

# open eyes book 3

Bartłomiej Biga  
Jerzy Bralczyk  
Tadeusz Gadacz  
Konrad Grabiński  
Jerzy Hausner  
Anna Januchta-Szostak  
Bob Jessop

Zbigniew W. Kundzewicz  
Wojciech Paprocki  
Joanna Sanetra-Szeliga  
Andrzej Sławiński  
Igor Zachariasz  
Jacek Zaleski  
Mateusz Zmyślony

---

If we were to underscore the importance of civic initiatives, such as Open Eyes Economy, we would say – to paraphrase the title of John Lennon’s unforgettable song “Give Peace a Chance” – that grassroots social initiatives are needed to give values a chance

---

ISBN 978-83-948523-3-7



9 788394 952327 >

## open eyes book 3

How my friend Raymond who  
helped me with the article  
in this book

Paul

# Table of Contents

- 7 *Foreword*

## PART I – FIRM-IDEA

- 13 **WOJCIECH PAPROCKI**  
*The Concept of Firm-Idea  
in the era of the Fourth Industrial Revolution*
- 47 **ANDRZEJ SŁAWIŃSKI, JERZY HAUSNER**  
*Values in finance:  
The perspective of the Open Eyes Economy*
- 77 **KONRAD GRABIŃSKI**  
*Measuring social obligations  
in accordance with the concept of Firm-Idea*
- 95 **BARTŁOMIEJ BIGA**  
*The Possibility of replacing legal monopolies  
in the pharmaceutical sector with broad conditional  
access to intellectual property*
- 111 **JACEK ZALESKI**  
*Proposal of a new method  
for formulating patent claims*

PART II – CITY-IDEA

- 135 **ZBIGNIEW W. KUNDZEWICZ**  
*Climate change and its impacts.  
Possibilities for mitigation and adaptation*
- 155 **ANNA JANUCHTA-SZCZAK**  
*Water-friendly cities?*
- 179 **IGOR ZACHARIASZ**  
*The Right to the city  
as a public subjective right*
- 197 **MATEUSZ ZMYŚLONY**  
*Urban development strategies.  
City-Idea or which way to a new home*

PART III – BRAND-CULTURE

- 219 **JERZY BRALCZYK**  
*Truth*
- 229 **JOANNA SANETRA-SZELIGA**  
*Culture – a strategic resource?*

PART IV – MAN-WORK

- 247 **TADEUSZ GADACZ**  
*The University in times of thoughtlessness*
- 261 **BOB JESSOP**  
*Varieties of academic capitalism  
and entrepreneurial universities*
- 293 **JERZY HAUSNER**  
*The Social space-time  
of economic value creation*



# Foreword

Volume Three of the Open Eyes Book is thicker than the previous two. This is not so much due to the expanded agenda of the present Open Eyes Economy Summit – Congress, as to the fact that we systematically strengthen the Open Eyes Economy as an intellectual and implementation movement in order to include new stakeholder groups and new threads in it.

The summit takes place every November in Cracow, but to reach it, we take various paths leading through numerous thematic areas and different cities where we organise our debates, seminars, and conferences. In 2018, they have already been hosted by nearly 25 cities. In this way, we not only influence the public, but also mobilise the movement's active participants to embrace a different, open view of both economics and the economy, as well as invent and implement alternative ways of interpreting the economic reality and actions to those considered dominant so far.

Neoclassical economics adopted utilitarian ethics as its foundation, which has led to an extreme instrumentalisation of thinking about economic values. The Open Eyes Economy movement follows the example of Amartya Sen, Nobel Prize winner in economics, who emphasised that modern science has upset the balance between two traditions, i.e. the one that originates with Aristotle and the Stoics, and combines economics with philosophy, especially ethics, and the one that treats the former exclusively as a science and attempts to formalise it. Our responsibility is to restore this balance, but it requires overcoming the hegemony of

utilitarianism as an ethical benchmark for economics. It is not a question of rejecting analytical methodologies and analytical thinking in economics, but complementing them with a broader reflection which makes it possible to recognise the social consequences of economic activity and economic education.

