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ARTIFICIAL INTELLIGENCE: NATURE AND PRINCIPLES OF IMPLEMENTATION (Artificial Intelligence: Characteristics and Applicability Indices in Modern Smart Automated Industry and in the Ecosystem and Infrastructure of Innovative Startups)

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Abstract

This article examines the rapid advancement of artificial intelligence and its transformative impact on professional activities across creative, technical, and administrative domains. It emphasizes that although AI systems are capable of performing tasks traditionally assigned to junior specialists, including code generation and data processing, the essential role of human professionals remains in defining system architecture, supervising AI-driven workflows, integrating functional components, and ensuring overall logical coherence of technological solutions. Particular attention is devoted to the analysis of fields demonstrating the highest applicability of artificial intelligence, including computer science, mathematics, analytical office functions, and marketing-related processes. The article also addresses the impact of AI on healthcare and environmental initiatives, including the use of multimodal models for accelerated medical diagnostics and personalized treatment. Separate consideration is given to recent advances in cross-model interoperability, including algorithms for universal output translation and semantic token alignment, which significantly enhance collaborative efficiency among AI systems. The article concludes that the future of artificial intelligence will be determined not only by increasing computational performance, but also by the advancement of systemic integration, scalable interoperability, and the comprehensive deployment of intelligent systems across industries and innovation ecosystems.

Keywords: *Artificial intelligence, Artificial neural networks, Application of modern artificial intelligence technologies, Application of artificial intelligence technologies across various professional domains, Applicability indices of artificial intelligence technologies, Scope of professional tasks that can be performed using artificial intelligence and artificial neural networks; Applicability indices of AI technologies to different professions, Level of AI integration into professional activity, List of office and administrative positions and professions in fields such as marketing, where tasks include analysis, provision, and transmission of information*

Artificial Intelligence Applicability Indices and Cross-Model Interoperability in Modern Industry and Startup Ecosystems

Figure 1. *Examples of robots incorporating elements of artificial intelligence and artificial neural networks used in automated production lines of automotive manufacturing companies, for example, Ford*



The comprehensive integration of artificial intelligence and artificial neural networks into innovative technical solutions, including the incorporation within supersystems of control and management of non-contact monitoring and measurement elements based on the principles of electromagnetic resonance spectroscopy, necessitates a reconsideration and modification of the provisions of the Theory of Inventive Problem Solving (TRIZ) and the Algorithm of Inventive Problem Solving (ARIZ). In particular, it requires a revision of the 40 inventive principles and the approaches aimed at achieving the Ideal Final Result.

TRIZ and ARIZ were originally conceived as a “precise science.” For a certain period, their laws and methods corresponded to the level of technological development and engineering capabilities of that time.

However, what do the Theory and Algorithm of Inventive Problem Solving represent today in practical terms?

How have modern high technologies and processor-based systems influenced their integrative capabilities?

These are not the only questions requiring clarification. An important contemporary phenomenon is the widespread search for analogues of future inventions within biological systems, particularly in the context of biomechanical research. How does this trend correlate with the laws, methods, and principles of TRIZ and ARIZ?

At present, many of the most effective and innovative inventions arise from discoveries in living nature, which inspire engineers to develop novel technical solutions capable of addressing complex problems through unconventional methods and techniques.

When analyzed and forecasted using TRIZ methodologies and analytical techniques, and through technological–dialectical synthesis, this phenomenon may provide practical pathways for effective application in innovation processes, especially in biotechnology and genetic engineering.

An undeniable strength of TRIZ lies in its attempt to apply dialectical approaches to inventive problem solving, particularly through the identification and resolution of contradictions. To this end, TRIZ introduced a specialized algorithm (ARIZ), consisting of a sequence of logical procedures designed to reformulate inventive problems in terms of contradictions and to provide structured recommendations for their resolution.

Additionally, TRIZ literature contains numerous illustrative examples and problems of significant educational and analytical value.

Today, largely due to the integration of artificial intelligence and artificial neural networks, the processes of solution selection and decision-making occur at a substantially accelerated pace. This acceleration, in turn, necessitates the rapid adoption of related and adjacent technical decisions within innovation-driven environments.

