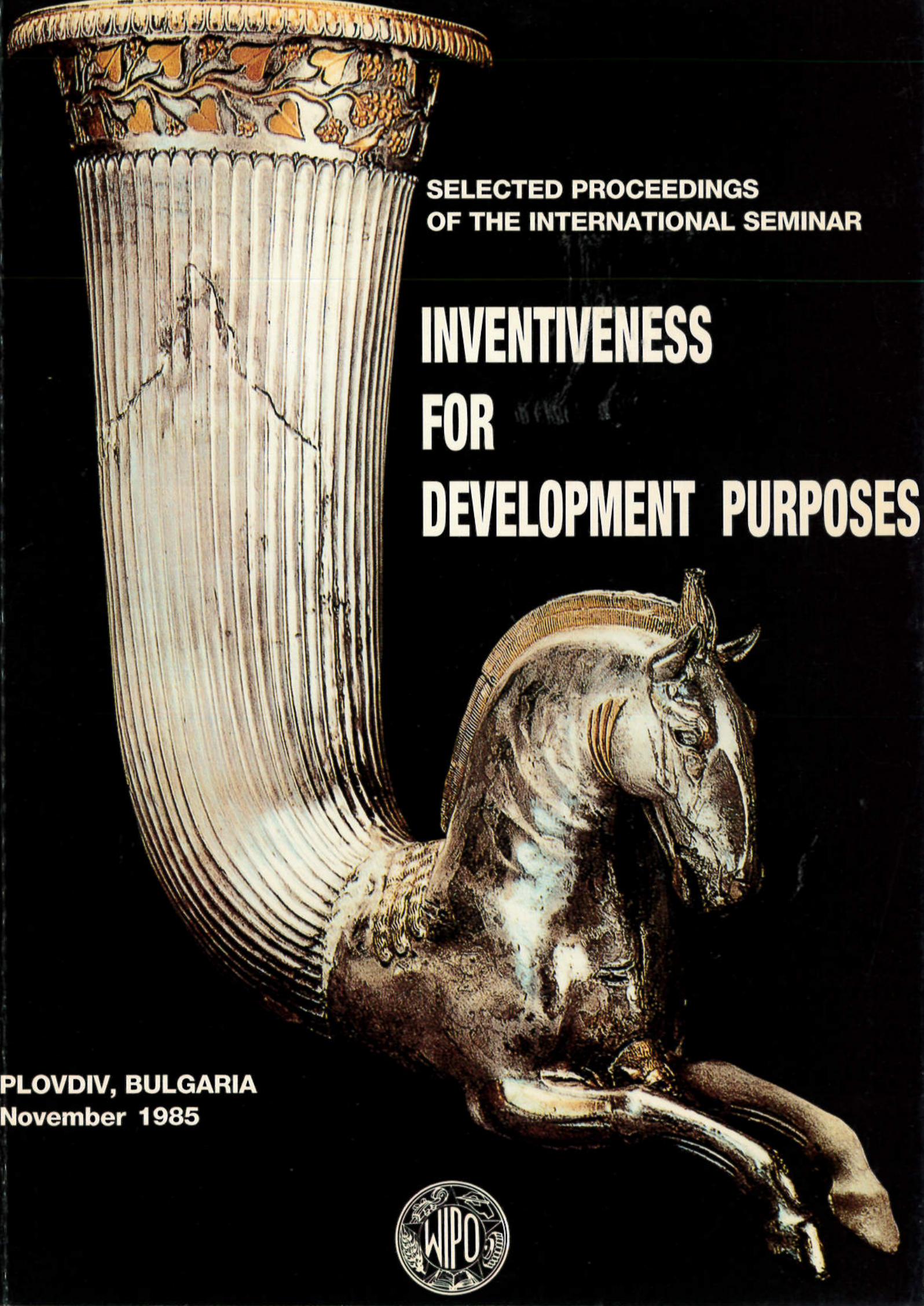

SELECTED PROCEEDINGS
OF THE INTERNATIONAL SEMINAR

INVENTIVENESS FOR DEVELOPMENT PURPOSES

PLOVDIV, BULGARIA
November 1985

WIPO

GOVERNMENT OF THE
PEOPLE'S REPUBLIC
OF BULGARIA

WORLD INTELLECTUAL
PROPERTY ORGANIZATION

SELECTED PROCEEDINGS OF THE INTERNATIONAL SEMINAR INVENTIVENESS FOR DEVELOPMENT PURPOSES

organized by the
Government of the People's Republic of Bulgaria
in cooperation with the
World Intellectual Property Organization (WIPO)

Plovdiv, Bulgaria
November 12 to 15, 1985

GENEVA, 1987

The cover page shows a rhyton (ancient drinking horn) made of silver and gold which was found in Bulgaria as a part of a famous Thracian gold treasure that dated from 385-350 B.C.

