DEVELOPING THE EUROPEAN VILLAGES IN THE REPUBLIC OF MOLDOVA TAKEN INTO ACCOUNT THE DIGITAL ECONOMY SOCIETY INDEX (DESI)

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Taking into account the current statistics related to the DESI index in Moldova and the results of the gap analysis, the research team of the HiQSTEP project [4] concluded that the level of maturity of Moldova in monitoring the digital economy and society can be given a score of 2 on a 5-point scale. Moldova started the DESI monitoring process about ten years ago, at the time when the National e-Governance Centre was established. It focused on reporting on the

development of e-services; however, data collection was not the aim of the Centre. In 2012, an Agreement was signed between central public administration institutions on the division of responsibilities for collecting, submitting and disseminating indicators for monitoring the strengthening of the information society in the Republic of Moldova. However, the Agreement was not implemented and most indicators, including seven similar or very close to the DESI indicators, were not collected at all. The existing questionnaires of the National Bureau of Statistics allow, in principle, the collection of relevant DESI indicators for the "Human Capital" sphere, but an appropriate methodology for this has not been developed. The data published by the National Bureau of Statistics is medium disaggregated; for example, data on individuals are in some cases disaggregated by region, in others by residence (rural/urban), by gender and by age group. However, most of the data is disaggregated by year only.

Therefore, as part of the recommendations of the analysis process project, which is graphically depicted in Figure [1], we have chosen a methodology from Italy as a reference base at EU level.
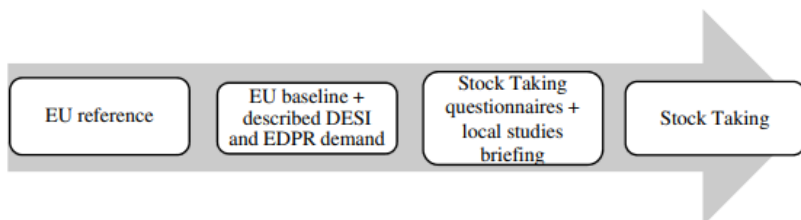

Fig. 1. Analysis process [4]

The HiQSTEP study used the EU 2016–2021 "reference" monitoring system for the digital economy and society, including digital signage, DESI and EDPR (EU Digital Progress Report). Currently, this is the EU program "Digital Decade of Europe: digital goals for 2030" [5].

According to the Italian Digital Agenda Observatory [6], Polytechnic University of Milan, the European DESI index is a valuable tool for determining the maturity of countries and critical aspects on

their way to increase efficiency. However, the level of maturity, along with progress across the five dimensions and related indicators, may be affected by contextual features that are specific to the region rather than the country, such as the geographical, demographic and economic heterogeneity of the territories, as well as their different autonomy in the management of digital transformation processes. Innovation. This is especially true for geographically large and densely populated countries, hence the regional DESI index. Extending the European DESI to the level of regions (or broad sub-national areas) would provide a more detailed, albeit equally widespread, picture of figures across the continent. Such implementation would then make it easier for the territories to understand their own maturity and therefore help them fine-tune appropriate policies and spending plans. This is primarily due to the relative accuracy of the DESI Regional Index, which includes contextual characteristics to allow for comparisons based on actual similarity (for example, a comparison between Lombardy and Catalonia may be more meaningful than a comparison between Italy and Spain as a whole). In addition, the regional DESI offers Member States a clearer explanation of their positioning and a direct indication of its target areas.

Based on this conclusion, our studies [7, 8] are aimed at supporting the integration of the target areas of the development regions of the Republic of Moldova into the "European Research Area" and the "Digital Single Market", in the context of the new status of the EU candidate country and the first results of the National Program "European Village", covering the territories of selected settlements. The results of the studies show that in the DESI national reports at the EU level, information on all indicators is not provided, disaggregated by rural and urban areas. Therefore, it is impossible to say whether the progress made in digital development is narrowing the digital divide between urban and rural areas or, on the contrary, is exacerbating this inequality, further complicating the future development of these areas.

Information on rural areas is presented only for infrastructure deployment in rural areas, namely: i) very high capacity networks

(VHCNs) and 5G ii) broadband coverage and iii) fixed broadband coverage. Perhaps this is only a reflection of the political priorities of the EU in the field of digital rural development, which are mainly focused on the deployment of this type of infrastructure.