The Open Eyes Economy is not exclusively an intellectual or academic movement. It is also intended to show alternative ways of doing things as opposed to the purely commercial and opportunistic management practices and their dissemination. For example, one of the practical issues with which we are currently dealing is the approach to intellectual property and its practical application. We are critical of the dominant business model of intellectual property protection, especially the practice of patenting solutions and concepts. We set out to prove that it is an economically and socially expensive as well as inefficient model. Most companies do not patent with a view to increasing profits, but in order to minimise losses. They do not really have a choice, since if they refuse to follow suit, it would cost them even more. There is no way out of this quandary until a different definition of the situation is adopted. We advocate a completely contrary model: instead of passively protecting intellectual property, intangible assets should be actively managed. While the predominant model to date relies on preventing others from accessing our intellectual property, the new one is based on conditional availability (diffusion) of our tangible assets to others – as a basis for partnership building, competence development, and knowledge generation. The instinct to exclude others should be replaced by conditional inclusion, and the drive to prevent others from producing should be replaced by co-operation. The pool of benefits will expand, moreover, the proposed model does not eliminate rivalry and market competition.

In our successive projects, we focus on the key points of reference for us, to wit: companies, cities, and schools, especially universities. We bond them together by introducing an axiological perspective to reflect on and describe these basic forms of organisation of collective life. This is understandable, since our movement represents the value economy, which opposes the greed economy. Hence the names of our fundamental

concepts: Company-Idea, City-Idea, University-Idea. Put together, they offer a cognitive perspective specific to the Open Eyes Economy, which emphasises the anthropological and cultural approaches to the analysis of economic phenomena.

More and more people seek to overcome dogmatic thinking, to formulate and disseminate a heterodoxical approach to the most pressing problems of modern times. They are well aware that if we want to change the way we do things, we have to change the way we define the situation and rewrite a number of dogmatic and scholastic concepts. And we are heading in the same direction, even if we choose to follow different paths. They are bound to cross one day.

*Jerzy Hausner*

Chairman of the Programme Board

Open Eyes Economy Summit



# Wojciech Paprocki

## The Concept of Firm-Idea in the era of the Fourth Industrial Revolution

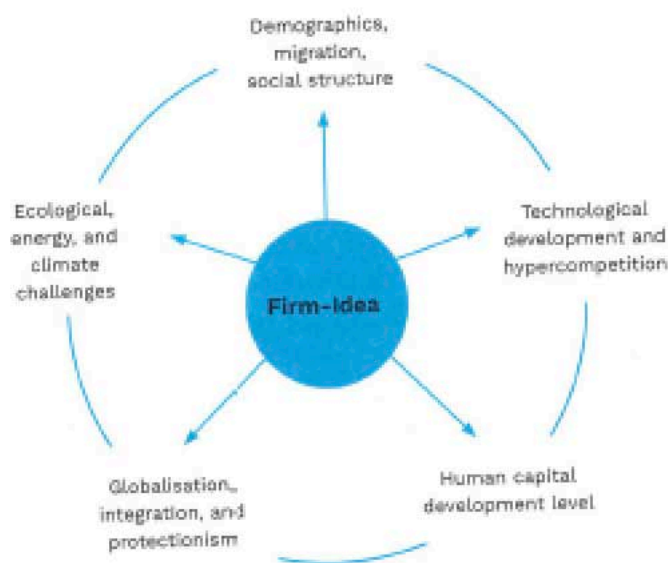
### Introduction

In every era, the situation is unusual – so much is changing and will continue to change. Michał Wawelberg's words, written in 1930, make it abundantly clear: "The pace of life is so fast that we usually have neither the time nor are willing to think about or examine in depth the meaning and causes of various phenomena of economic and social life; we do not take into account the implacable law of causality" (Wawelberg 1930, p. 5). It seems, however, that at the end of the second decade of the 21<sup>st</sup> century we really are facing a unique opportunity to change the way business enterprises operate. For the first time in the process of civilisational development, we have an opportunity to give up trying to answer the question "How will we live?" and move on to the question "How we want to live?" (Precht 2018, p. 15). This is due to the fact that in the coming decades, working hours may become significantly shorter, and perhaps even a part of society will remain outside the labour market, while everyone will be guaranteed subsistence. The remarks presented in this paper refer to the current of thought which has been present in the literature for over a century. It constitutes an attempt to apply two approaches – the theoretical one and the historical one in social sciences

