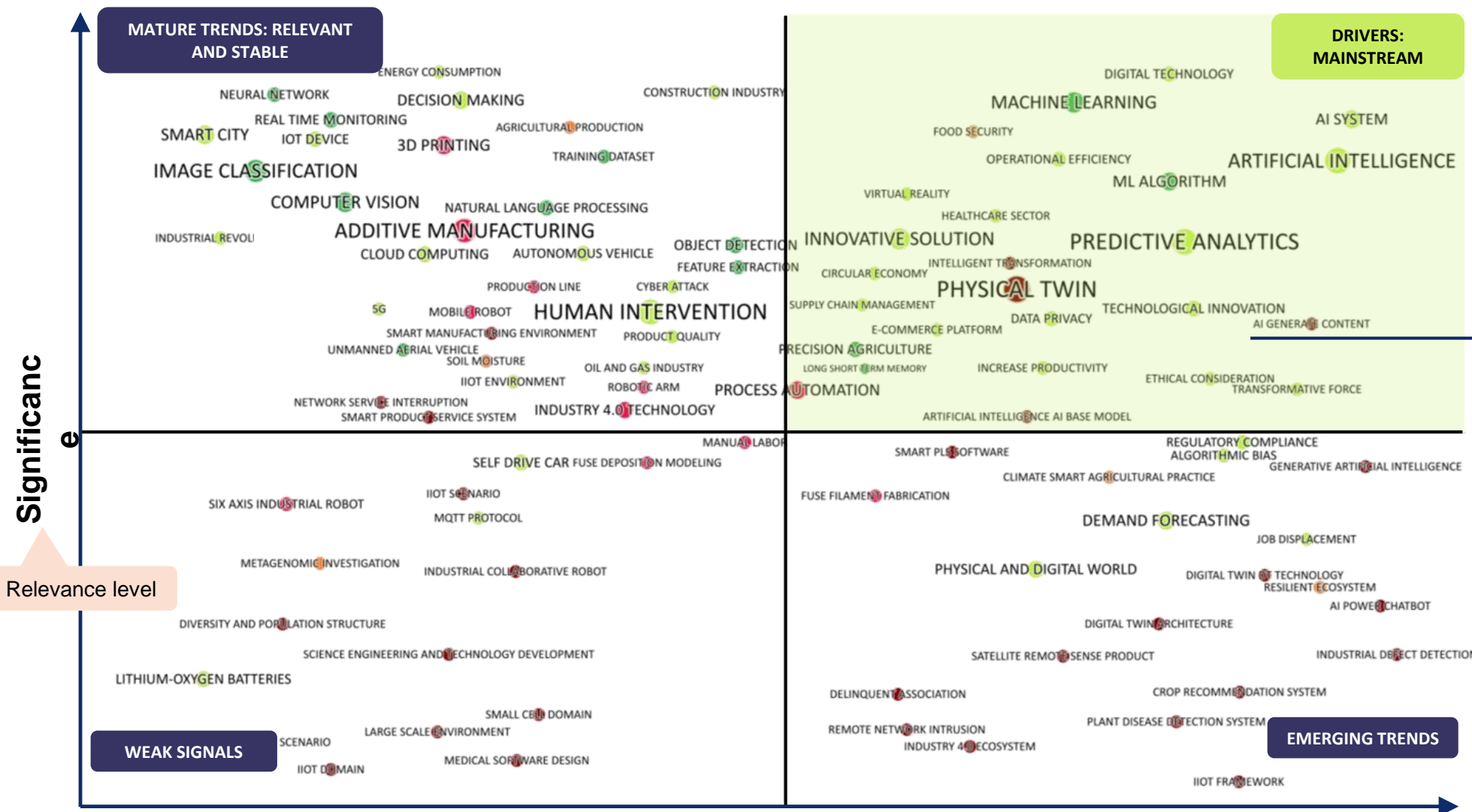




# Early Detection of Promising AI Technologies

## Case of industrial AI

BASED ON INTERNATIONAL RESEARCH ARTICLES



**AI GENERATE CONTENT**

By 2030, the intensity of the use of **generative AI models in industry will double**, including due to the rapid spread of synthetic data

