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Central European Economic Journal

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Disputes Over the Concept of Ecological Economics and Environmental Economics in the Light of the Works of Professor Tomasz Żylicz

Abstract
The problem of the concept of ecological and environmental economics and the relationship between them is the vital research problem in modern economics. The presentation of disputes in this respect is the subject of the presented article. For obvious, substantive and non-substantive reasons, the scientific views of Professor Tomasz Żylicz will be the central axis. The purpose of the topic presented in this paper analysis is not to settle the controversy but to present the dispute using the views of some discussion participants, especially the comments formulated by Professor Tomasz Żylicz. The research method is based on a critical analysis of the literature and desktop research.
Conclusion 1: The problem of understanding ecological and environmental economics is just one of the many important issues that can be found in the works of Professor Tomasz Żylicz.
Conclusion 2: This problem is connected with very interesting theoretical, cognitive and terminological issues and practical issues related to the implemented environmental policies or sustainable development strategies at their various levels.

Keywords
ecological economics | environmental economics | modern economics

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1. Introductory Remarks

Professor Tomasz Żylicz was a participant and in many cases, the initiator of discussions taking place in the society of Polish economists dealing with ecological issues in the broad sense of the word. As early as 1988, he posed the question: *'Are economists able to cooperate with ecologists?'*, seeing not only the possibilities but also the necessity of such cooperation (Żylicz, 1988, p. 3-4). It was forced by both the need and its potential benefits. Undoubtedly, it was the reason for the further research of Professor Tomasz Żylicz, which resulted in further interesting publications. Then reasons for the necessary cooperation of economists and ecologists were formulated by the Professor in the introduction to the work *Economics in the face of the problems of the natural environment* [original Polish title: *Ekonomia wobec problemów środowiska przyrodniczego*], where he wrote: 'It [the book][1] *will fulfil its task in connection with the work on the national strategy for nature protection*' (Żylicz, 1989, p. 11). The year 1989 was a breakthrough year, and Professor Tomasz Żylicz himself actively joined this dialogue. Taking up work in the state administration (in the Ministry of Environmental Protection, Natural Resources and Forestry) as the director of the Economics Department, he brought us in, consulted and commissioned us to carry out various works, which were used, for example, to prepare the 1st National Environmental Policy. At that time, we asked ourselves many questions and discovered a whole range of new challenges. Thanks to the Professor, we also had the opportunity to meet and learn about each other's views. Professor Tomasz Żylicz was a *spiritus movens* in creating the society of economists dealing

1 all bracket comments by S. Czaja.

with ecological problems. We organised seminar meetings and conferences, established associations (such as the Polish branch of the European Association of Environmental Economists and Natural Resources) and created research teams. It is impossible to overestimate the role played in this process by Professor Tomasz Żylicz.

One of such research problem, initiated by Professor Tomasz Żylicz, was the problem of the concept of ecological and environmental (environmental) economics and the relationship between them. The presentation of disputes in this respect is the subject of the presented article. For obvious, substantive and non-substantive reasons, the scientific views of Professor Tomasz Żylicz will be the central axis. The purpose of the topic presented in the paper analysis is not to settle the controversy, but to present dispute using the views of some discussion participants, especially the comments formulated by Professor Tomasz Żylicz.

The article presents the importance of Prof. Żylicz's leading publications, especially books: 'Ekonomia wobec problemów środowiska przyrodniczego' (1989), 'Costing Nature in a Transition Economy. Case Study in Poland' (2000), 'Ekonomia środowiska i zasobów naturalnych' (2004), and, 'Economics of International Environmental Cooperation' (2015). The author also briefly discussed the place of sustainable development in the economic sciences.

2. Scientific Views of Professor Tomasz Żylicz on the Mutual Relations Between Ecological Economics and Environment Economics in the Context of the Achievements of Polish Thought

At the beginning of his interest in economic and ecological problems, Professor Tomasz Żylicz studied the importance of environmental problems in the theory of economics (Żylicz, 1989). He posed an interesting question, can the natural environment be valued? And reflected on the usefulness of cost-benefit analysis, the economic magnitude of ecological damage, as well as ecological risk.

