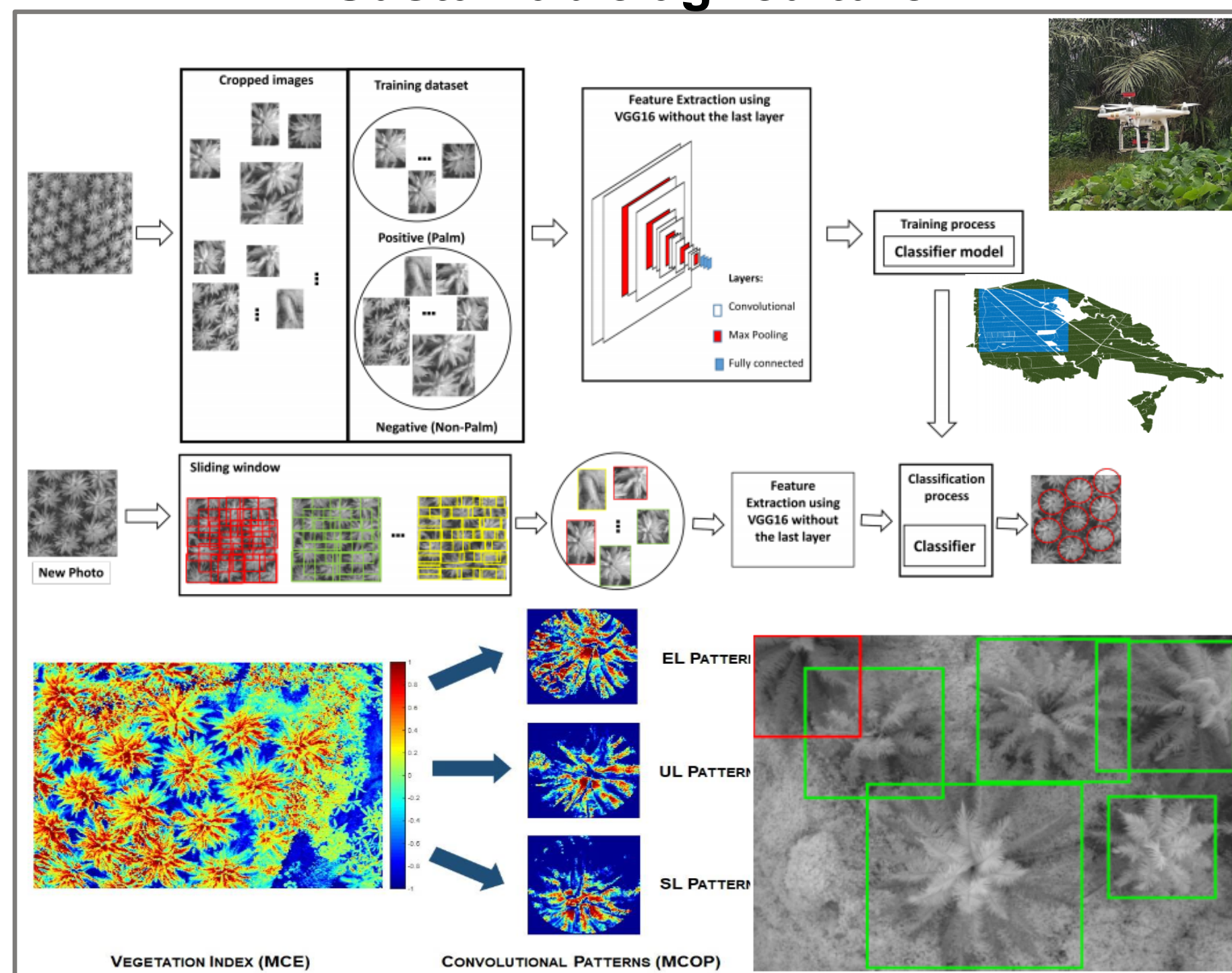# Artificial Intelligence for Societal Enhancement
## - Addressing UN SDGs -

Sustainable agriculture

Using AI to improve sustainability of Oil Palm crops

- The global demand for palm oil, both as a food source, and pharma and energy industries, is increasing. To improve sustainability, the RSPO (Roundtable on Sustainable Palm Oil) has stablished principles to reduce the use of pesticides, fertilizers and fires, as well as fair treatment of land and workers according to local and international labour rights.

- By working closely with industry, we have developed novel techniques to analyse high-resolution images of crops gathered by low-altitude drones. This leads to faster reliable diagnosis of disease as well as supporting crop management. Applying deep and transfer learning has resulted in novel adaptive vegetation indices obtained from multispectral aerial views.

- This has been integrated into fuzzy forecasting maps, to achieve international standards in crop management tools that support the development and financing of oil palm plantations both at small and medium scale.