### Thematic areas

- Industry 4.0
- Industrial AI analytics
- Computer vision
- Additive manufacturing
- Digital agriculture

# Framework for AI research

A three-level hierarchical framework to categorize AI research is used in foresight

## Area

major independent  
research area  
covering several  
interconnected fields

## Field

A group of conceptually  
related methods, models,  
and solutions

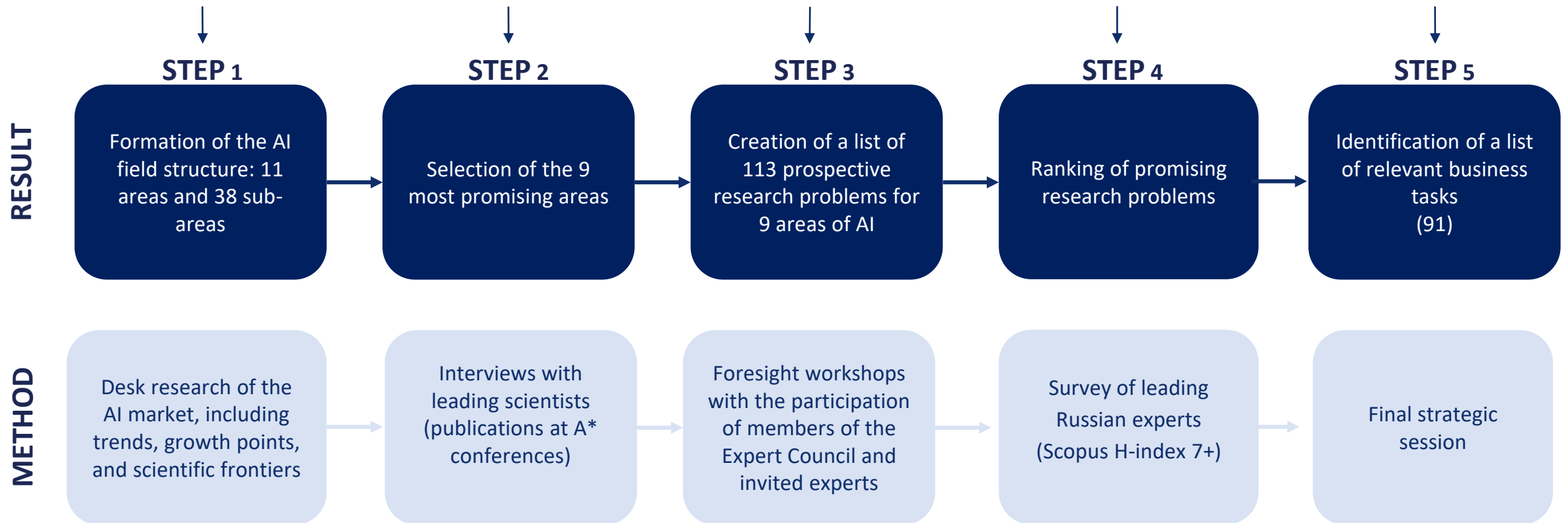
## Research problem

A specific, up-to-date research  
task with clearly defined  
challenges and anticipated  
outcomes



# Methodology and Stages of Project Realization

**Expert panel:** 50+ AI experts from business, scientific community and government





# Key Output: Three-level Hierarchy of AI Research Tasks

Area	Includes	Examples	Total
	9	Fundamental and generative models	9
<b>Field / Group of research tasks</b>	3-5 for each area	LLM and other models for character data generation	37
<b>Research tasks</b>	2-8 for each field	Development of effective algorithms for training, retraining and LLM distillation	127