Professor Tomasz Żylicz also took up the problem of the relationship between environmental damages and national income, which developed significantly in the second decade of the 21st century in the form of research on welfare, well-being and gross domestic product. He is also familiar with the challenge of externalities (external benefits and costs). All these issues are significant for the economic challenges of environmental policy. Still the most important factor for disputes, ecological and environmental economics is the role of the market of environmental goods and services and the state policy in this area, as well as the possibility of using market tools for environmental protection. This is reflected in the title of the 7th chapter of this book, titled *Towards to 'Ecological Economics'* [original Polish title: *W kierunku „ekonomii ekologicznej'*]. It is symptomatic with quotation marks. Professor Tomasz Żylicz noted that the end of the 1980s could be considered a very formal beginning of the emergence of ecological economy. '*These events* [especially the establishment of the International Society for Ecological Economics in 1987 and the publication of the journal' Ecological Economics'in 1989] *are, however, more an expression of the will and preferences of the international academic community than the actual consolidation, or even definition, of a new scientific discipline. It is not even known very well how this ecological economy would differ from economics in general* (Żylicz, 1989, p. 156-157). He further notes that '*the ecological economy is shaped in a certain opposition to the 'ordinary' environmental economics. This second, which achievements are mainly related to the Journal of Environmental Economics and Management (published since 1974) and the scientific society that sponsors it, is more homogeneous. It is less interdisciplinary, and with regard to economics itself, it shows a preference for the neoclassical school. The most important environmental economics achievements concern the application of the neoclassical analysis apparatus to solve practical issues of conservation policy. The undoubted merit of the supporters of this approach is the promotion of some innovative tools for environmental protection, such as transferable rights or deposits*' (Żylicz, 1989, p. 157).

The precursors of this economy are Kenneth Boulding, Paul Erlich, Nicholas Georgescu-Roegen, Herman Daly and Dennis Meadows. The prominent representatives are Edward Barbier, John Cumberland, Robert Constanza and David Pearce (Fiedor, 1992, p. 19-34).

Discussions on the subject of ecological economics appeared already in the early 1990s. Then R. Constanza, H. Daly i J. Bartholomew presented a

Table 1. Research areas of ecological economics, according to R. Constanzy, H. Daly'ego and J. Bartholomew

From–To	Economic sectors	Ecological sectors
Economic sectors	Orthodox trends in economics, traditional models of economic growth	Economics of the environment and natural resources, an ecologically-economically sustainable growth model
Ecological sectors	Economics of natural resources, durable growth model	Ecology, zero growth model
	Ecological economy, the concept of sustainable development	

Source: R. Constanza, H. E. Daly, J. A. Bartholomew, *Goals, agenda, and recommendations for ecological economics* (in:) „Ecological Economics', R. Constanza [Ed.], 1991.

proposal for understanding the research field of this discipline (Table 1).

In this context, ecological economics is treated as a transdisciplinary approach, trying to depart from the theoretical foundations and assumptions of neoclassical environmental economics. It uses the achievements of all disciplines focused on the natural environment (Table 2).

Such a transdisciplinary approach to ecological economics may somewhat blur its existing differences in relation to environmental economics, the more so as the supporters of this relatively new discipline, which is ecological economics, willingly criticize neoclassical economics and the paradigm of economising the natural environment.

Despite this greater interest in environmental economics, Professor Tomasz Żylicz was able to appreciate certain elements of ecological economics, especially in searching for a new paradigm of economics, ecological and economic efficiency or energy theory of value and ethical justice. It can be concluded from this that he was aware of the advantages of environmental economics and its limitations.

Undoubtedly, the book 'Economics of the environment and natural resources' [Polish title: *„Ekonomia środowiska i zasobów naturalnych*'] is a confirmation of the views of Professor Tomasz Żylicz and his research attitude close to environmental economics (Żylicz, 2004). It can be treated as a textbook in which the author introduces the issues and through the selection of issues and methods of their presentation, testifies to his preferences. This is the right of every author. If we look at the content of the book, we can see the issues of environmental economics and natural resources developed on the basis of neoclassical microeconomics, neo-Walrasian general equilibrium, or the modern welfare economy. And this is a pure environmental economy.

In the following years, the disputes between ecological and environmental economics are also transferred to other issues, namely the sustainability of socio-economic development, and in a broader context, to other principles of such development and the principles of treating various forms of capital.

