9 Maggio 2025 Ore 11.00-12.30

Nuove tecnologie digitali in agricoltura:

come e perché aumentarne **la diffusione?**

AgriLiv Network WEBINAR

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agritech National Research Center for Technology in Agriculture

ALMA MATER STUDIORUM UNIVERSITÀ DI BOLOGNA | DEPARTMENT OF AGRICULTURAL AND FOOD SCIENCES

Partners: Canale Emiliano Romagnolo | HORT@ From research to field | Euro.Soft BEYOND INNOVATION | new Business Media gruppo tecniche nuove | LATITUDO 40

Analisi multidimensionale degli impatti

- **Antonio Boggia,** docente di Economia ambientale ed economia circolare, Università degli Studi di Perugia

- **CONTENUTI**
- Agricoltura sostenibile e tecnologie innovative
- L'esperienza nello Spoke 3, WP 3, Task 3.3.2 in Agritech
- Valutazione degli impatti economici, sociali ed ambientali
- Indicatori
- Metodi

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Sustainable agriculture: state of the art

Challenges:

Environmental	• Soil degradation, water scarcity, biodiversity loss and greenhouse gas emissions.
Economic	• Market volatility, input costs, farm profitability.
Social	• Working conditions, rural depopulation, food security.

Key issues:

Balance between environmental health, economic profitability and social equity

Reduce dependence on chemicals (fertilizers, pesticides) and air emissions.

Promote biodiversity, crop rotation and soil conservation.

Conventional agriculture vs. Sustainable agriculture

• High yields, intensive resources use, environmental impacts..	Long-term resilience, ecosystem protection, economic equilibrium.

Transition strategies

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Spoke 3 - WP 3 – Task 3.3.2 Multidisciplinary technology assessment

Integrated multidisciplinary evaluation of selected new solutions for smart agricultural systems will be performed according to economic, social, and environmental dimensions.

Methods: assessment indicators; multi-criteria analysis; advanced data management and statistical analysis, LCA, LCC sLCA

Task leader:

UNIPG: Multicriteria evaluation model for sustainability assessment of smart agriculture.

Partners:

UNIBO: Technology assessment applied to new technologies.
UNIBA: Evaluation of the impact of smart systems for precision agriculture on the quality of selected products and by-products.
UNINA: Evaluation of energy flows for indoor and outdoor cultivation and multi-criteria optimization
POLIMI: Measurement and evaluation of the sustainability of intelligent systems and technologies in agriculture.
UNIPR: Integrated multidisciplinary evaluation of new solutions for smart agricultural systems.
UNIRC: Multidisciplinary technology assessment

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Technology assessment applied to new technologies

Objectives and activities:

- to perform an integrated multidisciplinary evaluation of new solutions for smart agricultural systems.
- A pillar of the study is the economic, social and environmental sustainability of these solutions with the aim to improve the resilience of the agricultural systems.

1) Identification of the most valuable indicators for the three areas of sustainability;
2) Construction of an Indicator System to survey the end users' accessibility and acceptance of new technologies for cultivation (end users are farmers, services).
3) Development and testing of an indicators' dashboard useful for the evaluation.

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Development of the indicators framework

Reference	Dimesion	Theme	Cluster	Indicator	Description	Quali/quanti	Assessment methodology	UDM	NOTE
Dantsis, 2010	Environmental Integrity	Land	Soil Quality	Mechanical treatment	Assess the number of machinery entrances in the field (e.g. tillage, fertilization, pesticide application, harvest) as well as the horsepower of machines used to assess the risk of soil compaction	Semi-quantitativ	Number of machines entrances on field weighted on their horsepower		
Dantsis, 2010	Environmental Integrity	Land	Soil Quality	Farming system	share of total utilised agricultural area occupied b organic and integrated farming to d scrib the degree of adoption of environmentally friend practices	Quantitative	Area occupied by organic or integrated farming / tot. Cultivated area	%	

Reference	Dimesion	Theme	Cluster	Indicator	Description	Quali/quanti	Assessment methodology	UDM
SAFA	Economic	Economic Viability	Profitability	Net Income	This indicator measures whether the total revenue earned by the enterprise in the last five years is sufficient with producing the goods and services sold by the enterprise exceeds the total expenses, including interests and taxes.	Semi-quantitativ e	Assess if the net income kept positive values and growth trend over the last 5 years	-
SAFA (elaborated from)	Economic	Economic Viability	Profitability	Cost of Production	This indicator measures whether the enterprise has completed a process to determine the total cost of the products sold and breakdown cost component to evaluate their weights.	Quantitative	Cost of Raw materials + Cost of direct labor + Cost of overhead/ tot.land	Eur/ha UAA