In fairness, it should be noted that within the framework of the Common Agricultural Policy, there is also some support for the digitalization of the agricultural sector, while the rest of the rural sectors and social groups are not currently a political priority.

Thus, there may be a need to develop a Digital Economy and Rural Society Index (DERSI), which will help policy makers and policy makers in rural development to better navigate action and help achieve more equitable development in the EU, avoiding rural areas falling behind their urban counterparts**.**

International benchmarking of the Italian methodology for creating a regional DESI: in the context of the administrative division of the Republic of Moldova adapted to the European requirements/norms/standards
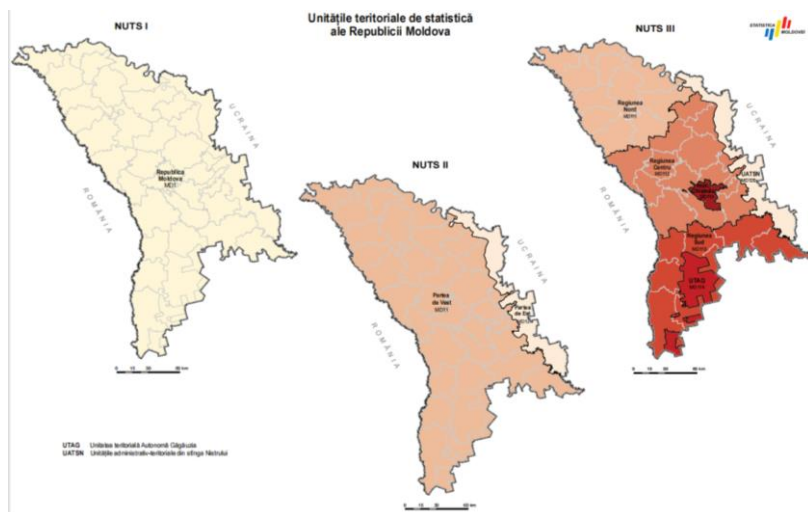

Fig. 2. Statistical regions of the Republic of Moldova [9]

The nomenclature of territorial statistical units of the Republic of Moldova [9] is a hierarchical nomenclature consisting of the following levels:

level 1 – one statistical region covering the entire Republic of Moldova;

level 2 – two statistical regions, western part (right side of the Nistru) and eastern part (left side of the Nistru).

level 3 – six statistical regions: North, Center, South, Municipality of Chisinau, Autonomous Territorial Unit of Gagauzia and Administrative-territorial unit(s) of the Left Bank of the Dniester.

✓ Aggregates digital indicators into a composite index.

✓ Measures Europe's numbers and identifies areas for improvement.

✓ Tracks progress of EU Member States.

✓ Supports international benchmarking.

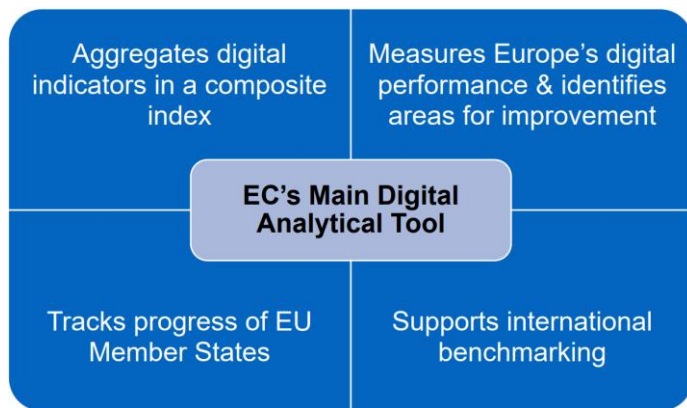### Main digital analytical tool – DESI

Fig. 3. EU Commission DESI Analytical Tool [10]