## The business environment in the Fourth Industrial Revolution

During the Fourth Industrial Revolution, as in the previous periods, a business entity active on the market achieves the capacity to survive and develop provided its revenues exceed costs by sufficient margin and it can settle its obligations on an ongoing basis. In order to sustain this capacity, it must respond promptly and adapt to changing conditions in the environment, which constitutes an element of the social and cognitive space interpreted as Firm-Idea. During the Fourth Industrial Revolution, the greatest attention should be paid to the five basic areas that make up the company's environment. These are shown in Figure 3.

Figure 3. Five business environment areas with an impact on the enterprise in the Fourth Industrial Revolution



Source: Own study.

# Andrzej Sławiński

## Jerzy Hausner

### Values in finance: The perspective of the Open Eyes Economy

*If we learn anything from the history of economic development, it is that culture makes almost all the difference.*

Landes 2000

#### Introduction

Recently, we have witnessed three spectacular events in finance: the global banking crisis, the advent of the index revolution, and the emergence of cryptocurrencies. All three resulted indirectly from the diminishing commitment of the authorities to the core free-market and social values.

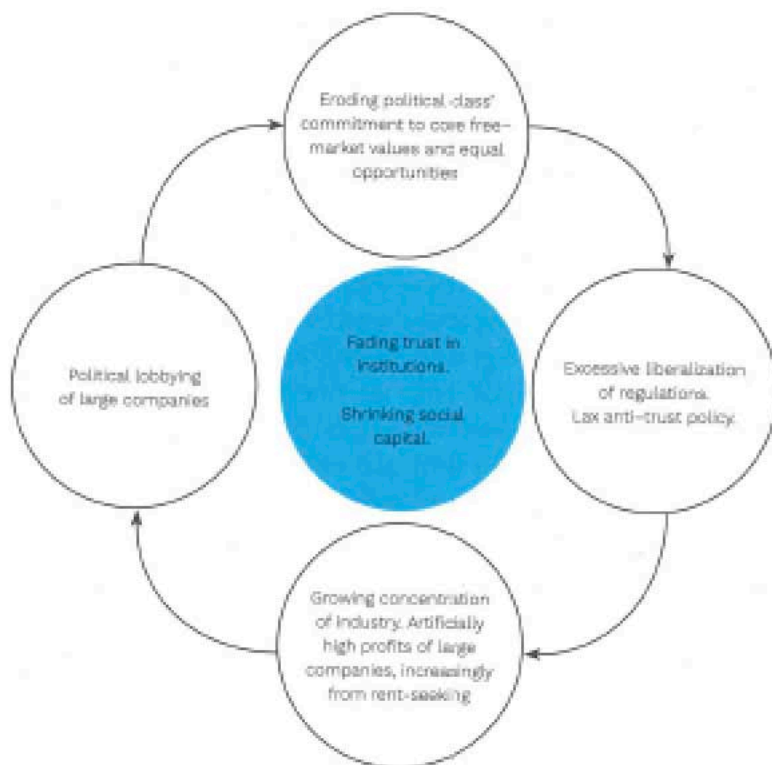
The global banking crisis of 2007–2009 resulted not only from regulatory mistakes. Some of these mistakes were not fortuitous; they were the product of consolidation of crony capitalism enabled by excessively lax bank regulations facilitating the emergence of the too-big-to-fail financial conglomerates with their excessive risk taking propensity.

The index revolution has resulted in a massive redirection of Americans' savings flows from actively to passively managed funds. This was undoubtedly a positive phenomenon, but such a change could have occurred much earlier had the authorities informed prospective pensioners that index funds were the best option for investing their retirement savings.

riskier business lines, such as trading, under the umbrella of taxpayer's insurance of household deposits (Hoenig 2018).

