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# *Interdisciplinary co-operations in the 21st Century: The continuation of excellence in art and science in Central and Eastern Europe*[*]

## Abstract

The 20th century was marked by the appearance of new disciplines and related specializations. There are no more physicists or mathematicians, just particle physicists, solid state physicists or topologists, algebraists, etc. The new generations of architects have less knowledge in structural engineering or interior design – these became separate fields. Obviously, the new disciplines helped the rapid developments. On the other hand, the overspecialization led to various troubles. Most problems of our age are so complex that cannot be treated in the framework of one or a few disciplines. Thus, there is a strong need for broad interdisciplinary co-operations. In the same time, the countries in Central and Eastern Europe should identify some fields where they could be the leaders in the world and not just followers of other scientific and artistic schools. My proposal is that one of these fields should be interdisciplinary studies in which the region has great traditions. (The EU programs prefer the term „multidisciplinary", but I believe that „interdisciplinary" is better since the latter emphasizes not just the fact that many fields are put together, but also the existence of a deep co-operation between these.) We may mentions many names – from Bolyai (mathematics) to Tesla (electrical engineering), from John von Neumann (computer science) to Dušan Vukotić (animated films) – who made major contributions using interdisciplinary approaches. It is very important to continue these traditions, which would also help competitiveness and innovations. A further advantage is that interdisciplinary programs need not a special

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finance beyond some basics, since the members of the programs remain at their universities and research institutes. We have, however, an urgent task: interdisciplinary thinking should be promoted in education. My suggestion is to introduce „Studium Generale" programs at the universities and to organize international research seminars regularly. I will summarize the experience of some similar programs (General Technics, STS = Science and Technology Studies, New Liberal Arts, ISIS using symmetry as a bridge between art and science, etc.). I personally believe that Montenegro, also considering its attractive geographic location, could become a center of such activities in the future.

## Introduction

The 20th century was marked by the appearance of new disciplines and related specializations. There are no more physicists or mathematicians, just particle physicists, solid state physicists or topologists, algebraists, and so forth. The new generations of architects have less knowledge in structural engineering or interior design – these became separate fields. Obviously, the new disciplines helped the rapid developments. On the other hand, the overspecialization led to various troubles. Most problems of our age are so complex that cannot be treated in the framework of one or a few disciplines. Thus, there is a strong need for broad interdisciplinary co-operations.

## 1 Focusing on Montenegro

First of all, I would like to mention two historic families whose descendants made important interdisciplinary contributions in the 20th century. I guess that this approach would give some surprise for the readers.

Let us start with **Duke Pavle Orlović / Војвода Павле Орловић** (ca. 1350-1389), who died shortly after the Battle of Kosovo (Бој на Косову). His direct descendants are various noble families in Montenegro, including

– Martinović-Orlović (Мартиновић-Орловић)
– Samardžić-Orlović (Самарџић-Орловић).

His non-noble descendants include **Nikola Tesla / Никола Тесла** (1856-1943). Interestingly, his life and work is associated with many countries:

– 1856 born in Smiljan (Gospić, Croatia)
– his father was a priest in the Serbian Orthodox Church

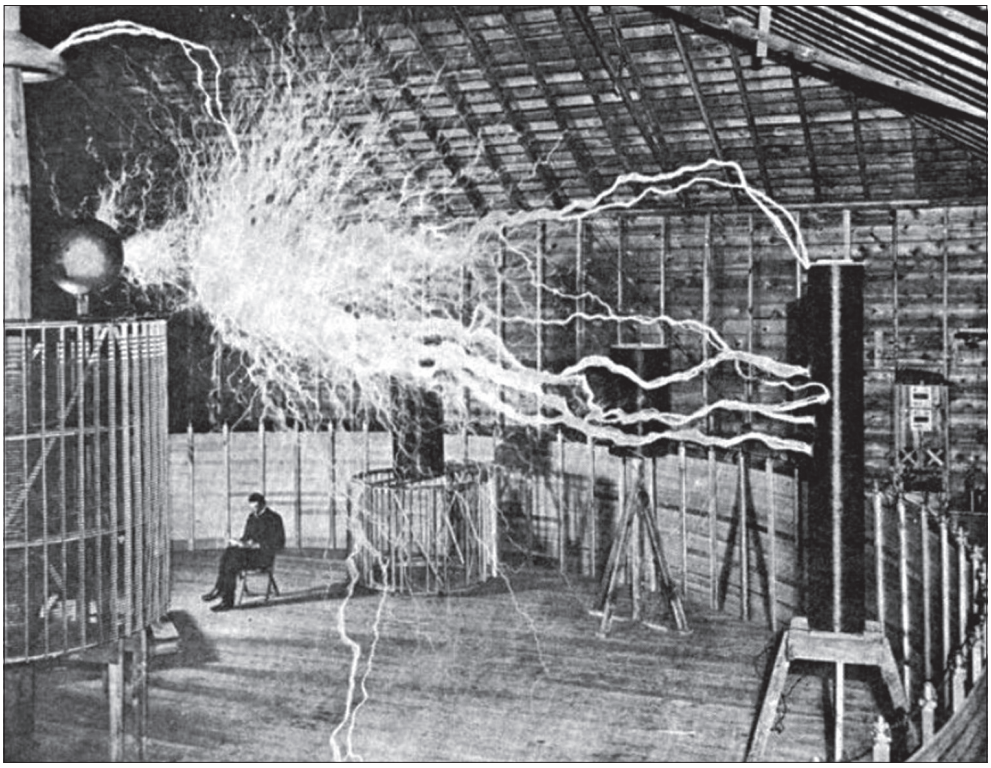

Figure: Tesla in his laboratory at Colorado Springs, circa 1900.