Reference	Dimension	Theme	Cluster	Indicatore	Description	Quali/quanti	Assessment methodology	UDM
RefAB (elaborated from)	Internal Social Sustainability	Working Condition	Capacity development	Autonomy in Decision Making	Assess the degree of autonomy in decision making, related to managerial or strategic decisions.	Semi-quantitativ e	Parameters assessed on a scale basis (1=never, 7=all of the time)	-
RISE	Internal Social Sustainability	Working Condition	Workload	Working Hours	Daily, weekly and annual working hours and annual vacation are recorded and evaluated against the regional standard. Assure that each person working on the farm has enough free time to recover physically and mentally, so that they can remain healthy and productive in the long run.	Qualitative	Assess towards the reference optimal condition: 5 days a week, 40 hours a week, 6 weeks' paid vacation a year, overtime remunerated	-

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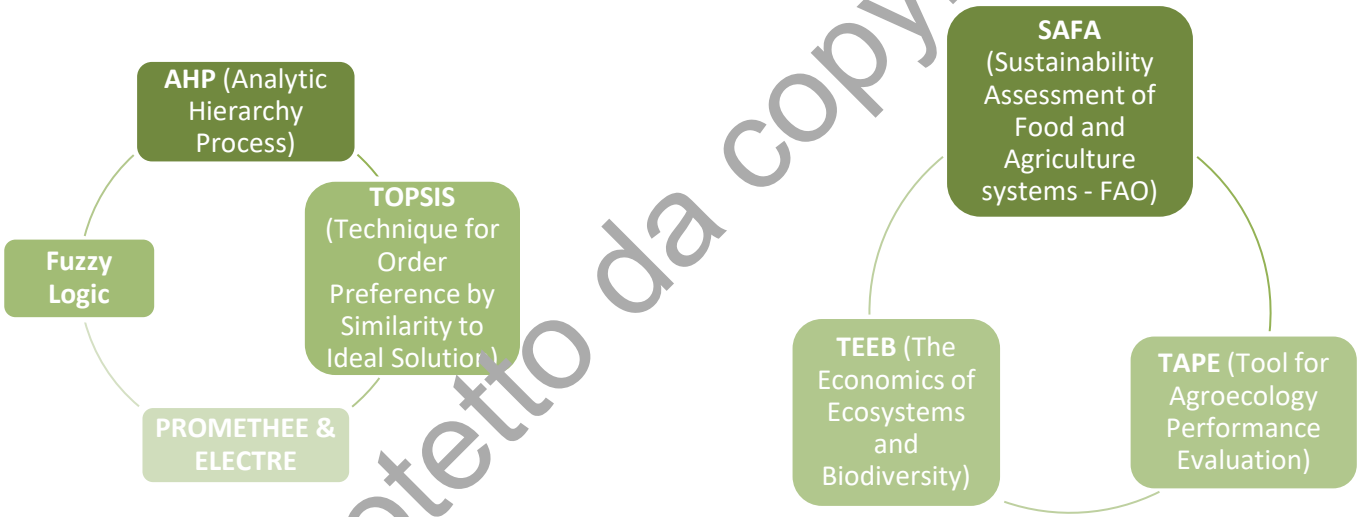
Sustainability assessment in agriculture

MCDM (Multi-Criteria Decision Making)

Sustainability Assessment Frameworks



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Sustainablility Assessment of Food and Agriculture Systems (SAFA) - FAO

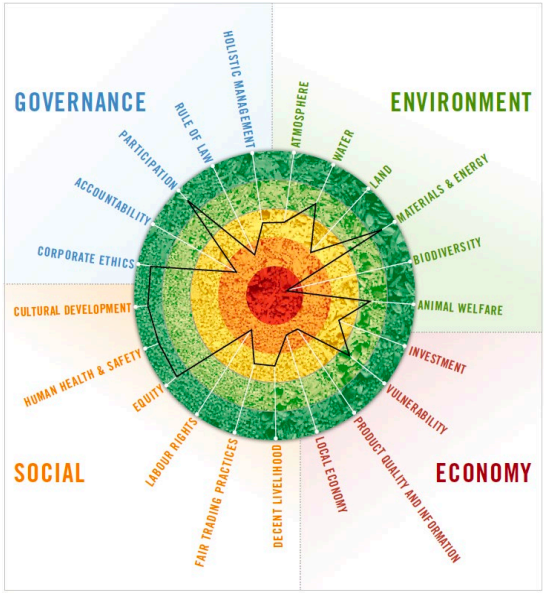
Sustainability means ensuring human well-being (and achieving global food security) without depleting or diminishing the capacity of the earth's ecosystems to support life or at the expense of others' well-being