WIPO PUBLICATION
No 655(E)

ISBN 92-805-0176-3

FOREWORD

The present volume contains the texts of 12 papers presented at the International Seminar on "Inventiveness for Development Purposes" which took place in Plovdiv, Bulgaria, in November 1985.

The Seminar was organized jointly by the Government of the People's Republic of Bulgaria and the World Intellectual Property Organization (WIPO). It was held in conjunction with the World Exhibition of Achievements of Young Inventors "Bulgaria'85", which also took place in Plovdiv at the same time and which was co-organized by the Government of Bulgaria and WIPO. At that exhibition, more than 4,200 inventions of young people from some 70 countries, including over 50 developing countries, were displayed.

The aim of the Seminar was to give prominence to the important role of technological innovation in economic and social development and to provide the opportunity to government officials, researchers, representatives of industry and inventors from developing, socialist and industrialized market-economy countries to exchange experiences and ideas.

The Seminar was attended by more than 300 participants from 29 countries, namely, Afghanistan, Algeria, Bulgaria, China, Cuba, Czechoslovakia, Democratic People's Republic of Korea, Ethiopia, Finland, German Democratic Republic, Germany (Federal Republic of), Honduras, India, Iraq, Kenya, Malaysia, Mongolia, Morocco, Nepal, Netherlands, Peru, Poland, Romania, Soviet Union, Sudan, Surinam, Sweden, Yugoslavia and Zimbabwe.

The Seminar focused on selected topics of particular importance to the promotion of inventive activity and technological innovation. Those topics were covered by the 12 papers published in the present volume. The papers are the contributions of experts from Bulgaria, Czechoslovakia, the German Democratic Republic, the Philippines, the Soviet Union, Sweden and the United States of America, as well as an official from WIPO.

The publication of the said papers is a welcome occasion for WIPO to renew its warmest thanks to the Government of the People's Republic of Bulgaria, to the Bulgarian co-organizers of the Seminar and the Bulgarian Organizer of the World Exhibition for their having ensured the exceptional success of the Seminar and the World Exhibition.

Geneva, August 1987

Arpad Bogsch
Director General
World Intellectual Organization Property

TABLE OF CONTENTS

Mr. A. Narbut and Mrs. N. Narbut, Researchers,
Public Laboratory of Invention Theory
Soviet Union

FROM THE EXCHANGE OF INVENTIONS TO THE EXCHANGE OF METHODS

Our colleagues engaged in elaborating or implementing inventions on a large scale cannot fail to have noted a very clear trend: ever more frequently, the international trade partners seek to acquire not a finished industrial product, but a secret or a method for producing it. The varying forms of trade in inventions are becoming more and more advantageous to the various partners. It is clear that such exchange of inventions actively contributes to speeding up the industrial development of those countries participating in the exchange. It is not necessary to give figures since these are widely known.

Why is it therefore that the overwhelming majority of inventions obtained originate in the industrially developed countries (particularly Japan) and why is it that the countries of the "Third World," the developing countries, make such little use of this effective means of strengthening their industry?

Analysis of this situation brings us to the following conclusion: the majority of modern inventions are intended for technical systems that are at a very high level. Consequently, their use in the relatively less advanced industry of developing countries is either altogether impossible or possible only after substantial prior adaptation, that is to say after the development of a new solution that corresponds to the level of the existing technical systems. In addition, the purchase of inventions (e.g. through licenses) frequently implies the purchase of the corresponding equipment from the

other country and leads to a degree of dependency on that country.

