



# SOCIO-ECONOMIC SUSTAINABILITY INDICATORS

Draft briefing

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## INTRODUCTION

Digitalisation can have both positive and negative impacts, depending on the conditions of access to information and communications technologies (ICTs), the design and application of these technologies, and the complexity of the systems in which they are used. The socio-economic assessment within the DESIRA project aims to measure the impact of digitalisation on sustainable development. In order to do so, DESIRA is developing a set of indicators to measure different aspects of sustainability, based on a methodology called the Integrative Concept of Sustainable Development (ICoS)<sup>1</sup>. With these sustainability indicators it is possible to evaluate the social, economic, and environmental impacts of digitalisation. This involves collecting stakeholder perspectives on the impacts of digitalisation on the fulfillment of sustainability targets within the three DESIRA domains (agriculture, forestry and rural areas). This is explained further in Section 3.

Overall, the purpose of impact assessment with sustainability indicators is to inform and guide the political decision-making process. The assessment will suggest how to improve sustainable development and simplify communication by reducing complexity<sup>2</sup>. Sustainability indicators can be used to assess different development areas for a number of purposes, such as monitoring progress towards goals and targets based on development conditions over time and space; aiding public participation and awareness; promoting decision making,

and political and behavioural change; comparing places and situations; and improving communication on debates over sustainability (Moreno-Pires 2014)<sup>3</sup>.

## 1. SOCIO-ECONOMIC SUSTAINABILITY INDICATORS (SESI)

The development of a set of indicators and related targets to assess the socio-economic impacts of digitalisation in rural areas is one of the main intended results of the DESIRA project. These indicators are known as Socio-Economic Sustainability Indicators (SESI) and are relevant for at least one, if not all, of the three domains covered by DESIRA Living Labs (LL): agriculture, forestry and rural areas.

The selection of the first set of SESI was done using a multistep and interdisciplinary process. The list is based on the comprehensive Integrative Concept of Sustainable Development (ICoS), which defines three general goals and preconditions for sustainable development<sup>4</sup>. These goals are:

- 1 Securing human existence: includes the basic needs and capability of people to shape their own lives;
- 2 Maintaining society's productive potential: this potential consists of natural, man-made, human and knowledge capital;
- 3 Preserving society's options for development and action: this addresses immaterial needs, such as integration in cultural and social contexts, as well as material needs.

Additionally, ICoS includes a set of instrumental rules, known as Conditions to achieve substantial sustainability, which address the economic, political and institutional framework conditions required to fulfil the rules within the three goals. The substantial sustainability rules describe the minimum requirements of sustainable development for all people in present and future generations (See Table 1).

The DESIRA partnership's selection of scientifically sound, politically or societally discussed, and practically applicable indicators started with a literature review. In this first step, scientific, political, administrative and public documents; monitoring systems; and databases at different scales were comprehensively assessed. The research included the revision of a broad range of sources at international and national level, including the United Nation's Sustainable Development Goals (SDGs), the **UCL INEQ-CITIES Atlas**, the **OECD main economic indicator set**, and the **European Environment Agency indicators**, among others.

DESIRA has not only selected socio-economic sustainability indicators, but also environmental indicators to assess sustainability. Digitalisation is expected to provide benefits for the environment and these should be checked in the DESIRA Living Labs.

DESIRA partners and LL coordinators contributed to refine the first set of indicators through personal communications and project meetings. Through an iterative process, indicators were selected and defined taking into account the perspective, needs and expectations of local players.