Professor Tomasz Żylicz did not avoid the issue of creating a national environmental policy so that it would respect the principle of sustainable development. In this way, this general description of the relationship between the economy and the natural environment takes on a very practical dimension, becoming the basis for discussing how these relationships should be shaped so that both current and future generations can use environmental resources and services without threats and without lowering the standard of living (social welfare and individual well-being) (Żylicz, 2014).

These issues attract the attention of researchers representing various disciplines, often of an interdisciplinary nature. According to Professor Tomasz Żylicz, students of economics should be properly educated, and therefore in an interdisciplinary way. They will face such complex problems in their professional work and solve them efficiently (and therefore deliberately, effectively and efficiently) (Żylicz, 2010, p. 84-94).

Table 2. Transdisciplinary sources of ecological economics

Disciplines	The scope of interest in ecological economics
Social sciences and humanities	• historical, ethical, sociological and psychological foundations and dependencies of environmental protection; • elements of environmental education and ecological ethics;
Political science	• study of interest groups and their importance in the protection of the natural environment and the creation of environmental law; • principles governing the protection of the natural environment in societies and communities; • development (evolution) of the goals and strategies of balanced and sustainable development;
Law and legal sciences	• codification of instruments and standards of environmental protection in the national and international dimension; • creation of new solutions in the field of the law of protection and use of the natural environment;
Environmental sciences	• recognition of the impact of individual interactions (processes, substances) on the natural environment; • study of the consequences of negative and positive impacts on the natural environment and the methods of their formation; • analysis of the state of the natural environment and individual ecosystems on micro to global scale;
Technical sciences	• development of techniques (technologies, devices, and methods) for the protection of the natural environment; • developing low-centric methods of influencing the elements and components of the natural environment; • rationalization of the use of resources, values and services of the natural environment; • developing technical progress in accordance with the BAT philosophy;
Economics	• the use of optimization algorithms in the use and impact on the natural environment; • creation of appropriate methods of valorisation of elements and components of the natural environment; • development and implementation of a new paradigm of modern economics.

Source: Author's literature study.

3. The Emergence and Potential Opportunities for the Development of Environmental and Ecological Economics

A review of the planes, directions and methods of development of economic and ecological research in the theory of economics, as well as the analysis of various contemporary theories or economic models, allows distinguishing two basic model approaches that can be treated as specific paradigms in this area: (1) the ecological paradigm of economics (the ecological economics and economic activity), (2) the paradigm of economisation of the natural environment in the context of its protection and economical use (Czaja & Fiedor, 2010, p. 30-52). There is a third consensus approach between the two.

The ecological paradigm of economics and economic activity is derived from the critique of the usefulness (suitability) of the traditional neoclassical optimisation analysis for solving the problem of degradation and protection of the natural environment, as well as ensuring its appropriate quality and the availability of environmental resources for future generations (generational justice formulas). This criticism refers, among others, to such arguments (not taken into account, according to its representatives in mainstream economics), such as (1) the multidimensionality and cumulative nature of the phenomena occurring at the interface between the economy, society and the natural environment, (2) the existence of interactions between various types of pollution in the natural environment and (3) interdependencies between the economic system on the one hand and natural systems (physical, biological, meteorological and others) on the other.

The ecological paradigm of economics means treating the natural conditions and goals of economic development as absolutely superior to the conditions and goals formulated and analysed in the traditional, mainly neoclassical, theory of economics. According to this paradigm, it is not the resources of anthropogenic capital – or its accumulation – but the resources of natural capital – that are the most important constraints on modern economic development. Maintaining its stability, including at least the not deteriorating quality of the natural environment, is the most important goal of this development.

The paradigm of economising the natural environment is a view somewhat opposite to the ecological paradigm of economics. It is mainly related to neoclassical environmental economics. According to it, the instruments of economic optimisation analysis, both static and dynamic, can and should be used to define methods and instruments with the help of which the environmental policy minimises the costs of achieving the assumed or desired ecological goals (e.g., improving the quality of the natural environment), or implementation costs (usually expressed as investment costs) of ecologically sustainable growth. The economisation of the natural environment (its resources and services) contributes to a more effective use of the limited material and human resources that are necessary to achieve the environmental goals formulated by the policy. In this way, it reduces the opportunity cost of environmental protection, which is the depletion of resources necessary for implementing other objectives co-determining the level of social welfare, including those related to the increase in material welfare.