Diagram 1 illustrates the feedback loop between the weakening commitment of the political class to core free-market and civic values and the solidification of crony capitalism producing opportunities for rent-seeking by large firms. This mechanism erodes trust in democratic institutions, which, in turn, diminishes social capital (a culture of trust and cooperation) indispensable for long-term growth (Cox 2017; Sztompka 2016; Westlund, Frane 2010).

**Diagram 1.** Crony/state capitalism's self-reinforcing vortex



Source: Own study.

# Konrad Grabiński

## Measuring social obligations in accordance with the concept of Firm-Idea

### Introduction

The concept of Firm-Idea prompted a new way of thinking about the role of enterprises in the economy. The model is being developed in a variety of fields, including copyright protection, human resources management, and ways of managing organisations. One of its more important areas is the accounting side of organisational resources, including, in particular, the identification and measurement of social obligations. The fact that so far no social obligations have been included in accounting reports does not mean that they do not actually exist. A more limited view of the economic reality presupposes that a business entity identifies and fulfils only those obligations which it cannot avoid. The recognition of other responsibilities, the so-called social obligations, as understood by a given entity, is considered not only inappropriate, but also a sin of mismanagement. As a result, numerous businesses feel no responsibility for the fates of local communities or their environment. More socially aware entrepreneurs recognise that their company's existence and future depends on the future of the environment and communities in which they operate, including suppliers, customers, employees and other stakeholders.

Despite the many attempts, measuring social obligations, or much more broadly, measuring pro-social activity, has yet to succeed in terms



# Bartłomiej Biga

## **The Possibility of replacing legal monopolies in the pharmaceutical sector with broad conditional access to intellectual property**

### Introduction

The rationale for the existence of a legal system to protect inventions based on temporary monopolies can only be perceived in a dynamic perspective. In static terms, restricting the dissemination of innovation from a social vantage point should be viewed as a decidedly negative phenomenon. However, the promise of exclusivity offered by intellectual property rights is intended to boost the incentives to engage in inventive activities by providing favourable and safe conditions for the dissemination of the effects of such work over a certain period of time.

It should be emphasised, however, that the promise of obtaining a patent is not the only motivation to innovate. Quite often, considerable importance is also attached to prestige or the opportunity to secure benefits thanks to business models which presuppose a wide dissemination of the invention, i.e. when the commercial potential is based on the prospect of selling complementary goods and services or on the network effect. It is also impossible to ignore such circumstances as the time advantage (which considerably benefits the innovator), or the positive impact of the leading edge on a number of intangible resources held by the company.

## Proposal of a new method for formulating patent claims

### Introduction

This article presents a new method for formulating patent claims called the *ssm* (Strictly Syntax Method) and explains the idea behind it as well as its properties. The descriptive part of this paper focuses mainly on the logic of patent claims, offers a brief introduction to mathematical logic and set theory, including Venn diagrams, and relevant aspects of patenting rules. This method was the subject of a doctoral dissertation defended by the author at the Warsaw School of Economics.

Work on the new method of patent claim preparation and on patent descriptions is still in progress, although at the moment, it focuses mainly on its proper management, both at the implementation stage and once it has been fully commercialised. *ssm*-dedicated software is also being developed. These issues will be discussed in more detail later in this article, after the *ssm* system and its proposed modifications have been outlined. Next, the author analyses the possible stakeholders' behaviour in the process of implementing the method in question. The article concludes with an overview of the institutional aspects of the use and dissemination of the modified *ssm* system.

# Zbigniew W. Kundzewicz

## Climate change and its impacts

### Possibilities for mitigation and adaptation

#### Introduction

Climate can be defined as a series of complex atmospheric processes influenced by physical and geographical features of a given area. Climate reflects an image of the weather averaged for a longer period of time (e.g. 30 years), or the state of the atmosphere on a certain distant future day that can be expected at present. The weather will be the state of the atmosphere that will actually occur on that day. Consequently, the actual weather may significantly differ from the averaged expected conditions.

For several decades we have witnessed a clear and undisputed climate change. Nature broke the global average temperature records three times in a row – in 2014, 2015, and 2016. In the history of observations, out of the 18 warmest years, 17 have occurred since 2001. In other words, each completed year of the 21<sup>st</sup> century ranked amongst the 18 warmest years. The time series of decadal average global temperature trends shows that each of the last three decades was warmer than the previous one. Globally, the first decade of the 21<sup>st</sup> century was warmer than the 1990s, which, in turn, was warmer than the 1980s, whereas the 1980s saw higher temperatures than the 1970s.