– studied at the Technische Universität Graz and the Univerzita Karlova v Praze (Prague)
– 1878 Maribor (engineering work)
– 1881 Budapest (Tivadar Puskás' Telephone Company)
– 1882 Paris (Continental Edison Company)
– 1884 New York (Edison Machine Works)
– 1886 his own company (Tesla Electric Light & Manufacturing).

My second example is **Marko Miljanov** (Medun, near Podgorica, 1833 – Herceg Novi, 1901), the Montenegrin writer, tribe leader of Kuči, and duke, whose major work is *The Examples of Humanity and Bravery* (*Примјери чојства и јунаштва*, 1901). His granddaughter was **Olga Lazovich / Olgivanna Wright** (1898-1985):

– Montenegrin dancer (Petrograd Ballet),
– wife of the architect **Frank Lloyd Wright** from 1928,

– she run the Taliesin Fellowship long after Wright's death (1959) in Scottsdale, Arizona.

Historians of architecture pointed out several times, that the most productive years of Wright (1867–1959) were those that he spent with Olgivanna, from 1928 until his death. More than half of his buildings were designed during this period, including the Fallingwater (Bear Run, Pennsylvania, 1937) and the Guggenheim Museum (New York City, 1959). In the case of the Fellowship, Olgivanna's contributions were also essential. Parallel with this, she also guided a dance group.

Following this, let us turn to the very concept „value" with an international outlook.

## 2 The term „value" in various languages

The easiest case is the Chinese and Japanese where we may see a visual etymology:

价 Chinese: **CHIA / JIÀ**
price, value, valence

価 Japanese: **ATAI, KA**

In the left-hand box, the ancient form of the character is given. Its radical (at the left) refers to a human being. On the other hand the character is also associated with measurement (see the bottom of the right side). In fact, this part would mean alone „shell", which refers to money and various forms of measures. Unfortunately, the latter part disappeared in the modern simplified Chinese and Japanese versions of the character, which are given in right-hand box. Note that the character is also used in chemistry as „valence".

In Classical Greek there are at least two expressions that we should mention:

**TIMÉ (τιμή)** = price, cost, worth (of a thing)
**AXIA (αξία)** = worth, value
(cf., axiom = worthy truth / axiology = theory of value)

Let us see the origins of the modern expressions in English and in Slavic languages:

**VALUE** < Old-French < **valere** (Latin) = to be strong / worth
**ЦЕННОСТЬ**
**ЦЕНА / CENA / CINA / CIJENA** = price, worth
**KÁINA** (Lithuanian) = price, benefit
**КАЯТЬ / KAJATI** = sorry / blame / revenge
**KAĒNĀ** (Avestan / E-Iranian) = retribution
**CÁYATĒ** (Old-Indian)
**VREDNOST** = (Serb.) value (But in Russian: harmfulness)

### 3 Values in science and in politics

It is interesting that during this linguistic survey we reached various fields of culture, including the topic of axioms that play a central role in science (mathematics, physics). On the other hand, in politics there are no widely accepted axioms:

| SCIENCE | POLITICS |
|---|---|
| Axioms, theories<br>Values for a<br>foresight for long periods | Actual decisions<br>„Values" (pseudo-values) for a<br>foresight until the next election |

It is our duty to press politicians to use values that are valid for long periods, including „eternal values" (if we agree in such ones).

In the 21st century we face major problems (climate-change, energy crisis, population growth, lack of food and drinking water). Their treatments need a long foresight. In addition to this, it is also essential to help

– the public understanding of the values of science,
– the interdisciplinary co-operation in broad circles.

Thinking about the connections of science and politics, we may refer to the views of the Hungarian-born mathematician and pioneer of modern computing **John von Neumann / Neumann János** (Budapest, 1903 – Washington D.

C., 1957), who became the advisor of political leaders in the U. S. Shortly before his death, he published a paper entitled **„Can We Survive Technology?"** for a larger audience in the ***Fortune*** magazine (1955). According to him:

– science and technology are neutral,
– could be used for both good and ill,

– „The problems of the future of humanity cannot be resolved by a single prescription, but only in reliance on day-to-day opportunistic measures, and reliance on the human qualities required: **patience, flexibility, intelligence**.".

## 4 Returning to Central and Eastern Europe

We may mentions many names – from Bolyai (mathematics) to Tesla (electrical engineering), from John von Neumann (computer science) to Dušan Vukotić (animated films) – who made major contributions using interdisciplinary approaches. Sometimes distant fields of art and science were linked, which are demonstrated by such terms as op-art, kinetic art, mathematical poetics. These interdisciplinary traditions represent special values for the entire world.

It is very important to continue these traditions, which would also help competitiveness and innovations. A further advantage is that interdisciplinary programs need not a special finance beyond some basics, since the members of the programs remain at their universities and research institutes. We have, however, an urgent task: interdisciplinary thinking should be promoted in education.

In the same time, the countries in Central and Eastern Europe should identify some fields where they could be the leaders in the world and not just followers of other scientific and artistic schools. My proposal is that one of these fields should be interdisciplinary studies in which the region has great traditions. (The EU programs prefer the term „multidisciplinary", but I believe that „interdisciplinary" is often better since the latter emphasizes not just the fact that many fields are put together, but also the existence of a deep co-operation between these.) I personally believe that Montenegro, also considering its attractive geographic location, could become a center of such activities – workshops, conferences, summer courses – in the future.