Decision-making speed no longer allows sufficient time or opportunity to perform a qualified assessment of the correctness and adequacy of decisions using traditional, well-established methodologies; therefore, specialized algorithms are required that incorporate new and non-obvious solutions, which collectively ensure the most comprehensive and rapid responses to errors in the development of innovative projects, particu-

larly those based on inventions aligned with current technological realities.

The present publication further provides examples of six algorithms which, in combination with elements of artificial intelligence and artificial neural networks, make it possible to evaluate and classify the stages and phases of innovative startup project development and to analyze the feasibility of achieving the ideal final result within the project under examination.

This solution becomes particularly critical for edge devices – such as smartphones, drones, and autonomous vehicles – that must rely on limited computational resources in the absence of an internet connection. In the case of autonomous vehicles, faster data processing can prevent catastrophic outcomes. The research marks a new stage in the development of collaborative AI, enabling developers to seamlessly combine the strengths of different models to create more efficient and accessible solutions for millions of users worldwide.

Figure 2. *Examples of the application of artificial intelligence and artificial neural networks in various digital technologies across different areas of industrial activity*



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cient and accessible solutions for millions of users worldwide.

Figure 3. *A robot whose control and monitoring systems incorporate artificial intelligence*



These algorithms, arranged sequentially along the course of the innovation process

The six algorithms presented enable continuous monitoring of the development of an innovative project, including those incorporating elements of artificial intelligence and artificial neural networks.

However, given the current state of affairs, a relevant question arises: if contradictions, in their classical interpretation, do not exist, then how can non-existent contradictions be resolved? How can innovative technologies be developed using the principles and methods of the Theory of Inventive Problem Solving (TRIZ) and its algorithmic framework, while simultaneously applying new, effective, and constructive approaches?

Even without this consideration, the Theory of Inventive Problem Solving has exhibited a number of significant limitations, which evidently led to stagnation in its development after the death of its founder, as well as to considerable difficulties in its practical application.

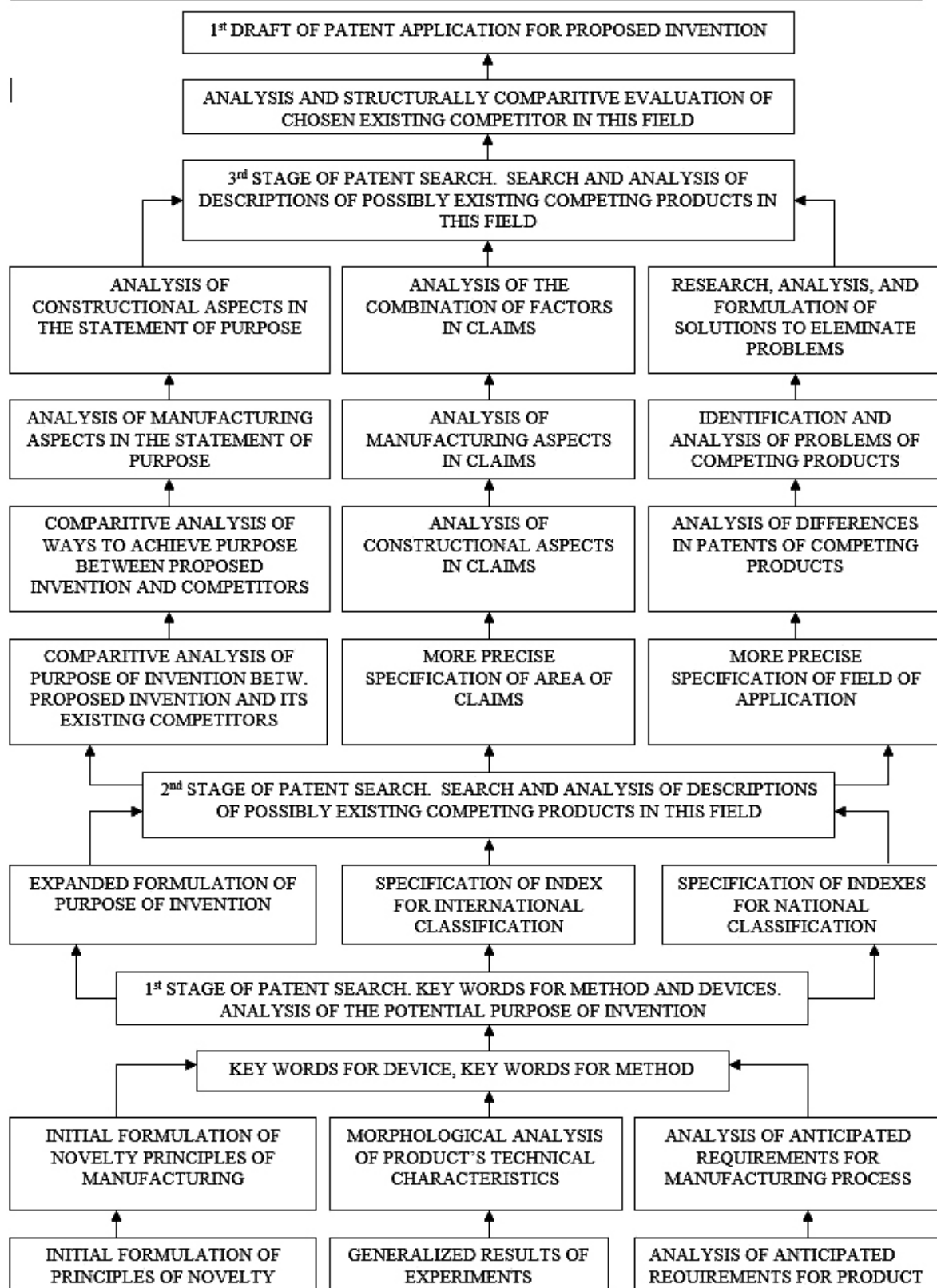
What were these limitations?