# Anna Januchta-Szostak

## Water-friendly cities?

*Don't divorce the river from its basin*

H.B.N. Hynes 1970

### Introduction

In 2015, the World Economic Forum for the first time placed the water crisis at the top of the world's greatest threats. In subsequent reports, apart from weapons of mass destruction, climate and environmental threats were mentioned: weather extremes, natural disasters and the failure of climate change adaptation, which may further exacerbate the water crisis (World Economic Forum 2018).

In the context of projected urban population growth, particularly in low and middle-income countries where the pace of urbanisation is expected to proceed the fastest (UN DESA 2018), the risks associated with water scarcity, excess and pollution in urbanised areas may have global effects (Kundzewicz, Kowalczyk 2011).

Europe experienced a similar urban boom and its environmental consequences in the 19<sup>th</sup> and 20<sup>th</sup> centuries. Today, European cities are increasingly sustainable, even though they are home to 74% of the Old Continent's population. The experience of previous centuries allowed us to raise the environmental standards, but are European cities actually water-friendly?

## The Right to the city as a public subjective right

Explaining what the right to the city is, or rather what it may be in the context of the discussion which started in the 1960s, causes lawyers a lot of problems. First of all, they must give a clear answer as to what the right is in general, for its very concept is hotly debated. As Immanuel Kant already pointed out, this issue may dismay many a scholar, who, for fear of falling into tautology and the lack of a general notion of right, will invoke legal regulations that prevail in a certain place and at a certain time (Kant 2015, p. 39). In the contemporary debate on the right to the city, it is rather not the question of referring to a certain legal practice based on the regulations in force in a given country which guarantees this right. When considering the problem of the right to the city today, we often mention an idea, a vision, and a postulate (Lefebvre 2012, p. 184) which rarely find a positive expression in the legal systems in some countries, and if so, they tend to be quite generally formulated (Izdebski 2017a). However, even if the lawyers invoke a general definition of the right, they must not stop there. They still need to explain what the city is, which is not a simple matter either. The concept does not always refer to a physical space with a strictly defined development structure or its specific features. The origins of the city can be sought not so much in its spatial layout or architecture, but in its functions, which are often identified with those of a centre of power (Benevolo 1995, p. 15). It is also possible to identify the city not so much with power as with knowledge. It is worth recalling that the legal definition of city (town) adopted in



# Mateusz Zmyślony

## Urban development strategies. City-Idea or which way to a new home

Long-term planning and thinking about how to manage urban development deserves an entire series of books. The aim of this text is to offer a brief summary Polish experiences in this area in the last 20 years.

Why Polish experiences? It is not only about our local perspective. Taking an objective look at the development of our cities over the last two decades, we can safely say that we are witnessing a distinctive and unique phenomenon – an extremely interesting case study.

Why cities? We are witnessing a historic change. Before our very eyes, people move out of villages. They are no longer needed there – mechanisation and industrial breeding methods have changed the old world. Until recently, 90% of humankind lived in rural areas. Today, this proportion has been reversed.

People eventually moved into cities, which have become completely different organisms from they it used to be. It is hypothesised that the system of nation states will be succeeded by a global network of cooperating super-cities. Robert Biedron, The Mayor of Slupsk, spoke about it during the 2017 Open Eyes Economy Summit. Super-cities, which develop on the foundations of the existing urban areas, are the elements that we are only trying to control. Few people are aware of the pace of their growth. The populations of the largest ones already exceed 20 million people. An extreme case in point is Lagos, the former capital of Nigeria. This largest city in Africa recently boasted 21 million inhabitants, but is still expanding rapidly. According to the more pessimistic scenarios, by

# Jerzy Bralczyk

## Truth

Zilu said, "If the ruler of Wei were to entrust you with governance of his state, what would be your first priority?"

The Master said, "Most certainly, it would be to rectify names."