# Prospective Areas and Sub-Areas of AI Development

<p><b>I. Architectures, Machine Learning Algorithms, Optimization, and Mathematics</b></p> <p>1.1. Development of new MO algorithms 1.2. Search for Deep Network Architectures 1.3. Acceleration of Computations 1.4. Distributed and Federated Learning</p> <p><b>II. Computations for AI</b></p> <p>2.1. Development of Computation Engines for AI 2.2. Development of Hardware and Software for AI 2.3. Frameworks for Machine Learning (ML) and AI</p> <p><b>III. Data for AI</b></p> <p>3.1. Creation of Benchmarks for AI Evaluation 3.2. Data Creation and Augmentation 3.3. Data Privacy Preservation</p>	<p><b>IV. Fundamental and Generative Models</b></p> <p>4.1. LLM and Other Models for Symbolic Data 4.2. Diffusion and Other Models for Non-symbolic Data 4.3. Multimodal LLM Models 4.4. Knowledge Transfer Methods with Model Adaptation 4.5. LLM Augmentation without Model Adaptation</p> <p><b>V. Safety, Trust, and Explainability</b></p> <p>5.1. Alignment 5.2. AI Explainability 5.3. Ensuring Safe Development and Operation of AI Systems 5.4. Ensuring Protection Against Misuse of AI for Hacking Purposes</p> <p><b>VI. Narrow AI</b></p> <p>6.1. CV (computer vision) 6.2. NLP (natural language processing) 6.3. Other narrow AI technologies (S2T, RecSys, TSA, etc.)</p>	<p><b>VII. Management, Decision-Making, Agent/Multi-Agent Systems</b></p> <p>7.1. Development of RL (Reinforcement Learning) Algorithms 7.2. Agent Systems: Open-ended Task Learning 7.3. Multi-Agent Systems: Swarms, Language Agents</p> <p><b>VIII. Elements of AGI (Artificial General Intelligence)</b></p> <p>8.1. Reasoning and Reflection in AGI 8.2. Hybrid AI 8.3. Embodiment 8.4. Brain and Mind Modeling</p> <p><b>IX. Human-Machine Interaction</b></p> <p>9.1. Technical Means of Human-Machine Interaction 9.2. Methods and Algorithms of Human Interaction 9.3. Methods of Human-Machine Integration</p>
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**Out of the project's focus:**

- **X. Socio-humanitarian and economic aspects**
- **XI. Applied research (AI for science, education, and the social sphere - areas of state responsibility)**



**RADICAL TRANSFORMATIONS**  
(tasks leading to revolutionary technological changes or significantly impacting the field)

7.3. Multi-agent systems

8.3. Hybrid AI

8.4. Embodiment

8.5. Brain and Mind Modeling

8.1. Reasoning and reflection

9.2. Methods and algorithms of interaction with a human

9.1. Technical means of human-machine interaction

8.2. Lifelong learning

5.4. Ensuring Protection Against Misuse of AI for Hacking Purposes

7.5. Optimal control methods

5.3. Ensuring Safe Development and Operation of AI Systems

6.1. CV (computer vision)

6.3. Other narrow AI technologies

7.2. Agent Systems

7.1. Development of Reinforcement Learning Algorithms

7.4 Networks of networks and systems of systems

1.3. Acceleration of computations

2.2. Development of HSSs for AI

3.2. Data Creation and Augmentation

4.2. Diffusion and Other Models for Non-symbolic Data

4.3. Multimodal LLMs

5.2. AI Explainability

2.1. AI computer development

2.3. ML and AI frameworks

1.2. Search for Deep Network Architectures

**CATALYSTS OF AI DEVELOPMENT**  
(tasks that are more auxiliary in nature, facilitating the advancement of other AI technologies)

**INCREMENTAL INNOVATIONS**  
(tasks whose solutions lead to gradual, non-revolutionary, and generally predictable changes)