Within TRIZ, an attempt was made to formulate laws governing the development of technical systems, which were intended to

serve as the foundation both for the theory itself and for a general problem-solving methodology. However, the majority of these so-called “laws” cannot truly be classified as such.

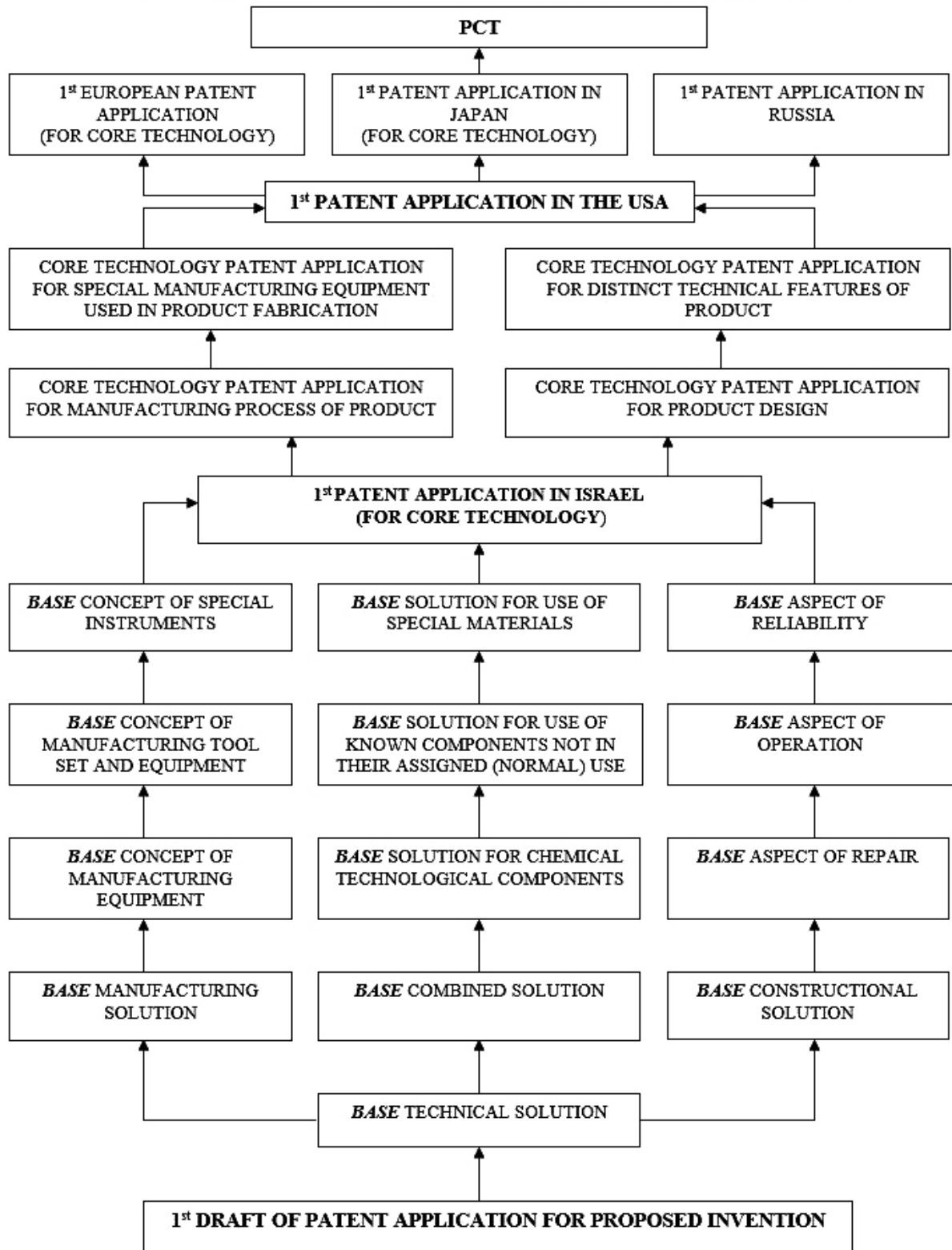
Patenting & Licensing Strategy

1st INITIAL STAGE OF PROJECT - NEW INTERNET TECHNOLOGY PRINCIPLES (RESEARCH)