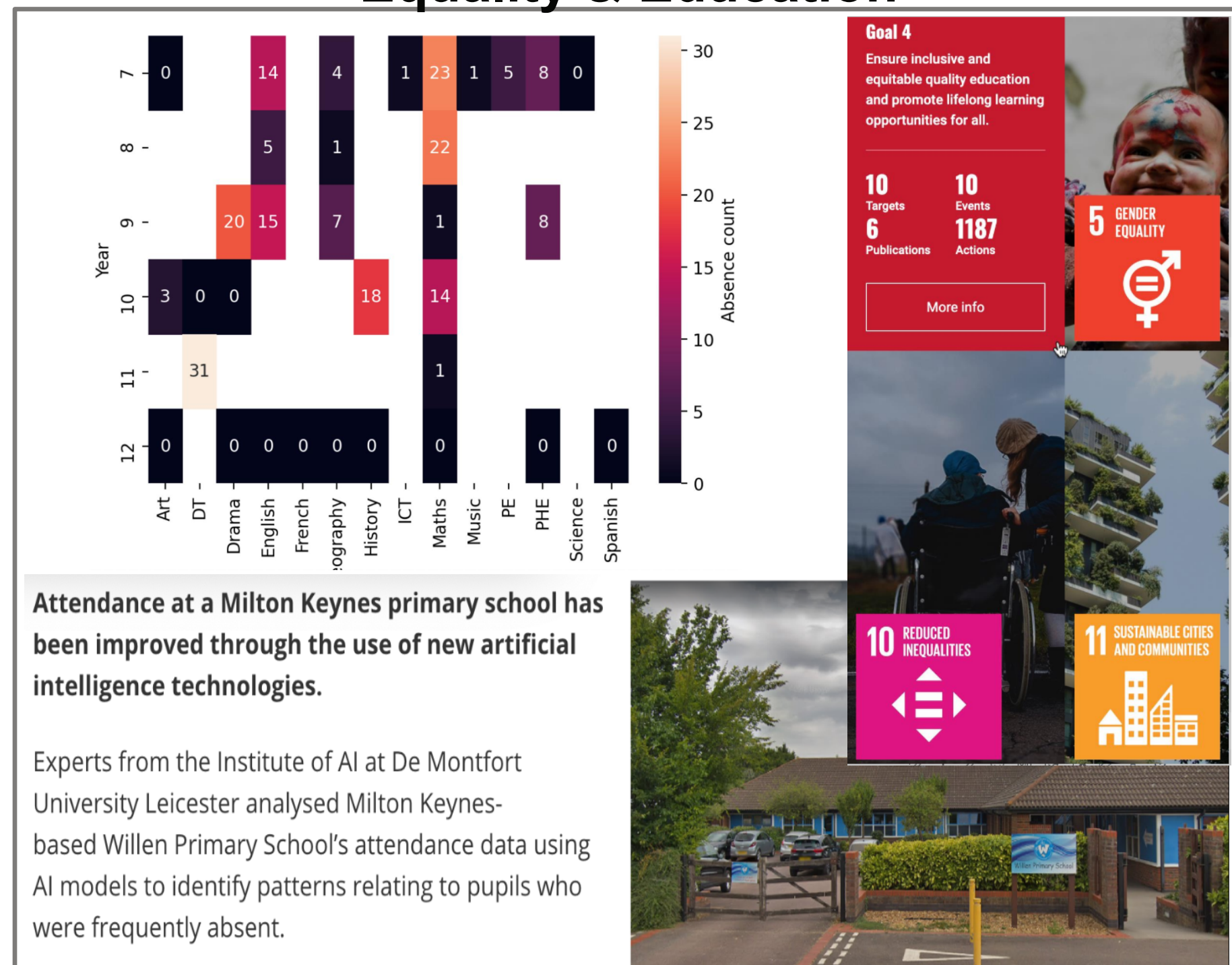- This project is supported by the Newton Fund (IAPP1\100130).