6.2. NLP (natural language processing)

4.1. LLM and Other Models for Symbolic Data

5.1. Alignment

9.3. Human-Machine integration methods

4.5. LLM Augmentation

3.3. Data Privacy Preservation

1.1. Development of new ML algorithms

9.4. Machine-human interaction

1.4. Distributed and Federated Learning

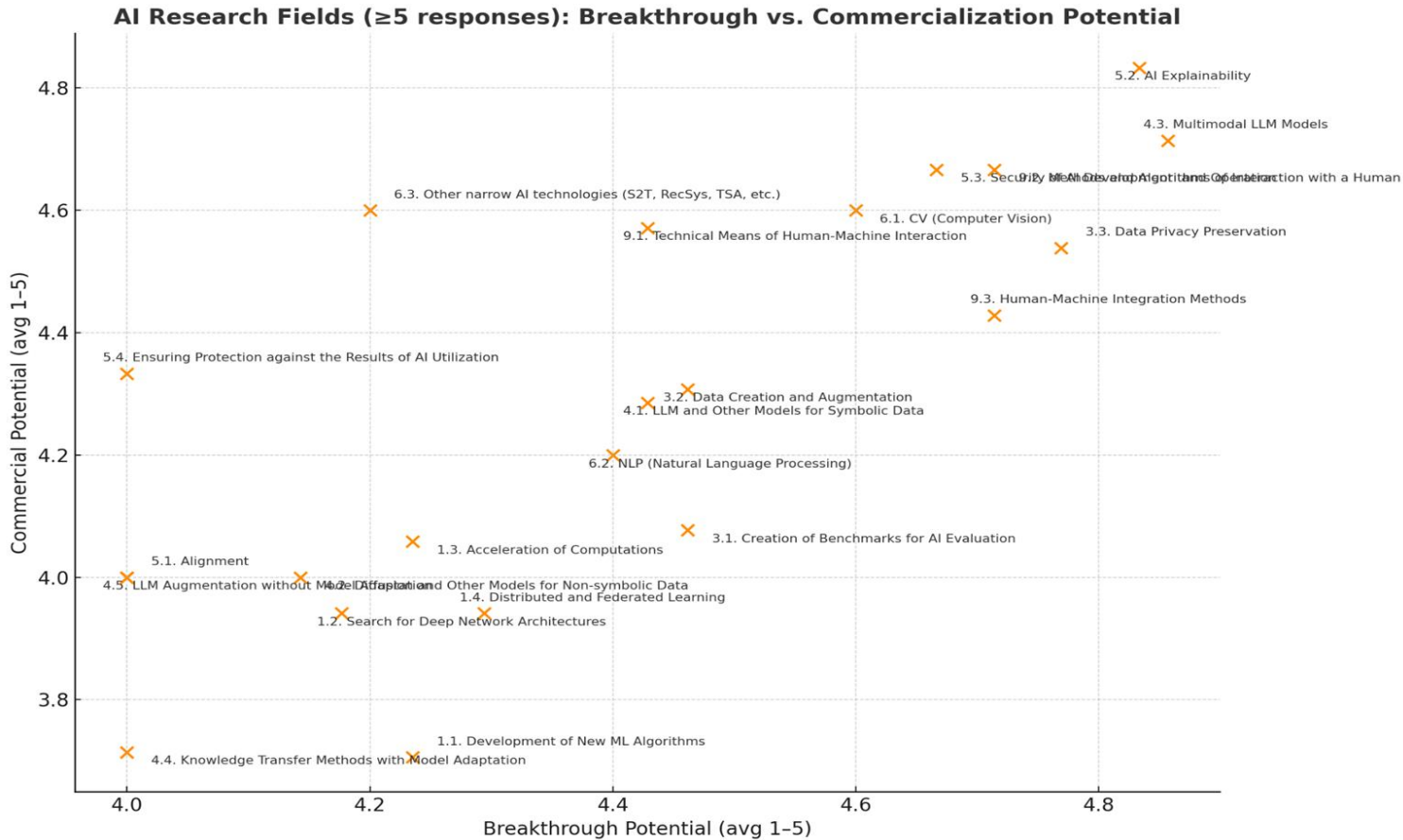
1.5. Mathematical foundations of AI

4.4. Knowledge Transfer Methods with Model Adaptation

3.1. Benchmarks for AI Evaluation



# AI Research Priorities Matrix



**High-impact zones:** Fields such as **AI Explainability (5.2)**, **Multimodal LLMs (4.3)**, and **Human–Machine Integration Methods (9.3)** are rated high on both axes — combining innovation potential with strong commercial promise.

**Emerging, less commercial domains:** Foundational work such as **Model Adaptation (1.1)** and **Alignment (5.1)** still holds high research value but shows lower immediate market applicability.

The upper-right quadrant defines **strategic AI domains** where breakthrough science aligns with market readiness — ideal targets for funding, partnerships, and technology transfer initiatives.



# Thank you!

## Alexander Sokolov

sokolov@hse.ru

<http://issek.hse.ru>

<https://foresight-journal.hse.ru>

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