Zilu said, "Is that so? How strange of you! How would this set things right?"

The Master said, "What a boor you are, You! A junzi<sup>1</sup> keeps silent about things he doesn't understand.

"If names are not right then speech does not accord with things; if speech is not in accord with things, then affairs cannot be successful; when affairs are not successful, li<sup>2</sup> and music do not flourish; when li and music do not flourish, then sanctions and punishments miss their mark; when sanctions and punishments miss their mark, the people have no place to set their hands and feet. Therefore, when a junzi gives things names, they may be properly spoken of, and what is said may be properly enacted. With regard to speech, the junzi permits no carelessness."

The Analects of Confucius, 13.3, pp. 66–67<sup>3</sup>

The very notion of post-truth appears to be homologous: it reflects well both what it means and what it is supposed to diagnose. By virtue of its vagueness, it can be used in a number of ways without incurring any special responsibility, hence it is also convenient. Moreover, it sounds good as a member of a group of words built with the prefix *post-*, which

1 A cultivated gentleman.

2 Custom.

3 Open access [http://www.indiana.edu/~p374/Analects\\_of\\_Confucius\\_\(Eno-2015\).pdf](http://www.indiana.edu/~p374/Analects_of_Confucius_(Eno-2015).pdf)

# Joanna Sanetra-Szeliga

## Culture – a strategic resource?

### Introduction

Culture can be thought of and defined in a variety of ways. However, what seems to be the most important is its human dimension – culture is everything that is not necessary for one's survival in the physical sense, but essential to feel human. It is an expression of values which can be conscious, as in the case of works of art or religious practices, or not entirely conscious, but still commonly present, as in the case of family celebrations or ways of spending time (Matarasso 2001, p. 3). Culture does not express biological necessity, but rather "our lives begin to be shaped by setting goals which, in a biological sense, are above or beyond any purpose, which cannot be deduced from the need for further existence or a better satisfaction of our natural needs, or which do not reflect man's biological situation in the cosmos" (Weber 1927, p. 39). If so, it is difficult to look uncritically at Maslow's hierarchy of needs, in which cultural needs gain in importance only after other, more fundamental ones, have been fulfilled. It is next to impossible to treat culture as a kind of luxury or an aspect of life that is necessary and important only for some people. On the contrary: "From cavemen to Australian aboriginals, from African American slaves to contemporary African tribes, people in the most deprived conditions find time, resources, and energy to make music, build religious temples, maintain sacred places,

# Tadeusz Gadacz

## The University in times of thoughtlessness

In terms of civilisational evolution, we have found ourselves in a peculiar situation. The enormous development of science, new technologies, and almost universal access to knowledge not only did not alleviate thoughtlessness, but even intensified it, or perhaps only revealed it. One has the impression that we are currently experiencing an exceptional escalation of irrationalism, lack of critical thinking, naivety, questioning of scientific authorities, e.g. as regards vaccinations, but most of all, the flights of creative fancy, which prevail in the form of new words and which, when considered to be the actual reality, shape our individual and social lives. A symbolic manifestation of this trend is the recently quite fashionable word *post-truth*. A post-truth is not a lie, but a certain state beyond the truth and untruth, once identified by Friedrich Nietzsche, in which we no longer have the time or even the opportunity to verify information, since we are forced to respond to hundreds more pieces of information that demand our attention. Moreover, we do not know whether such information comes from man or from an algorithm. We no longer deal exclusively with facts and their interpretations, but with alternative facts. Post-truth has become possible owing to the development of information and communication technologies, their dissemination, and in no small measure to thoughtlessness. We are already in a completely different position than a certain Cracow bookbinder running an old workshop with tradition. Years ago he was approached by a university graduate who wanted to have his master's thesis bound. The elderly, respectable