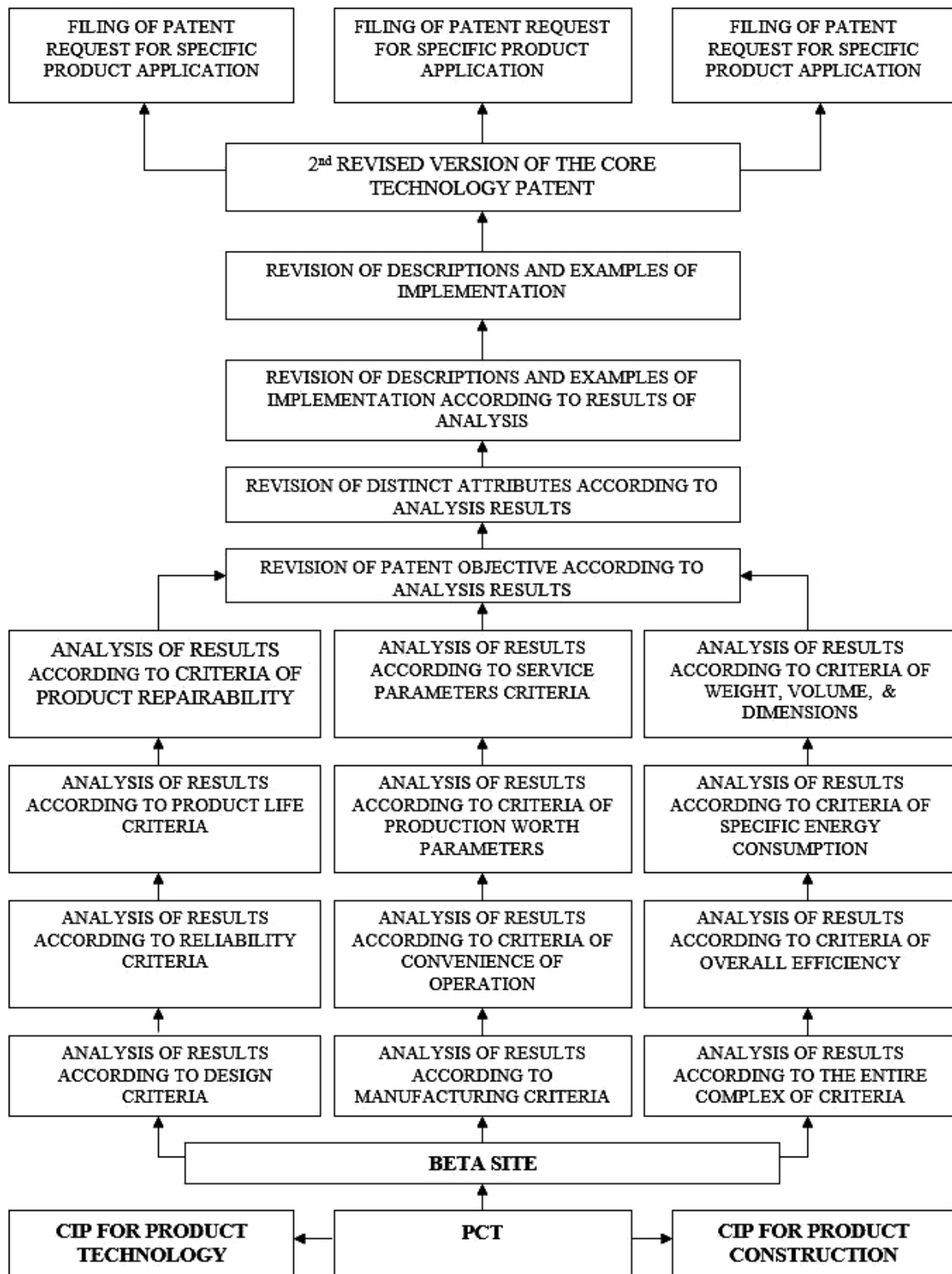
Patenting & Licensing Strategy

2nd INITIAL STAGE OF PROJECT – Codification Technology Principles and Internet integrated solutions
 DEALS WITH CORE TECHNOLOGY THAT RELATES TO *BASE* TECHNOLOGY AND CONSTRUCTION PRINCIPLES OF PRODUCT (“*BASE*”), AS OPPOSED TO A SPECIFIC APPLICATION OF THE PRODUCT