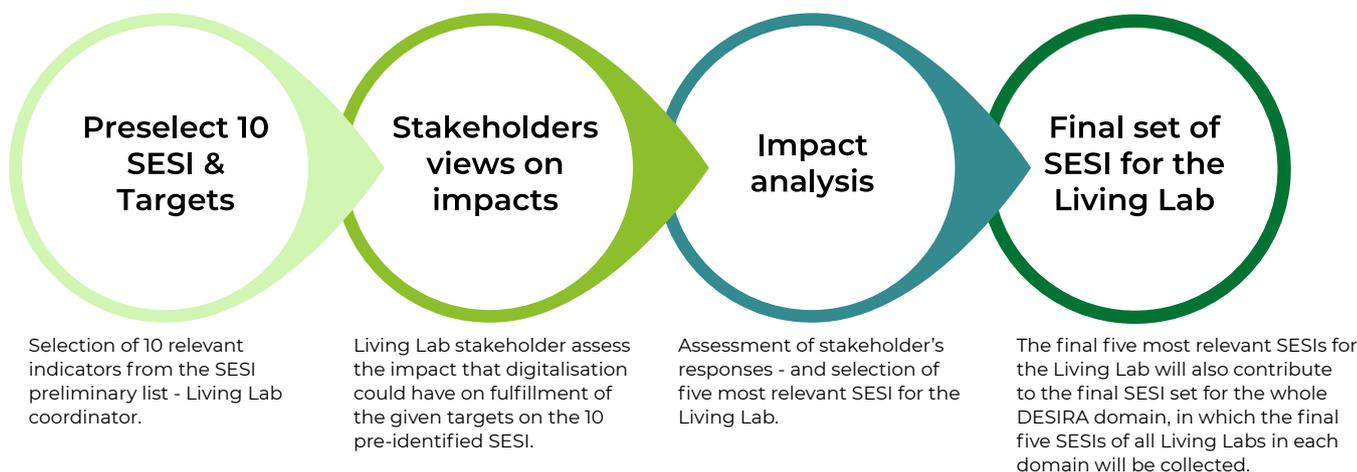
The preliminary list of indicators that resulted from this process is presented in Table 1. This list will be assessed by external stakeholders through a series of exchanges with the Rural Digitalisation Forum, local partners from the Living Labs, and workshops of the application scenarios. The final aim is to obtain a comprehensive list of SESI that can be applied to agriculture, forestry and rural areas.

## 2. HOW ARE THE LIVING LABS USING THE SESI TO ASSESS THE SOCIO-ECONOMIC IMPACTS OF DIGITALISATION?

In order to assess the impact of digitalisation on the socio-economic sustainability of a Living Lab (LL) focal question, the coordinators of the LLs will use the preliminary indicator list for their domain to select 10 of the most relevant indicators to the topic and region. Together with other research questions relevant to the DESIRA project, these indicators are part of an online survey for distribution and completion among the stakeholders in the LLs. In this survey, the LL stakeholders are asked to assess the 10 selected indicators by considering the impact that digitalisation could have on the fulfilment of given targets. Each indicator has been assigned a DESIRA sustainability target, which is essentially the sustainable form of the indicator. For instance, the indicator 'Pollution of air and water' has the sustainability target of 'reduced pollution of air and water'. The targets are not assigned with a specific timeframe or region - this is left for interpretation by the respondent in regards to their particular LL focal question and region. The target clarifies the sustainability ambition to be achieved, and therefore makes it possible to assess the perspectives of stakeholders on the impact of digitalisation towards achieving the objective.

Stakeholders can select their answer via a Likert scale (strongly decrease likelihood of reaching target – strongly increase likelihood of reaching target). Secondly, the LL stakeholders are asked to select the five targets that they find most important to the impact of digitalisation on their focal question. This selection and ranking works to improve and fortify the SESI set towards a final, useable SESI tool for the Living Labs.

Figure 1: The use of SESI in the Living Labs



### 3. HOW WILL THE RESULTS OF THE ASSESSMENT AND SELECTION OF SESI BE USED?

With the information collected from the stakeholders' assessment of selected SESIs, the LL coordinators will have many perspectives from stakeholders on how they believe digitalisation will impact the socio-economic sustainability issues of their region.

Additionally, the DESIRA partners will have a large overview on the perceived impacts over all 20 LLs from across Europe. This will allow for in-depth analysis at LL level, as well as a comparative analysis between LLs and within agriculture, forestry and rural areas. The perceptions collected are vital pieces of information on the acceptance, barriers, perceived advantages and disadvantages of digitalised tools in agriculture, forestry, and rural areas.

The SESI assessment provides critical information for decisions made by policymakers, technology developers, and the general public. By collecting and understanding the expected impacts of digital tools, the development and marketing of these tools can be improved. Policies at EU and Member-State levels can be improved to support the transition towards digitalisation in agriculture, forestry, and rural areas. These results create opportunities for co-design between the users and producers of digital tools. Additionally, assessments with the indicators over time can measure societal change in the shift towards digital agriculture, forestry and rural areas.

### 4. PRELIMINARY SET OF SESI

Table 1 presents the preliminary set of SESI that have been selected to assess the impact of digitalisation on sustainable socio-economic development in DESIRA's Living Labs.