In all those cases, the developing countries are forced to pay an excessively high price to develop their industry. The conclusion is obvious: if inventions are necessary to developing countries, but their purchase is not economically valid, it is therefore much more rational to "produce the inventions" directly within the country. Moreover, inventions should ideally occur at the exact place where the need is felt: within a specific factory, plant, scientific establishment or farm. In other words, any country that wishes to become industrially developed has need of a system for producing inventions. The first step along the path to creating such a system must be to familiarize senior engineers with the principles of the modern theory on the solution of inventive problems (TSIP).

The basic principle of this theory is the fact that the orientation of the development of technical systems is objective, that is to say it depends neither on our possibilities nor on our needs. Naturally, without man, technology cannot develop. Man speeds up or slows down the development of a given technical system, he creates new systems and abandons old ones. However, once he has begun with the development of a given system, development will proceed according to principles that are out of his control.

An analogy can be made between a technical system and a railway truck. A man can push a truck with all the strength he can muster, but the fastest movement will only be achieved if he pushes in the direction of the rails. So far, the analysis

of tens of thousands of technical systems taken from "real life" has enabled some ten basic laws to be established for their development. It has also been discovered that any technical system whatsoever can be modeled as a compact system comprising objects and fields. The simplest functional system may be comprised of two objects and one field.

The developers of TSIP are continuing to collect information in order to give the abstract models and laws a practical technical content that takes into consideration the latest scientific achievements (particularly in physics). The laws of development, the object-field models and the information bank in turn enable structures to be set up for the inventive solution of real technical engineering problems. To return to the analogy of the railway, the development of a technical system may be represented as a railway line. The whole field of technology thus takes on the form of a railway network with a large number of branches. In order to solve an inventive problem it would be necessary, in such a model, to displace a "truck" from one track to another in order to reach the desired location whatever the point of departure.

At first glance, all is simple. However, there always exists an obstacle to the change of track. "Inventions are necessary for the development of industry, but inventions are not desired if one has to pay too much for them." That is more or less the situation any inventive problem is reduced to. To identify the basic obstacle to the development of a technical system using a given set of means to overcome the obstacle is a working principle that constitutes an important component of TSIP: the algorithm for solving inventive problems (ASIP).

With the aid of ASIP, problems can be resolved progressively, step by step. Starting from an actual situation, an abstract model is set up and the reciprocal action of the elements in the model is studied down to the contradictory physical requirements with respect to the condition or state of one of those elements.

In this context, allowance is made for the fact that technical systems strive towards an ideal, as also other laws of development, and varying methods are used to overcome the contradictions. In some cases, rules have been derived from well-known object-field models, enabling optimum decisions to be reached directly without a lengthy analysis (the so-called TSIP standards). Mention should also be made of the importance of a course held on the development of creative imagination. It enables management of the psychological factors involved in the process of solving inventive problems.

Unfortunately, the time available for the lecture does not permit us to cite a sufficient number of examples of the use of the theory of solution of inventive problems (TSIP). Indeed, many inventions could be mentioned which have been developed with the aid of this theory, both in the Soviet Union and in other countries. In Bulgaria, for instance, a number of seminars have been devoted to studying this theory during recent years, a series of books has been published and quite a few inventions have been made with its aid.

However, the most important aspect, in our view, is not the number of inventions. The importance lies in the fact that TSIP almost always leads to usable technical solutions whatever the problem involved. Additionally, the solution is compatible

with the existing technical system. In other words, TSIP can be used at all levels of production. And in every case the high quality of the solution is guaranteed as is its high degree of effectiveness. It is therefore already possible to state today that the exchange of inventions may be replaced by a wide-ranging exchange of the methods of obtaining inventions.

The Public Laboratory of Inventive Theory, which we have the honor to represent, has gathered a great deal of experience of such exchanges with colleagues from Bulgaria, the GDR, Poland, Viet Nam and other counties. Books by members of the Laboratory and by our scientific director Genrikh Altschuler have been translated in numerous countries throughout the world, including Japan, the USA and the United Kingdom. Training programs have been devised and tested, running from minimum introductory programs to fundamental programs involving two years of continuous training. We are willing to provide any assistance to public establishments or to individual enterprises in any country, either through the intermediary of WIPO or on the basis of bilateral agreements. We are convinced that such activities, which correspond fully with the aims of this seminar, will be useful for everyone.

* * *