GOOD GOVERNANCE
- G1. Corporate Ethics
- G2. Accountability
- G3. Participation
- G4. Rule of Law
- G5. Holistic Management

ENVIRONMENTAL INTEGRITY
- E1. Atmosphere
- E2. Water
- E3. Land
- E4. Biodiversity
- E5. Materials and Energy
- E6. Animal Welfare

ECONOMIC RESILIENCE
- C1. Investment
- C2. Vulnerability
- C3. Product Quality and Information
- C4. Local Economy

SOCIAL WELL-BEING
- S1. Decent Livelihoods
- S2. Fair Trading Practices
- S3. Labour Rights
- S4. Equity
- S5. Human Health and Safety
- S6. Cultural Diversity



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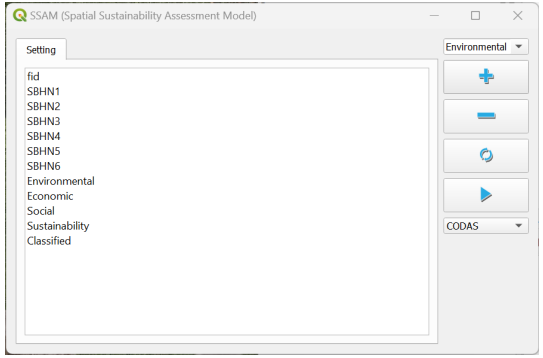
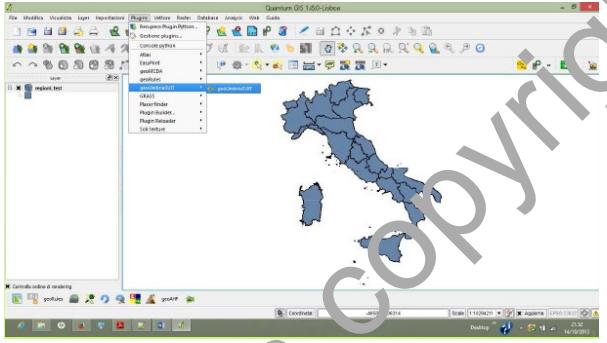
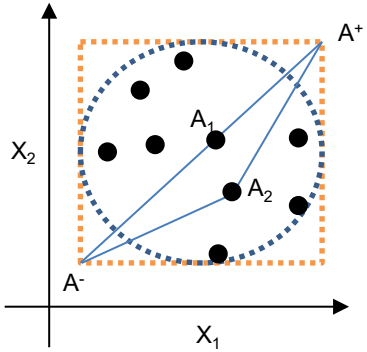
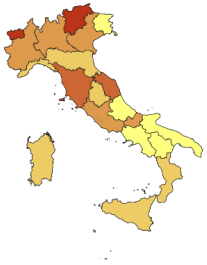
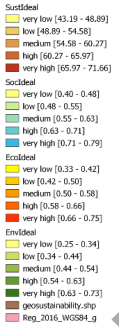
Spatial Sustainability Assessment Model (SSAM) – DSA3 UNIPG