Patenting & Licensing Strategy

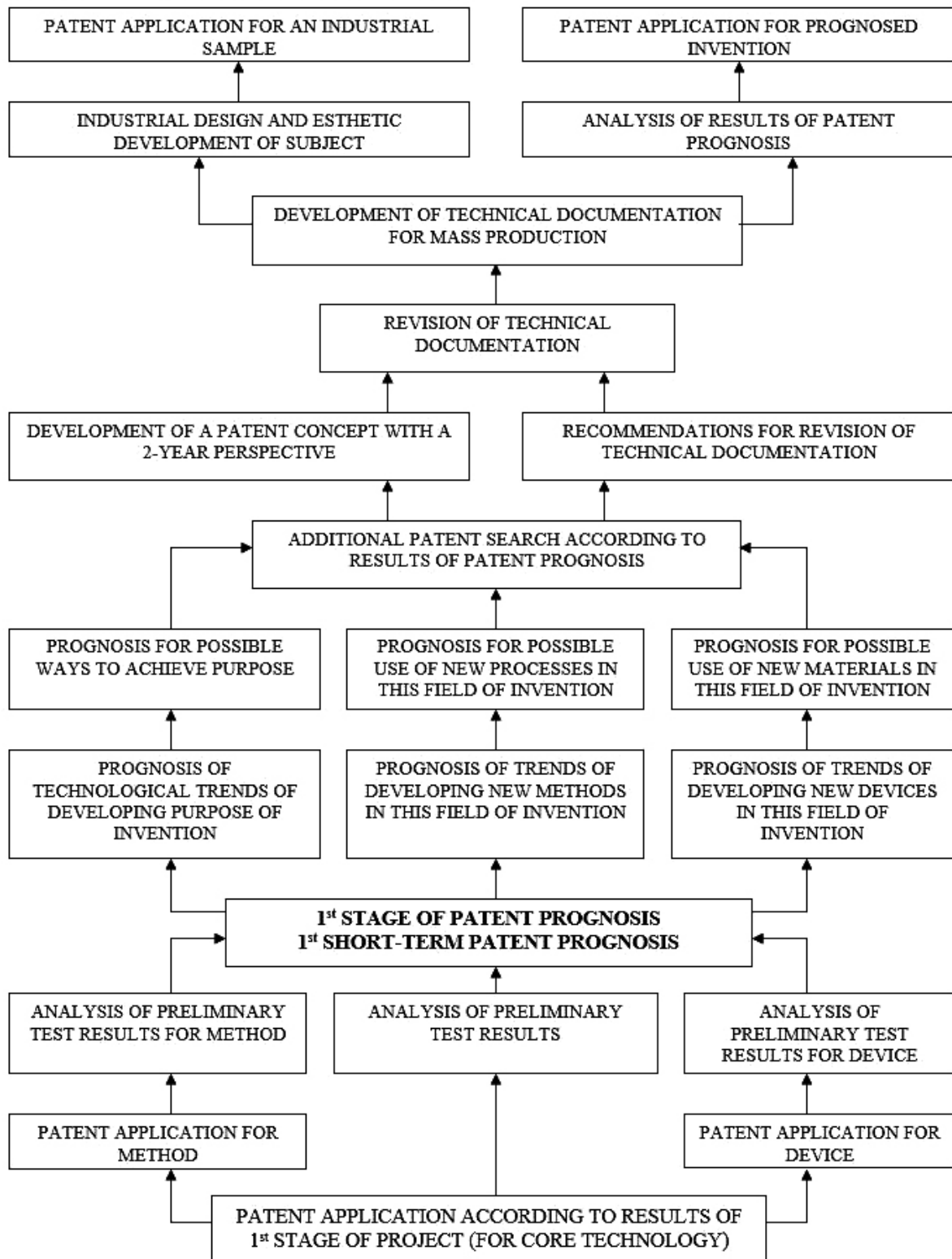
Codification Technology Principles, Coder-Encoder system and Internet solutions and interfaces
3rd INITIAL STAGE OF PROJECT (RELATING TO SPECIFIC APPLICATION)



Patenting & Licensing Strategy

STAGES: DETAIL DESIGN FOR MASS PRODUCTION of CODIFICATION TECHNOLOGY PRINCIPLES and CODER-ENCODER systems FOR Internet solutions , - COMPONENTS PRELIMINARY TESTING