The Digital Economy and Society Index (DESI) is a comprehensive quantitative indicator that analyzes digital efficiency in Europe.
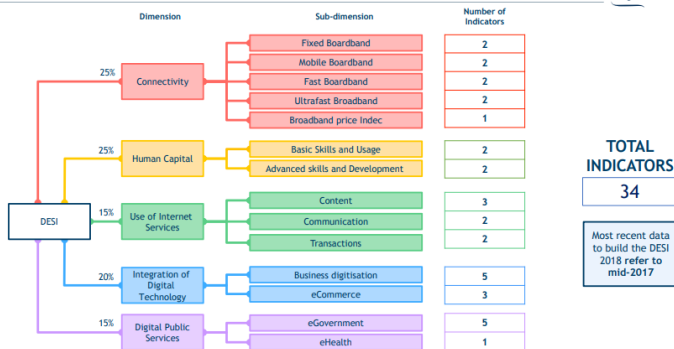
Fig. 4. Structure of DESI [12]

The DESI index was first calculated in 2014 using statistics from 2013. It is one of the main analytical tools developed by the European Commission's Directorate-General for Communications Networks, Content and Technology to provide evidence-based data to assess the development of digital technologies both in the EU as a whole and in its Member States. The purpose of the DESI index is to help EU countries identify areas that require priority investment and action to create a truly single digital market. Table 1 below shows the structure of the DESI index, the Italian "Observatory of the Digital Agenda", Politecnico di Milano.

In DESI, the aggregation of scores into sub-dimensions, sub-dimensions into dimensions, and dimensions into an overall index is done from the bottom up using simple weighted arithmetic averages according to the structure of the index.

For example, the highest DESI score for country C would be calculated using the formula:

> DESI(C) = Human_capital(C) * 0.25 + Connectivity(C) * 0.25 + Digital_Technology_Integration(C) * 0.25 + Digital_public_services(C) * 0.25

Where *Connectivity*(C) is the score obtained by country C in the connectivity dimension.

Methodology for creating a regional DESI [12].

The conclusions of the Italian Observatory that regions are territorial units and political actors whose dynamics differ from those of states, as well as within countries and across borders, a regional DESI cannot simply consist of applying the European DESI to smaller objects of analysis, are correct. But, according to NUTS (Nomenclature of Territorial Administrative Units for EU Statistics) there are "Local Administrative Units – LAU". Below the NUTS classification, local administrative units, abbreviated as LAUs, form the European Union (EU) economic territory division system for the purposes of statistics at the local level. They were created by Eurostat and are compatible with NUTS [13]. At the local level, two levels of LAU are defined:

✓ The upper level (LAU1) is defined for most but not all countries.

✓ The lower level (LAU2) consists of municipalities or equivalent units in EU member states.

Every year in the EU changes from 700 to 2000 of ~122,000 LAU/

Therefore, we consider selected subjects of the national program "European Village" in our study, with the aim of developing recommendations for village administrations/local initiative groups of villages on the use of DESI to assess the results of the impact of national measures to support the information society in rural areas and the formation of a "digital economy" carried out by central and regional administrations. In order to create a tool that is meaningful yet applicable and, most importantly, comparable to the European DESI, the EU researchers are proposing to refine the method for calculating regional DESI, structured in four steps. In this article, we take as a basis the "Regional DESI Methodology", which was first used to analyze the territory of Italy.

1. Check data availability. In phase 1, the main national and international sources of information were analyzed by Italian experts (among others: Istat for Italy and Eurostat for Europe) and potentially relevant data were carefully collected. We also find the "I-DESI" indicator: which adds an international dimension [14]:

✓ Defines that the "Digital Economy" is a global phenomenon.

✓ Provides an overview of the EU figures at the global level.

✓ Allows you to use the potential of the digital economy in Europe.

✓ Allows you to identify opportunities for improvement.

iDESI includes the same five dimensions as DESI, but is built on a slightly different set of metrics than DESI because some DESI metrics are not available in non-EU countries. As a result, I-DESI rankings and scores are slightly different from DESI rankings.

2. Identification of adequate intermediaries. Since the value of some DESI indicators could not be calculated at the regional level, the experts looked for proxies that could lead to the measurement of the same phenomena that are captured by the missing indicators. For example, monitoring the implementation of Piano Strategico per la Banda Ultralarga [15] by the Ministry of Economic Development, as a trustee, has developed for the National Governmental Administration the coverage and coverage indicators of ultra-fast broadband access.

