CO-CREATION WORKSHOP PRELIMINARY RESULTS

Novel Enabling Technologies
For A Sustainable Future: Artificial Intelligence

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Group 1: Giovanni Castria, Andrea Giannobile, Carmela Occhipinti, Xinyi Tu, Rich Walker

Use-case: Data-Driven Resilient Farming For Sustainable Food Market

Facilitators: Brigita Jurisic (INL), Charlotte Alcouffe (GAC)

The group chose Agriculture as a focus sector and throughout the exercise redefined the sector as Agrifood. The main issues raised for this sector were heavy regulation, waste management and climate change induced crops loss as well as crops loss due to disease. Lack of pollinators in certain ecosystems has also been highlighted as a challenge. The root cause of the environmental issues raised is climate change and the main effects that come with it are unpredictability, unreliability and fragility of the environment. The result of this leads to the farmers need to be able to adapt quickly.

A solution proposed to address these issues is permaculture-inspired data-driven resilient farming in form of modular micro-farms where diverse crops would be planted together based on indications provided by AI tools using soil, weather, disease and other relevant data. The solution would need to be powered with data collection and analysis technologies (sensors) as well as decision making and implementation support using abductive reasoning AI technology. The major benefit of this systemic solution is democratization of food growth for one´s own purposes. Modularity also enables micro-farm growth if/when desired. In terms of the environment, there are also benefits in soil regeneration and more efficient pest control. As a side-solution related to the pest control the group came up with an idea of biometrics for plants and pests as a data-collection mechanism supporting early recognition of any issues with the plants and enabling directed, early response to such issues. For this kind of solution to be able to be implemented we need to be able to share the data. The best place to start would be supporting pilots and developing new business models in the existing permaculture communities and growing from there. Of course, regulatory frameworks would need to be adapted as well to account for a different model of farming/growing.

Group 2: George Anadiotis, Luigi Briguglio, Martin Cimiterra, Ângela Faria, Ricardo Rodrigues

Use-case: ALICIA – Automated Life Cycle Impact Assessment

Facilitator: Livia Di Bernardini (APRE), Eva Fadil (GAC)

The group chose to focus the collective exercise on the Manufacturing sector. Several critical issues in the sector were considered such as the resilience of the supply chain, the poor working conditions, the lack of accountability of externalities, the lack of integration of data. It was then considered that many of these shortcomings were part of the specific problem related to the lack of an adequate life cycle assessment. This issue brings to the low level of circularity in the management of resources (causing waste of raw material), a non-sustainable supply chain and an overall degradation of the environment. Among the root causes, the lack of standards, massive production, and the mindset focused solely on economic profit were the main ones identified. On the other hand, policies, more transparency, education, sustainable and responsible production were the major needs considered.

This is why the group proposed a standard Life Cycle Assessment encompassing the process from resources to product retirement. The solution aims to bring value created out of waste, to improve the resilience of the supply chain making it more sustainable as well as to improve working conditions providing indicators, best practices and standards. The value proposed to bring with the solution is an ethics-driven approach to manufacturing improving the sustainability of production while enhancing transparency of the process and awareness. Adaptive AI was considered to be the most suitable technology to address the solution because of its capacity to learn and adapt from both historical and real time data.

The primary stakeholders in this initiative include manufacturers, suppliers, developers, and investors. The solution necessitates technical contributions from developers and support from educators to assist in the creation of the tool. Ultimately, the main beneficiaries will be consumers and the general public/citizens.

Some restrictions and limitations may hinder the resolution of the problem such as access to quality data, fragmentation of data (affecting data integration and interoperability) as well as business models that do not incentivise data sharing.

Concluding, the group envisaged an Adaptive AI-based system able to provide sustainable indicators to manufacturers and suppliers: Automated Life Cycle Impact Assessment (ALICIA). The solution would bring both social benefits in terms of value-based manufacturing and environmental benefits such as responsibile use of resources (that implies a waste reduction)

and a more sustainable production. Among the main impacts, it is worth mentioning that the solution will entail a reorganization of the supply chain, redistribution of profits, and job creation. New positions will emerge for auditors, LCA (Life Cycle Assessment) experts, AI implementers, SSH (Social Sciences and Humanities) experts, and business model specialists.