The paradigm of the economisation of the natural environment does not exclude the need for the theory of economics to search for new methodological foundations for the study of relations between the economy and the natural environment. An example is the ecological modifications of the analysis of inputs and results or the use of the law of conservation of mass and energy to study economic phenomena (Żylicz, 1989). However, this paradigm is opposed to the view that there is a need to create 'ecological meta-science' (W. Kapp). Individual scientific disciplines dealing with complex problems of the natural environment should cooperate with each other, maintaining, however, their methodological specificity and the distinctiveness of the research subject. The main task of economics in this system is to show the economic consequences and interactions between improving the quality of the environment and other factors co-determining the level and dynamics of material or social welfare. Many views of Professor Tomasz Żylicz seem to be consistent with this perception of the role of economy and ecology (Żylicz, 2014).

Both paradigms have profoundly influenced the development of two new disciplines within ecological economics and environmental economics. On the other hand, both paradigms were shaped by a conceptually broader process related to the dispute between the worldview and accompanying attitudes based on anthropocentrism and the worldview and attitudes based on natural-centrism.

One of the discussion threads in contemporary economics concerned the important problem of defining the concept and scope of a new discipline dealing with ecological and economic problems, especially the economic basis for protecting the natural environment or the exploitation of its resources. There have been various proposals in this area, from the already signalled ecological meta-science, through the greening of traditional theoretical schools, to environmental economics and ecological economics.

As a result, we are dealing with a specific situation. If it is considered a separate scientific discipline, ecological economics is at the initial stage of its development. On the other hand, environmental economics uses the concepts, models and neoclassical economics methods to such a wide extent that it is challenging to consider it as a sufficiently independent research area (a scientific discipline). In the foreseeable future, its ties with neoclassical economics will continue to be very strong.

One more approach can be seen, apart from the two above, based on the aforementioned paradigms, namely the search for a consensus in balancing the processes of environmental economisation and the greening of the economy, and other aspects of socio-economic development. This approach can be found precisely in the discipline developed in recent years under the name of sustainable development economics (Rogall, 2010). It is difficult to clearly define which approach is the closest to Professor Tomasz Żylicz. He did not expressly formulate his position. From his original studies, which I had the opportunity to read, in my interpretation, Professor Tomasz Żylicz is a supporter of the consensus search, but with slightly greater use of the achievements of environmental economics and the optimisation allocation apparatus of modern economics. Perhaps it is supported by mathematical education and a greater tendency to

solve economic and social practice problems (Sulich, Rutkowska & Popławski, 2020).

4. Basic Differences Between Ecological and Conventional Economics

The studies within the framework of ecological economy show its holistic perspective of understanding the relationship between man - society - economy and the natural environment. You can also see a completely different time perspective (Czaja, 2011), in which the need to limit various forms of economic activity is visible (Becla, Czaja & Graczyk, 2020). The latter's concern is the ability of natural ecosystems to provide material resources, energy carriers, assimilate pollutants and preserve the conditions for the survival of other species. The economy for the ecological economy is an element of mega-system: economy - society - natural environment.

Reading studies in ecological and environmental economics, or more broadly neoclassical economics, allows distinguishing the fundamental differences between the two approaches.

First, in the neoclassical growth theory, natural resources are not a barrier to such growth because the limitless potential of technological innovation can substitute them. For the ecological economy, each innovation increases the consumption of resources and/or the degradation of the natural environment, and therefore natural and anthropogenic capital are complementary, and not substitutable.

Second, the leading goal for the ecological economy is to maintain the long-term sustainability of the integrated mega-system achieve such a goal, it is essential to optimise management on a macro scale, and not from the perspective of individual entities, i.e., micro.

Third, the ecological economy focuses on the optimal size of the economy (scale of farming). On the other hand, neoclassical economics promotes economic growth, which means an increase in the flow of matter and energy between the economy and the natural environment, with all its consequences (Stiglitz, Sen & Fitoussi, 2010).

R. Constanza, H. Daly and J. Bartholomew proposed a more detailed comparison of ecological economics with the so-called conventional economics, distinguishing several vital features, in their opinion, such as (1) general view of the world, (2) time and spatial frames and genre views, (3) the basic goal at the macro and micro level, (4) the assumption of technological progress, and (5) the scientific nature of research. The results of the comparison are presented in Table 3.