Society & economical growth
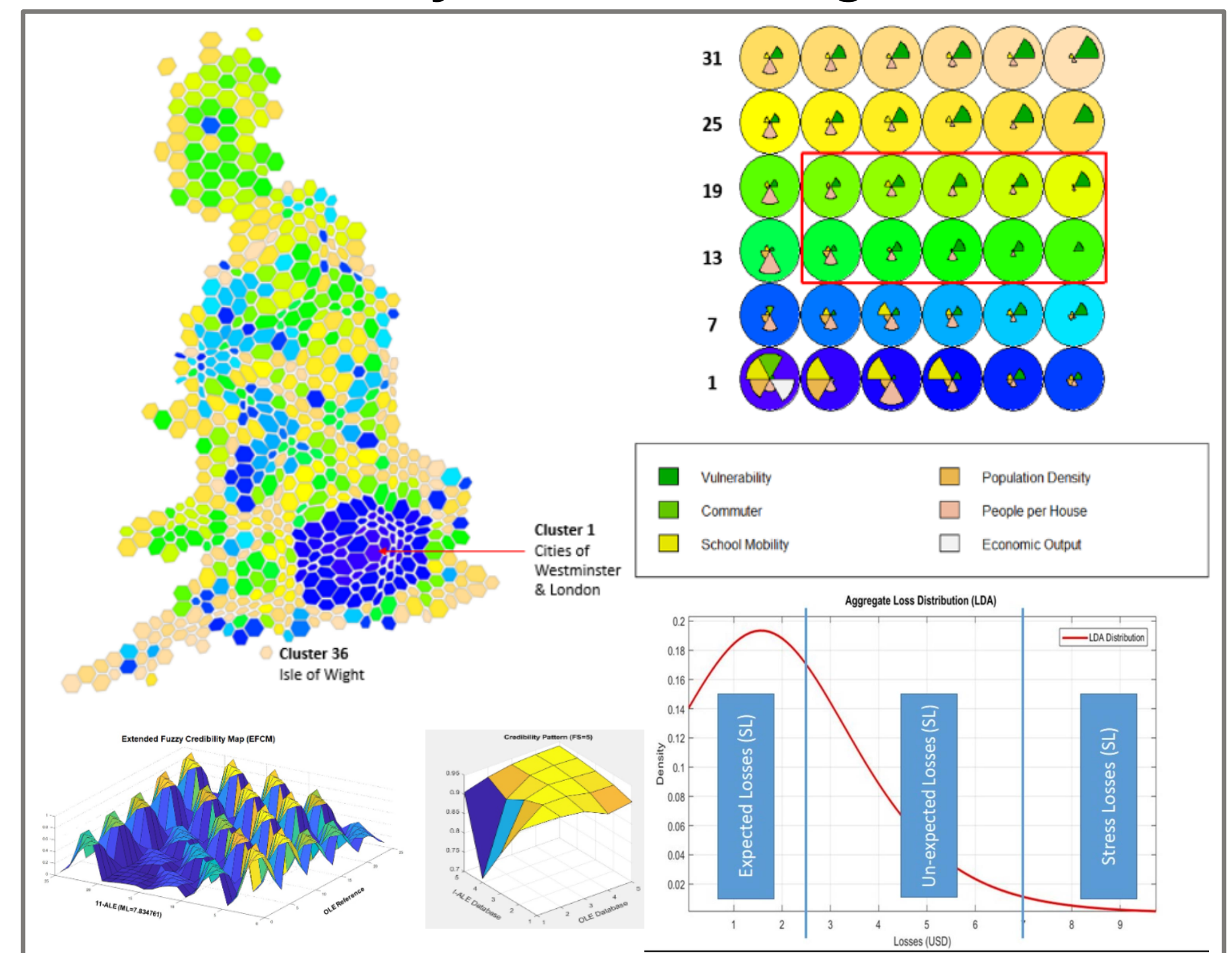
Risk assessment and mitigation

- Operational Risk (OR) occurs due to human errors, inadequate or defective internal processes, system failures or external events that affect an organization, process or economic system. This can cause severe losses to an organisation or even to whole economies, in which case it has a worse effect on the more disadvantaged members of society.

- For example, the lockdowns for Covid-19 have resulted in several countries facing economic and social turmoil which is likely to remain for several years; the unemployment rate in the United States quadrupled in one month with the rate being 14.7% in April 2020, whilst the Bank of England in the United Kingdom (UK) warned of the "sharpest recession on record".

- Modelling, analysing and providing mitigation strategies to managing risk is critical to support many of the UN SDGs. We use various computational intelligence techniques such as of fuzzy forecasting maps, Self-Organising Maps (SOM) and intelligent data analytics, which has allowed us to develop operational risk and risk distribution models to support industry and society.

Equality & Education

Attendance at a Milton Keynes primary school has been improved through the use of new artificial intelligence technologies.

Experts from the Institute of AI at De Montfort University Leicester analysed Milton Keynes-based Willen Primary School's attendance data using AI models to identify patterns relating to pupils who were frequently absent.

Monitoring and supporting student engagement

- One of the main tools to enhance equality in society is education, and it is as well an explicit UN SDG (4). To support this objective and other that are affected by this, we are using intelligent data analytics and pattern analysis to support the enhancement of student engagement.

- Buy understanding the patters and/or reasons students have attendance or engagement issues, our analyses provide tools to tackle these issues. We proposed a novel approach to help schools improve attendance that leverages the market target model, which is built on association rule mining and probability theory, to target sessions that are most impactful to overall poor attendance. Tests conducted at Willen Primary School, in Milton Keynes, UK, showed that significant improvements can be made to overall attendance, attendance in the target session, and persistent (chronic) absenteeism, through the use of this approach.