Group 3: Federico Francia, Alessandra Pennuto, Amir Sheikh Samani

Use-case: Data-Driven Business Model In Manufacturing

Facilitators: Francesca Foliti (APRE), Sofia Gatteri (STAM)

The group picked manufacturing as their sector of interest and indicated a lack of flexibility as the main problem to address, meaning an understated capacity to adapt to ever-changing circumstances – e.g., geopolitical events, economic and financial crises, evolving technologies, rapid digitalisation processes, regulatory changes, market conditions, and so forth. The problem encompasses several issues affecting the focus sector, such as the lack of a holistic approach to management. Consequently, manufacturing companies might face a higher risk exposure and higher maintenance costs, as well as reduced production levels, lower competitiveness, a little-to-no sustainable supply chain, and an unbalanced use of resources. Although indirect, another effect might be a low level of workforce satisfaction and wellbeing. The main root causes identified by the group include poor accessibility of emerging technologies (especially for SMEs), low TRLs (Technology Readiness Levels), outdated data collection and management systems, insufficient democratisation of technology, limited digital skills, and low trust in emerging enabling technology adoption.

Therefore, the enhancement of business flexibility and adaptability is the proposed solution to address common needs of manufacturing companies, and namely: a fair trade-off between sustainability and productivity, a more efficient resource allocation, increased confidence investing in digital upskilling and in the uptake of emerging technologies, enhanced connectivity and better data management capabilities. To do so, the group convened that adaptive AI is the most suitable technology. In fact, by combining several different scenarios and considering ever-changing external and internal conditions, it can improve the quality of decision-making processes based on data, thus ensuring a better fulfillment of the identified needs.

All-sizes manufacturing companies would benefit from the adoption of a data-driven, adaptive AI-powered business model flexible enough to adapt to different scenarios and to develop resilience. Business managers – the chosen target group – are thus encouraged to rely on this use-case when conducting their periodic evaluations, as it has the potential to lead to increased efficiency, productivity and more sustainable production, as well as to provide them with key cross-cutting insights and the ability to predict challenging conditions. It would benefit other actors in the supply chain as well, such as the workforce itself (at all levels), system integrators, and the final consumers, by delivering efficiency, innovation, and more space for personal and professional growth.

Socially speaking, the group agreed that the envisaged solution would lead to a workforce upskilling and overall workplace satisfaction and welfare, although the effects on employment rates remain uncertain. Environmentally speaking, the data-driven business model would enhance a more efficient management of resources, and ultimately result in an alignment with the international sustainability goals and regulations.

The key resources needed to achieve the proposed model are financial, technological, and human: appropriate funding, advanced knowledge of processes, ownership of enabling technologies (e.g., sensors), and best practices exchange are essential factors to the pursue of a successful data-driven business model.

However, some feasibility issues have emerged during the group discussion. Possible limitations might be represented by a lack of funding or by regulatory matters, or else by a broader fear of change that sometimes managers show. Such factors may limit the access to enabling technologies and prevent manufacturing companies from relying on a data-driven, AI-powered business model.

Group 4: Sigal Hachlili, Andrew Humphrey, Ruth Gow McLenachan, Henrikki Salo-Pöntinen, Francesco Salvadore

Use-case: DIA-BEATER

Facilitator: Maria Carmela Fierro (APRE), Minna Halonen (VTT)

The group initially chose "HEALTH" as its focus, intending to combine it with "AGRICULTURE". However, they eventually redefined their focus to 'WELLBEING', emphasising prevention, lifestyle choices and environmental factors that contribute to a healthy and fulfilling life. The central problem identified by the group is the lack of a wellbeing ecosystem for citizens.

The main causes are low levels of willpower and self-control, the negative effects of intensive agriculture, limited knowledge of how different sectors affect health and well-being, the rapidly changing technological landscape and the negative effects of intensive agriculture. These issues contribute to an overburdened health care system, a shortage of caregivers for a growing population, inadequate prevention, an increase in diabetes and related diseases, and a sedentary lifestyle among the population.

The proposed solution is to create a fully functioning ecosystem for wellbeing, powered by data collection and analysis using AI tools such as 'learning through trials and errors' and 'adaptive AI'. To achieve this, citizens need technological solutions and tools to support their actions and measure their impact on their lives. The group decided to focus on a specific population: people at high risk of type II diabetes.

They plan to develop a tool called "DIA-BEATER" that will provide tailored support and adaptive motivational triggers for healthy behaviour. The benefits of this use case include reducing the burden on hospitals, improving mental health, enhancing preventative care and promoting healthy lifestyles.