The ecological economy is at the stage of intense, though not consistently, accurate searches. As K. Górka notices, in an ecological economy, one can find fancy terms, sometimes effective ideas, and ineffective solutions. There is still a long way of research ahead of its representatives before ecological economics is fully recognised as a scientific discipline (Górka, 1992, p. 39).

If we look at the scope of ecological economics research formulated by the International Society of Ecological Economics (ISEE), these include:

- on the one hand, modelling the relations between society, economy and the natural environment, creating indicators for measuring these relations and the valuation of elements and components of the natural environment;
- on the other hand, the boundaries of intra- and intergenerational justice, the permissible size of trade and development, and the scope of policy instruments (Żylicz, 2016; Becla, Czaja & Poskrobko, 2014).

They cannot be considered of little importance in the modern world. However, they do not solve many of the current significant challenges. This is also noticed by Professor Tomasz Żylicz (Żylicz, 2007, p. 109-122). On the other hand, environmental economics studies the static and dynamic conditions for the optimal use of resources, values and services of the natural environment. The static aspects concern the efficient use of the limited resources allocated to protect and maintain the environment (preserving its quality and resources). Dynamic aspects concern the optimal use of resources and values of the natural environment in economic growth and development. Environmental economics is based on the economisation paradigm – the criteria of ecological efficiency and optimality are treated as the main ones, while the criteria of ecological safety or criteria resulting from the concept of sustainable development as supplementary. Such an approach makes it possible to distinguish three leading theoretical areas in environmental economics: (1) the economic theory of the use of material resources,

Table 3. Comparison of conventional and ecological economics in terms of R. Constanza, H. Daly and J. Bartholomew

Feature	'Conventional' economy	Ecological economy
General view of the world	Mechanistic, static, atomistic, individual preferences are recognized as basic data and dominant forces to be considered in the analysis, natural resources unlimited thanks to technologies and substitution	A dynamic systemic, evolutionary; preferences, technologies and organisms co-evolve to reflect a wide spectrum of ecological opportunities and constraints, people are responsible for their role in social and natural systems and their sustainability
Timeframe	Short: 50 years, usually 1–4	Multiscale: days to centuries multiscalar synthesis
Spatial framework	Local – International: Basic Analysis Units - Companies and Countries	Local-global: scale hierarchy
Genre framework	Only people	Entire ecosystems, including man: recognizes the relationship between nature and man
Primary macro target	Growth of the national economy	Sustainability of the ecological and economic system
The primary target of micro	Maximize profit (company) or utility (person): this drive leads to the macro goal, external costs and benefits ignored	Must be aligned with the macro goal: social organization and cultural institutions at a higher level of the temporal and spatial hierarchy resolve conflicts arising from short-sighted lower-level micro-goals
Assumption of technological progress	Very optimistic	Cautious sceptical
Scientific character	Monodisciplinary	Transdisciplinary

Source: Constanza, R., Daly, H. E., Bartholomew, J. A. (1991). Goals, agenda, and recommendations for ecological economics. In R. Constanza (Ed.), *Ecological Economics*.

which studies the optimal distribution of renewable and non-renewable natural resources in time, (2) the economic theory of pollution and environmental protection, examining the economic efficiency of achieving specific goals concerning environmental costs by comparing social and private costs of reaching the assumed level of environmental quality and (3) the economic theory of environmental preservation, dealing with the optimal conditions for the use of environmental resources from the point of view of the aesthetic and psychological values of the environment.

In resolving the dilemma of economy and ecology, Professor Tomasz Żylicz uses the views of H. Daly. According to them, environmental economics and ecological economics have different subjects of research and different methods. Then each discipline should be used for what it is best suited for. Ecology should indicate how far a man is allowed to interfere in the natural environment, i.e., to decide on the scale of the use of nature. On the other hand, allocation decisions – about who would use how much from the total available resources are most competently researched by the economy (Żylicz, 2014, p. 25-26). This may be a better, more effective and less costly path to finding solutions to current environmental problems that collide with very traditional ways of seeing nature.[2]

Using the views of Professor Tomasz Żylicz and other discussion participants, it is possible to define separate paths of ecological and environmental economics in the identification and proposals for solving contemporary problems of the natural environment (Table 4).