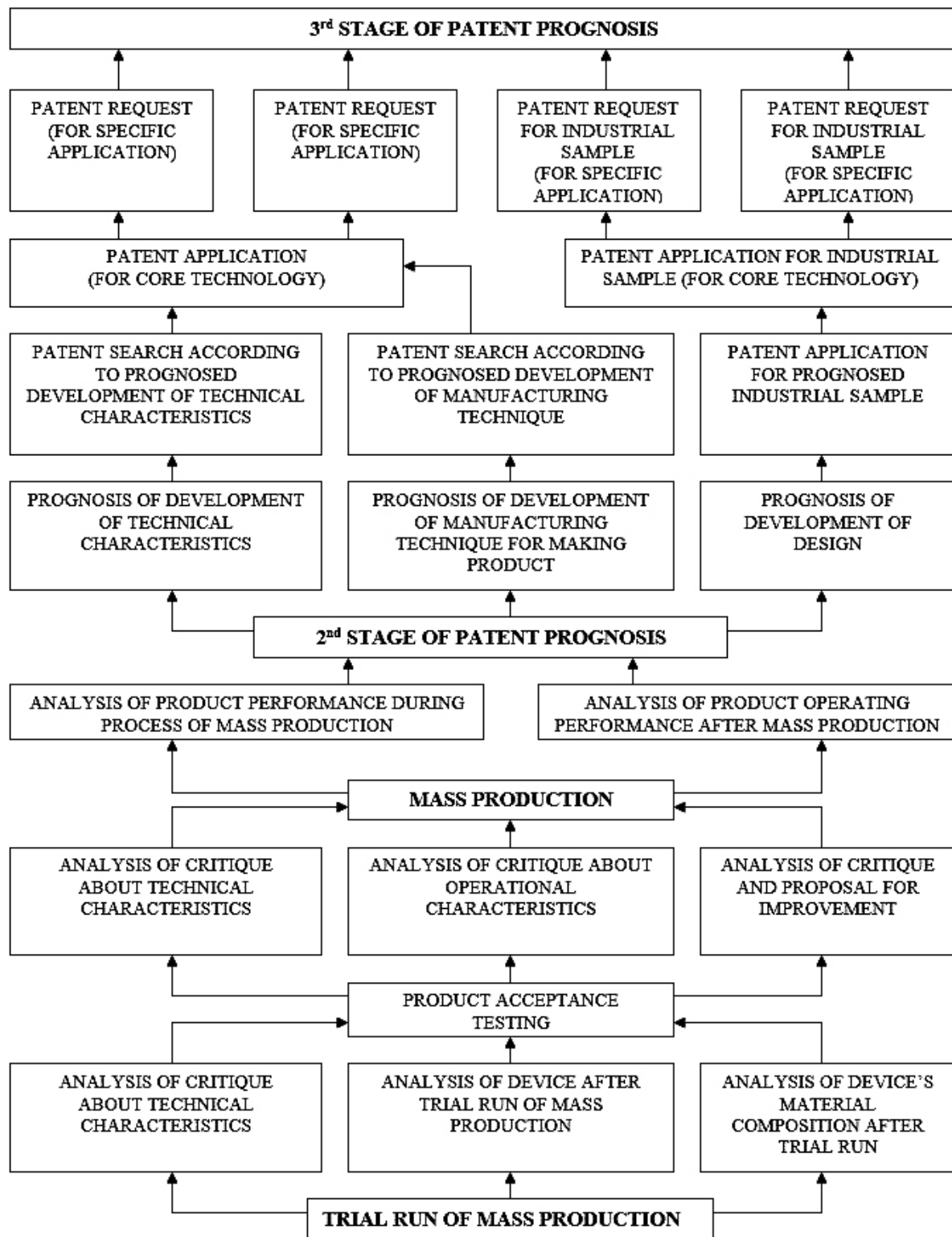
DOCUMENTATION FOR MASS PRODUCTION



Patenting & Licensing Strategy

Codification Technology Principles , Coder-encoder system and Internet new solutions and interfaces