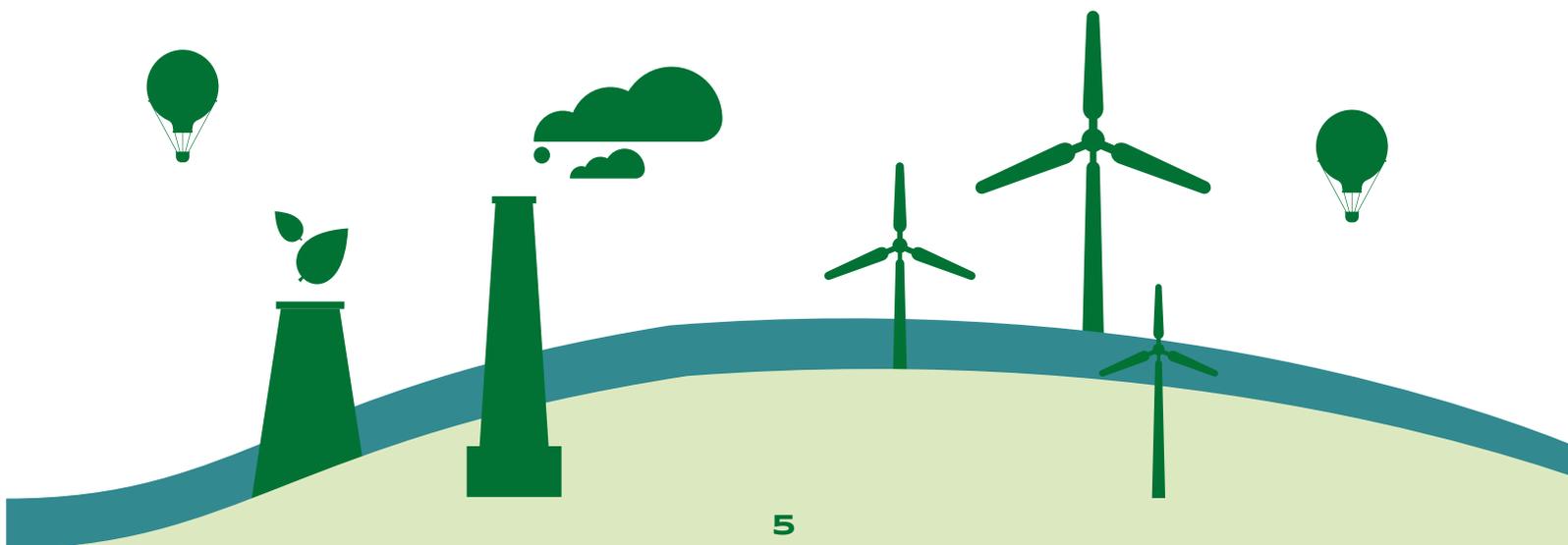
Table 1: Socio-economic sustainable indicators (SESI)

ICoS Rule Group	ICoS Rule	Indicator	Indicator source	SDG	Applies to Domain	DESIRA sustainability target
Securing Human Existence	Protection of human health	Share of manual workers in workforce	UCL INEQ-CITIES atlas	3, 8, 10	all	increased share of manual workers in the workforce
		Health risks to farmers by work-related accidents	DESIRA	3, 6	AG	reduced risk to farmers by work related accidents
		Health risks to farmers by dust and pesticides	DESIRA	3, 6	AG	reduced risk to farmers by dust and pesticides
		Health risks to the public by dust and pesticides	DESIRA	3, 6	AG	reduced risk to public by dust and pesticides
		Pollution of air and water	DESIRA	3, 13	all	reduced pollution of air and water
	Satisfaction of basic needs	Volume of production per labour unit	DESIRA (from SDG 2.3.1)	2, 10, 8	all	increased volume of production per labour unit by classes of farming/pastoral/forestry enterprise size
		Value added to end-product via digitalisation	Kruse <i>et al.</i> 2009	8, 9	all	added value to end-product
		Proportion of small-scale industries in total industrial value added	SDG 9.3.1	8, 9, 10	all	increased proportion of small-scale industries in total industrial value added
	Autonomous subsistence based on income from own work	Unit labour cost	OECD 31	8	all	reduced unit labour cost
		Total employment	OECD 33	8	all	increased total employment
		Dependence on seasonal migrant workers	DESIRA	8	AG	decreased dependence on seasonal migrant workers
		Employment of women in agriculture and forestry	DESIRA	5, 8	AG, FO	increased employment of women in agriculture and forestry
		Average income of small-scale food producers, by sex and indigenous status	SDG 2.3.2	2, 5, 8	AG	increased average income of small-scale food producers, by sex and indigenous status
		Contribution to income (of new technology)	adapted from Kruse <i>et al.</i> 2009	8, 9	all	positive contribution to income