They come from different paradigms. They base their research on different methodological and methodological methods. They propose various approaches to solve real problems of the natural environment and other time, space and species perspectives. However, one can risk based on the observation is that both paths will lead to an economy of balanced and sustainable development.

2 Many such conditions in the context of global climate change can be found in the famous work by Naomi Klein: *To zmienia wszystko. Kapitalizm kontra klimat*, Warszawskie Wydawnictwo Literackie MUZA SA, Warszawa 2016.

5. Potential Directions of the Evolution of Ecological and Environmental Economics in Contemporary Economic Thought

At the current stage of development of both disciplines – ecological and environmental economics – one can imagine several scenarios of further evolution in this area:

(1) independent, separate and partially independent development of both disciplines,

(2) the way to a synthesis consisting of 'merging' one discipline into another, when one of them takes over the domination,

(3) the disappearance of both disciplines and the taking over of their research problems by theoretical schools of mainstream economic theory,

(4) the emergence of a new discipline using the achievements of both disciplines, constituting the theoretical basis for the sustainable development strategy, i.e. the 'economy of balanced and sustainable development'.

The fourth scenario can be seen especially in the German literature, where the ideas of ecological economics are treated as a starting point for the development of a sustainable economy, which is to be the theoretical basis of the sustainable development strategy. Such discipline should be based on several of the following elements[3]:

- a strong concept of durability,
- correction of the reductionist methodology of environmental economics towards a pluralist approach,
- the evolution of mainstream economics and ecological economics towards a sustainable economy,
- the proper internal structure of the ecological economy,
- sustainable development, which is based on ethical and philosophical principles, including a call for a sense of personal responsibility and accountability for their actions,
- the interdisciplinarity of the methodological approach,
- the need to change the framework conditions of management through the use of political and legal as well as institutional and organizational instruments,
- the need to properly identify the concept of sustainability and develop new macro-indicators of socio-economic development,
- socio-ecological market economy or mixed economy as an economy model,
- identification of the main global determinants of sustainable development.

This scenario seems very interesting for several reasons. Firstly, sustainable development and the accompanying strategies do not have a complete theoretical basis. It seems natural for it to be developed. Secondly, sustainable economics could become a platform for the synthesis of the achievements of contemporary economic sciences in ecological and economic problems, giving the opportunity to accelerate the development of knowledge. Thirdly, the emergence of a new discipline always poses interesting cognitive challenges and offers an innovative approach to research problems. Ecological and economic issues must become a permanent element of both researches undertaken by universities and other research centres, as well as the didactic process and shaping awareness (knowledge) and attitudes.

6. Final Conclusion

The problem of understanding ecological and environmental economics is just one of the many important issues that can be found in the works of Professor Tomasz Żylicz. It is connected not only with very interesting theoretical, cognitive and terminological issues, but also practical issues related to the implemented environmental policies or sustainable development strategies at their various levels. Reading the output of Professor Tomasz Żylicz allows us not

3 See also: Rogall, H. (2010) *Ekonomia zrównoważonego rozwoju. Teoria i praktyka*. Poznań: Wydawnictwo Zysk i spółka. Many important studies on sustainable development, interpretations and methods of implementation in social and economic practice have been published in German. In Poland the Prof. Rogall's book is the most popular,.

Table 4. Ecological and environmental economics paths in identifying and solving problems of the natural environment

Ecological economy	Environmental economics
The paradigm of greening the economy	The paradigm of economising the natural environment
Creating ways of understanding the relationship between the natural environment - man - economy based on ecology, ethics and philosophy	Using the achievements of modern economics and economic thinking
Building a proper ecological awareness and life (consumption) attitudes	Launching effective market mechanisms to solve ecological problems
Practical use of resources, values and services of the natural environment, taking into account the criteria of intra- and intergenerational justice	Practical use of resources, values and services of the natural environment with the use of static and dynamic optimisation methods
Economics of sustainable development	

Source: Author's study.

only to get to know his views, understand many issues but also to pose one's own questions and seek answers to them, which is often the most valuable asset of the work of researchers, whom we can call Masters. Such a figure is Professor Tomasz Żylicz.

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