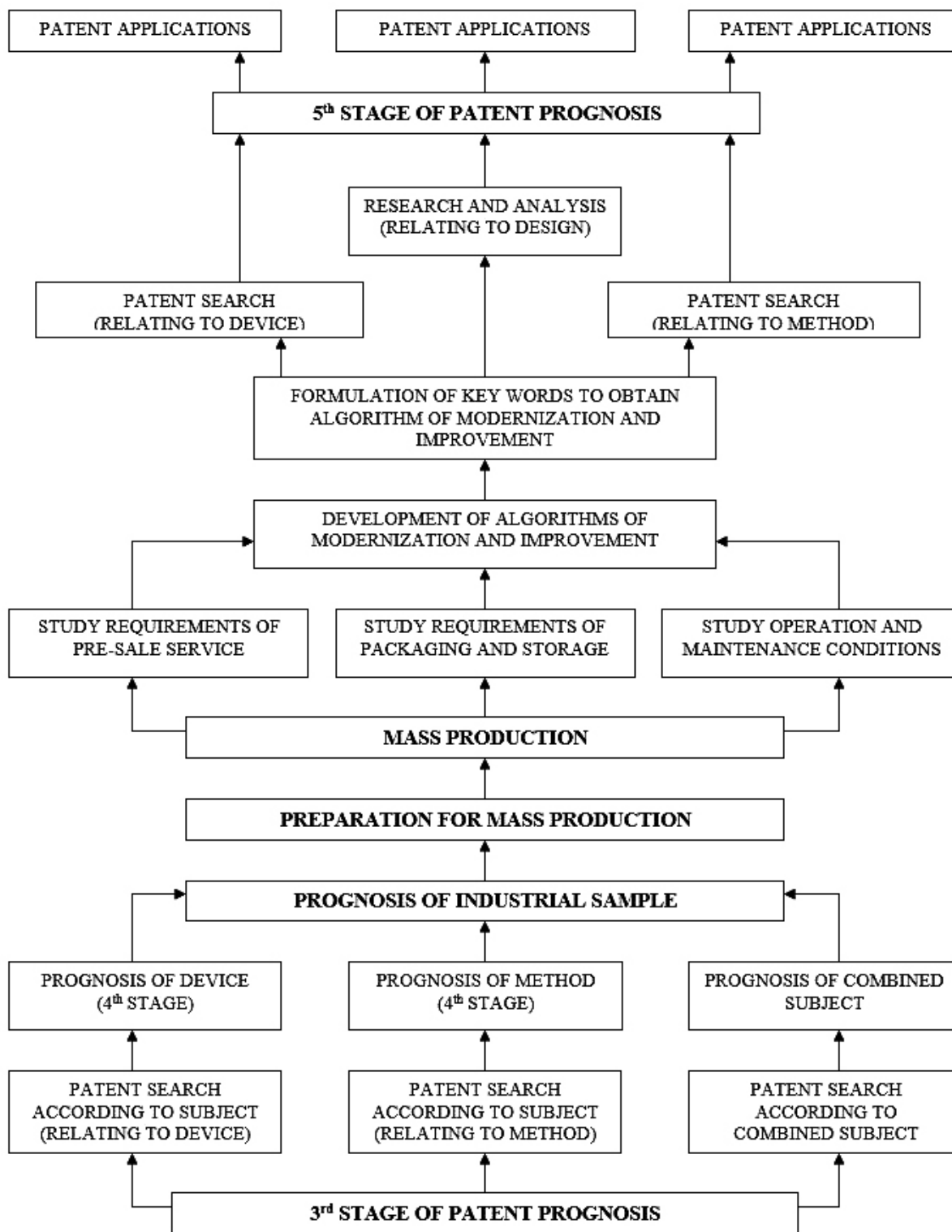
STAGES: TRIAL RUN OF MASS PRODUCTION
 PRODUCT ACCEPTANCE TESTING
 FULL SCALE MASS PRODUCTION



Patenting & Licensing Strategy

CODIFICATION TECHNOLOGY PRINCIPLES in Internet solutions, programs and interfaces

STAGES: MASS PRODUCTION
ACTIVE MARKETING PHASE
PRODUCT IMPROVEMENT



They would more accurately be described as partial patterns or tendencies in the evolution of technical systems, and even these are incomplete. As a result,

a coherent and comprehensive problem-solving methodology based on universally applicable laws was never fully established.

The formulated “laws” were primarily used as methodological justifications for illustrative examples of inventions. At the same time, factors of commercial feasibility were largely excluded, and their influence on the application of evolving development patterns for modernization, optimization, and transformation of technical objects was not adequately considered. This omission significantly limited the ability to evolve an invention into a commercially viable and востребованный innovative product.

Recent patent disputes among the world’s leading technology companies clearly demonstrate that the development laws proposed within TRIZ are insufficient to reflect the full diversity of tasks, functions, and characteristics of modern multifunctional systems. Given the emergence of new and continuously evolving factors that define innovative products, there is a need to reformulate these laws by integrating them with the principles governing the development of commercial structures and the commercialization of innovation.

The dialectical approach – based on the analysis of contradictions – which was em-

bedded in the primary problem-solving tool, namely the Algorithm of Inventive Problem Solving (ARIZ), was significantly distorted through the introduction of new constructs such as “technical contradiction” and “physical contradiction.” These constructs deviated from the essence of dialectical contradiction as defined in classical dialectical logic, resulting in difficulties in identifying contradictions when applying the algorithm to real-world inventive problems.

This raises a fundamental question that warrants special attention: what constitutes a real inventive problem? How can the correct or incorrect formulation of such a problem influence the commercialization potential of an invention? Furthermore, is it possible to reliably protect a newly developed technical solution from unauthorized replication?

The search for answers to these and many other questions has become an essential component of the modern dialectics of developing patenting and licensing strategies for inventions, particularly those involving elements of artificial intelligence and artificial neural networks.

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