ICoS Rule Group	ICoS Rule	Indicator	Indicator source	SDG	Applies to Domain	DESIRA sustainability target
Securing Human Existence	Just distribution of opportunities to use natural resources	Ownership and disclosure of collected data	DESIRA	10, 12	all	protected ownership and disclosure of collected data
		Accessibility of public data with business-related interfaces (farmers)	DESIRA	10, 12	AG	increased accessibility to public data
		Proportion of women among owners or right-bearers of agricultural land (by type of tenure)	SDG 5.a.1	5	all	increased proportion of women among owners or right-bearers of agricultural land (by type of tenure)
Maintaining Society's Productive Potential	Sustainable use of renewable resources	Freshwater use efficiency	DESIRA	6, 13, 14	all	improved freshwater use efficiency
		Agricultural input efficiency (pesticides, fungicides, insecticides, fertilizer, etc.)	DESIRA	2, 12, 13, 14, 15	AG	improved agricultural input efficiency
		Land use efficiency	DESIRA	13, 15	all	increased land use efficiency
		Energy use efficiency	DESIRA	7, 13		increased energy use efficiency
		Area under organic farming	Eurostat_sdg_02_40	2, 13, 15	AG	increased area under organic farming
		Agriculture: area under management practices potentially supporting biodiversity	EEA_SEBI020	2, 13, 15	AG	increased area under biodiversity practices
		Progress towards sustainable forest management	SDG 15.2.1	15	FO	increased progress towards sustainable forest management
		Forest: growing stock, increment and fellings	EEA_SEBI017	15	FO	increased growing stock...
		Forest fires	EEA_CLIM035	15	FO	reduced number of forest fires
		Livestock genetic diversity	EEA_SEBI006	15	AG	increased livestock genetic diversity
	Sustainable use of non-renewable resources	Fossil fuel use efficiency	DESIRA	7, 12, 13, 14, 15	all	improved efficiency of fossil fuel use efficiency
	Sustainable use of the environment as a sink for waste and emissions	Greenhouse gas emissions total	DESIRA	7, 12, 13, 14, 15	all	reduced greenhouse gas emissions
		CO2 emissions per unit of value added (infrastructure and industries)	SDG 9.4.1	9, 13	all	reduced CO2 emissions per unit of value added (infrastructure and industries)
		Electric machines/vehicles as a proportion of the total fleet in agriculture/forestry	based on EEA_TERM034	7, 13	all	increased electric machines/vehicles as a proportion of the total fleet in agriculture
		Final energy consumption by agriculture/forestry per hectare of utilised agricultural area (renewable and fossil energy)	Eurostat_tai04	7, 13, 15	AG, FO	reduced final energy consumption by agriculture/forestry per hectare of utilised agricultural area (renewable and fossil energy)

ICoS Rule Group	ICoS Rule	Indicator	Indicator source	SDG	Applies to Domain	DESIRA sustainability target
Preserving Society's Options for Development and Action	Equal access for all to information, education, and occupation	Gender pay gap	DESIRA	5, 8, 10	all	decreased gender pay gap
		Average hourly earnings of female and male employees by occupation, age, and persons with disabilities	SDG 8.5.1	5, 8	all	increased hourly earnings, equal hourly earnings across all genders and abilities
		Person hours of production	Kruse <i>et al.</i> 2009 <sup>5</sup>	5, 10	all	reduced person hours of production
	Participation in societal decision making processes	Public awareness of a subject	EEA	4, 10, 16	all	increased public awareness
		Public image of a subject or product	DESIRA	4, 10, 16	all	improved image of a subject or product
		Marketing of a product	DESIRA	4, 10, 16	all	improved marketing of a product
Conditions to achieve the substantial sustainability	Society's ability of reflexivity	Gross Domestic Product (GDP) - Outlook from the Organisation for Economic Co-operation and Development (OECD)	EEA_Outlook041	8, 11	all	increased GDP
		Gross value added of the forestry industry, at basic prices	Eurostat_tag00058	8, 9, 15	FO	increased gross value added to industry
	Balance of power between societal actors	Application of digital technology in small and medium sized enterprises	DESIRA	8, 9, 10	all	increased application of digital technology in small and medium sized enterprises

\*This list includes all indicators selected from the literature, existing sets, and the extra indicators indicated in the DESIRA discussions. Further fine-tuning will be made to this based on stakeholder consultations.



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