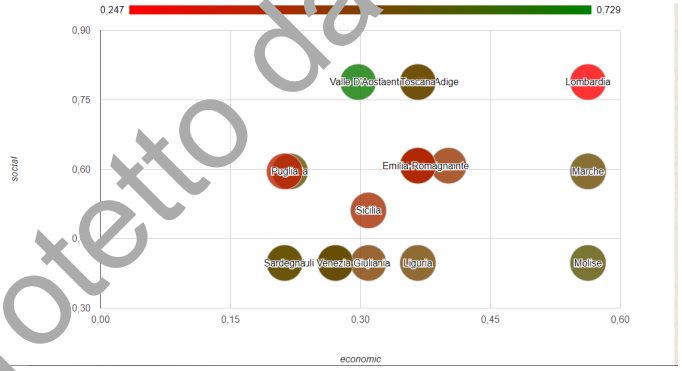


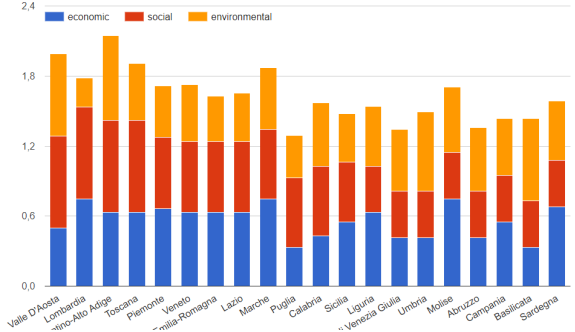












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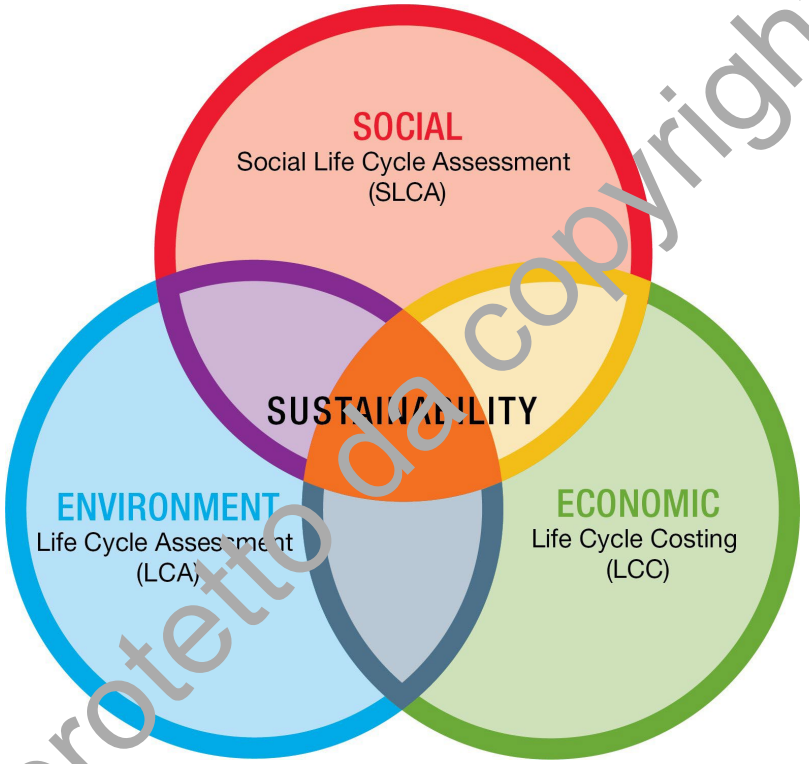
LCA – LCC - LCAs



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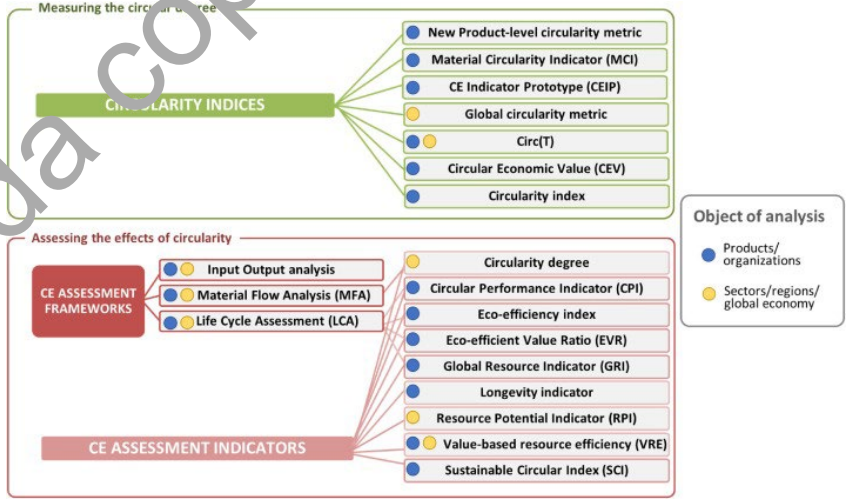
Complexity

The complexity in the use of indicators and assessment frameworks increases due to the increasing complexity of the production and territorial systems.

- SDGs
- climate crisis
- ecological transition
- transition towards the circular economy

need for circularity indicators to...



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