3. Selection of indicators. The criteria used by the experts to select the relevant indicators were the reliability of the data, i.e. selection of the most recent information, and relevance, ie. territorial granularity along with regional districts, macro-districts (North-West, North-East, Center, South, islands), and suburban area. At the parameter level, DESI considers four major policy areas for the digital compass 2030 [16] shown in Figure [4]. These are not isolated areas that individually contribute to digital development, but actually interconnected areas. Thus, the development of the digital economy and society cannot be achieved through isolated improvements in individual areas, but can be achieved through coordinated improvements in all areas.
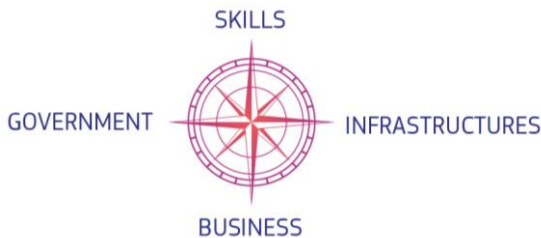

Fig. 5. Digital Compass 2030 [16]

4. Regional DESI engineering. The fourth and final step consisted of standardizing the considered data to make the regional DESI comparable to the European DESI. This process was carried out in accordance with the methodology defined by the EU. Regarding the 34 regional DESI indicators, the Italian regional DESI is the result of: 11 indicators based on the latest Italian DESI index; 7 indicators calculated at the level of macrodistricts; 4 indicators based on Eurostat NUTS 2 regional data; 10 indicators based on Istat regional data; 2 indicators based on data collected by the Italian Ministry of Economic Development. Future steps and goals In the near future, it is necessary to adapt the methodology and enrich the index with more accessible data and refine its structure. Such work could benefit from a dialogue between Member States and candidate countries contributing to the promotion of European integration processes already with the regional dimensions of the European Research Area (ERA), so that the regional DESI takes into account the specifics of data sources and data collection methods in all European regions. For these reasons, we would like to invite the information community of the development regions of the Republic of Moldova and the border regions of Romania and Ukraine to share knowledge about similar studies and/or practices aimed at the same dimension. Such an exchange should contribute to a broader discussion of the feasibility of our study and the effective application of such indicators in a regional context. Since services and solutions delivered digitally to citizens are expected to increase dramatically with the development of digital technologies, there is a clear need to implement a method of assessment at the local level. Under Action 5 of the Urban Development Program for the EU Digital Partnership [17], work is underway to develop a DESI for the local level. Program partner organizations have already made available preliminary findings on this topic, such as potential data collection methods for possible indicators. In addition, data collection methods and data sources were tested and validated by an external expert to be used to calculate DESI indicators at the local administrative unit level. The result was a report showing various analyzes and assessments related to DESI at the local level, which should be taken into account when initiating a

national institutional research project in the Republic of Moldova, with the participation of regional administrations.

Conclusions on the initiation of innovative public partnerships within the framework of thematic institutional research projects of the National Program "Research and Development" (2023–2027):

1. It is necessary to initiate analytical studies within the framework of innovative public-private partnerships with the coordination of regional universities and central administrations in the sectors of the National Program "European Village" in the regions, with the aim of conducting a series of interviews with representatives of authorities – pilot districts (experimental local initiative groups), responsible for collecting this data. The questionnaire on data collection capacity (capacity) should consist of four groups of questions: group 1: Data collection and analysis; group 2: data quality; group 3: resources; group 4: reporting

2. The preparation of initial data should be carried out by analyzing key sources of information at the national and EU levels, as well as the main national and regional activities planned under the digital market harmonization programs, the EU4Digital program and the regional statistical program for the EaP region Statistics through Eastern Partnership (STEP).

3. Organize special trainings for statisticians and civil servants on adaptation and application of the DESI methodology at the regional level. Such trainings may include the following topics: a general introduction to DESI and its purpose; in-depth analysis of the existing methodology, definitions (definitions); methodology that is in line with best practice in data collection; creation and use of tools (e.g. questionnaires) for data collection

4. Include the model of the innovation management system based on ArcGIS (ESRI), developed by the Innovation Center of the Moldovan Academy of Economics and Trimetrica SRL, NGO Infoera, in the preparation of geospatial statistics at various stages of regional projects.

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