# Bob Jessop

## Varieties of academic capitalism and entrepreneurial universities

### On past research and three thought experiments<sup>1</sup>

In his once highly acclaimed book, “The Coming of Post-Industrial Society” (Bell 1973), Daniel Bell predicted that (1) knowledge would replace capital as the critical factor of production as societies moved to post-industrialism, (2) intellectual technologies for planning the public good would displace mechanical technologies used to boost private profit, and (3) universities would supersede industrial enterprises as the dominant kind of social organization. The first prediction is reflected in late modern societal self-descriptions such as ‘information society’, ‘learning society’ or ‘knowledge society’ (UNESCO 2005; Souter 2010). But there has also been a shift in primacy from industrial to financial capital as well as a growing financialization of most social relations (van der Zwan 2014). The second prediction has been controverted by use of intellectual technologies to promote the economization and financialization of social life rather than to identify and advance the public good. And prediction 3 is challenged by the uneven trend for universities to act more like rival

- 1 The article “Varieties of academic capitalism and entrepreneurial universities. On past research and three thought experiments” was originally made available online in 2017 at Springerlink.com under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>). This text is reproduced without abstract and keywords, which were included in its original version, and published with the consent of the Author.



# Jerzy Hausner

## The Social space-time of economic value creation

### Introduction

The starting point for the argument presented below is the recognition that social reality exists in the form of a social space-time continuum. If we wanted it to relate to the physical world, perhaps we could stop there, recognising that we are dealing with two complementary dimensions of space-time. But I want to deal with the dimensioning of social space-time, which, in my opinion, cannot be confined solely to space and time. Social space-time is not a being. It does not exist outside people's knowledge and action: it is their product. For this reason, I want to offer a handful of considerations on what is implied by such an assumption, especially with regard to value creation.

My reasoning follows Piotr Sztompka's theoretical thought (1991), who in his concept of "social becoming" proposes a synthesis of individualistic and collectivist thinking, and argues that what is collective must be de-objectivised, whereas what is individual must be de-atomised (*ibid.*, p. 53).

Michael Hardt and Antonio Negri (2012), among others, develop this current of thinking by associating becoming with a multitude of social actors. They postulate a change of orientation of the ethical horizon from identity to becoming (*ibid.*, p. 79).

# Cracow as a CITY-IDEA



## From idea to development strategy

City-idea is one of the most important OEBES themes. It represents an open, citizen-friendly urban area, where public space has been returned to the people. It is a place where the capitalist market game gives way to values which are crucial for society and the environment. Cracow has hosted the OEBES for several years not without reason – the capital of Małopolska Region has a remarkably successful track record in implementing solutions that bring it closer to the City-Idea paradigm.

A huge change has taken place in transport and communication. City residents can take advantage of the Wavelo bike rental system, with the ever-expanding network of bicycle paths. The MPK (municipal transport operator) has modernised its bus fleet – currently, 100% of the city buses are low or zero emission vehicles.

In recent years, Cracow has undergone a genuine green revolution, systematically increasing expenditure on urban greenery. Apart from the consistent expansion of conventional green areas, a number of innovative solutions are being introduced, such as pocket parks or wildflower meadows, which are very popular among the residents. This is particularly important in a city with air pollution issues. A lot has been done to combat smog. In 2012–2018, the Low Emission Reduction Programme (PONE) managed to eliminate approximately 22.5 thousand coal-fired stoves. This is an instance of nationwide success. In this context, it is worth mentioning the local waste incineration plant, one of the most modern facilities of the kind in Poland.

# This is a region for investors!

## Małopolska's recipe for entrepreneurial success

Why does Małopolska account for 8% of Poland's GDP? Why as many as 384 thousand companies chose to operate here, and the region has occupied the top of national investment attractiveness rankings for years? Why was it awarded the title of a European Entrepreneurial Region 2016 by the European Commission and the Committee of the Regions?

Małopolska was awarded this title thanks to its perfectly prepared strategy drawing on several areas, which are considered the most important from the vantage point of further development of entrepreneurship, such as optimal management of European funds, partnership in the preparation and implementation of business-friendly measures and effective use of its potential, especially in those sectors that offer opportunities for rapid development, known as intelligent specialisations.

Knowledge and competencies constitute the core aspects of intellectual capital in this part of Poland. Almost half a million people have found employment in Małopolska's manufacturing sector, including highly educated graduates of the best Polish universities. Together with the research and development centres, they represent a huge scientific potential. In order to ensure smooth cooperation between science, industry, and business, numerous technology transfer centres have been established.