Optimal use of land
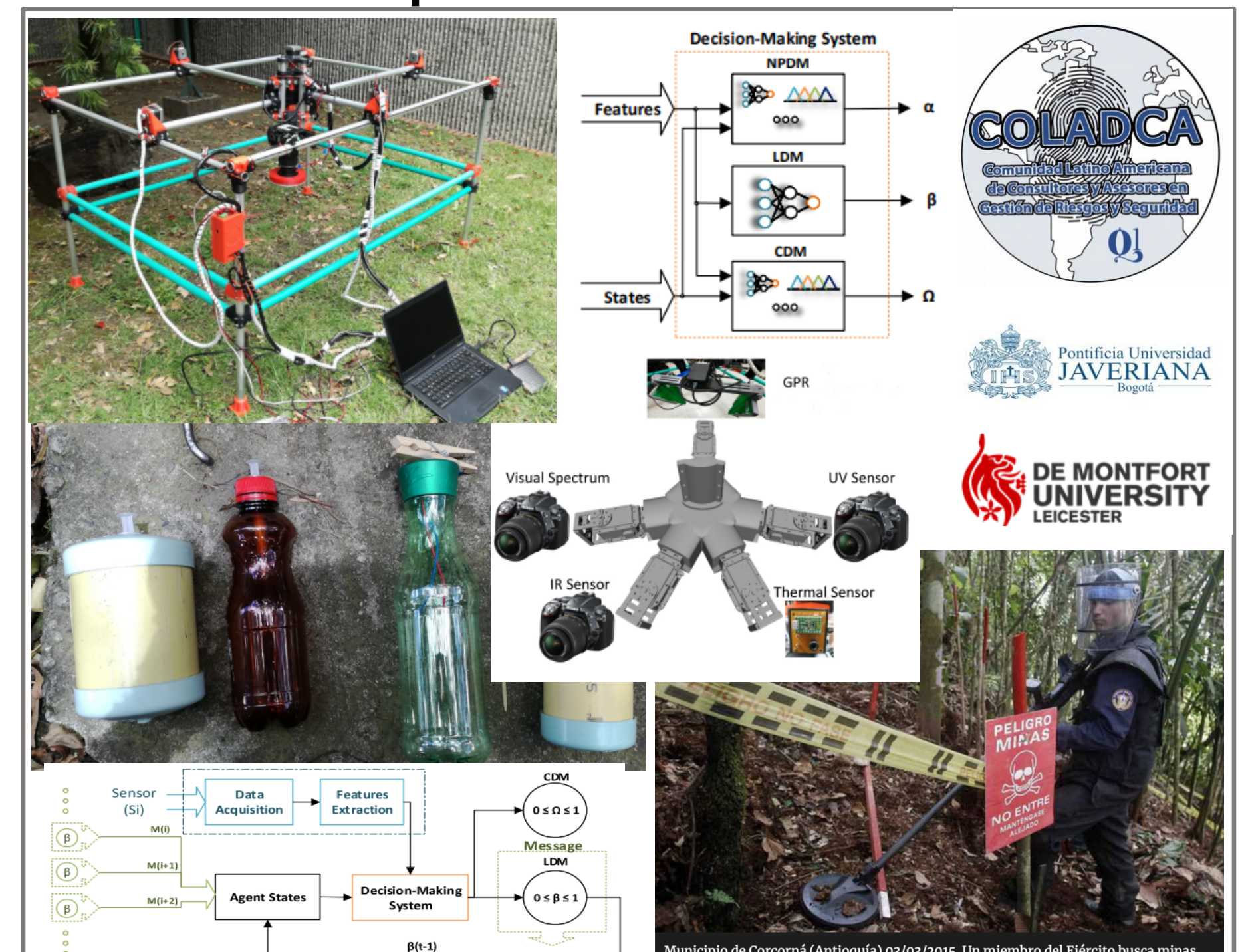
Enhancing sustainability in rural communities

- The peace process in Colombia provided a new lease of life to rural communities but is rife with social and operational challenges. Lands that were in no-go zones are now available for use but have many issues from direct effect of war such as land mines, to indirect such as debris, pollution and exhaustion.

- Our international partner (PUJ) has a very strong social engagement and impact and is working in both social and operational aspects to support the sustainable development of these communities; one of the projects involves assessing the land and help optimise its use.

- Sensing land characteristic and detecting buried objects is very complex and no one sensor or method can achieve this optimally. We are currently collaborating with PUJ in optimising a land scanning platform that uses an array of sensors and other data sources; we are developing a novel and powerful Robust Decision-Making Framework Based on Collaborative Agents RDM(ca).

Faculty of Computing, Engineering and Media

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