

Context Food loss and waste (FLW) pose significant challenges globally, affecting the environment, food security and economies. In 2022, the EU generated over 59 million tonnes of food waste, an average of 132 kg per inhabitant. Households account for 54% of this (72 kg per person), while the remaining 46% comes from the food supply chain. Food waste in the supply and consumption sectors represents about 10% of the food supplied in the EU. Tackling food waste is a triple win: it saves food for human consumption, reduces the environmental impact of food production and helps businesses and consumers save money. This is particularly important given that nearly 10% of EU citizens cannot afford a quality meal every two days. Portugal is the third country in the EU with the highest food waste, which also translates into a financial loss¹. According to a Too Good To Go study, the average Portuguese citizen wastes 28€ per month on discarded food, rising to 33€ for young adults (18-24 years old). Over a year, this represents a 336€ loss per person due to poor food management². Consequently, reducing FLW has become a priority on the sustainability agenda at all levels.

Objectives and ambition The MICROORC project will develop sustainable solutions that reduce and prevent food spoilage and food waste, with focus on technologies, services, tools, policies, and practices that are based on monitoring, utilizing, and targeting microbiomes in food and the food processing chain (Fig.1).



Fig.1: MICROORC will facilitate innovation of microbial business solutions in five areas, selected for their potential for contribution towards improved sustainable food processing, extended shelf life, and reduction in food waste based on monitoring and orchestrating the microbiome

Methodology This will be achieved through two main pathways: 1) developing tools, technologies, and guidelines for improved process control, microbiome monitoring, and more accurate shelf life prediction and labelling and 2) extending shelf life through bioprotection and packaging technologies that control or limit the growth of spoilage or pathogenic organisms, thereby reducing avoidable food waste.

References

¹https://food.ec.europa.eu/food-safety/food-waste_en
²<https://expresso.pt/newsletters/expresso-ser/2024-10-08-portugueses-os-terceiros-da-ue-que-mais-comida-e-dinheiro--deitam-ao-lixo-c1>

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ORCHESTRATING FOOD SYSTEM MICROBIOMES TO MINIMIZE FOOD WASTE

The first pathway focuses on reducing food waste linked to date marking by developing microbiome-based tools for better process control and shelf life prediction (Fig.2).

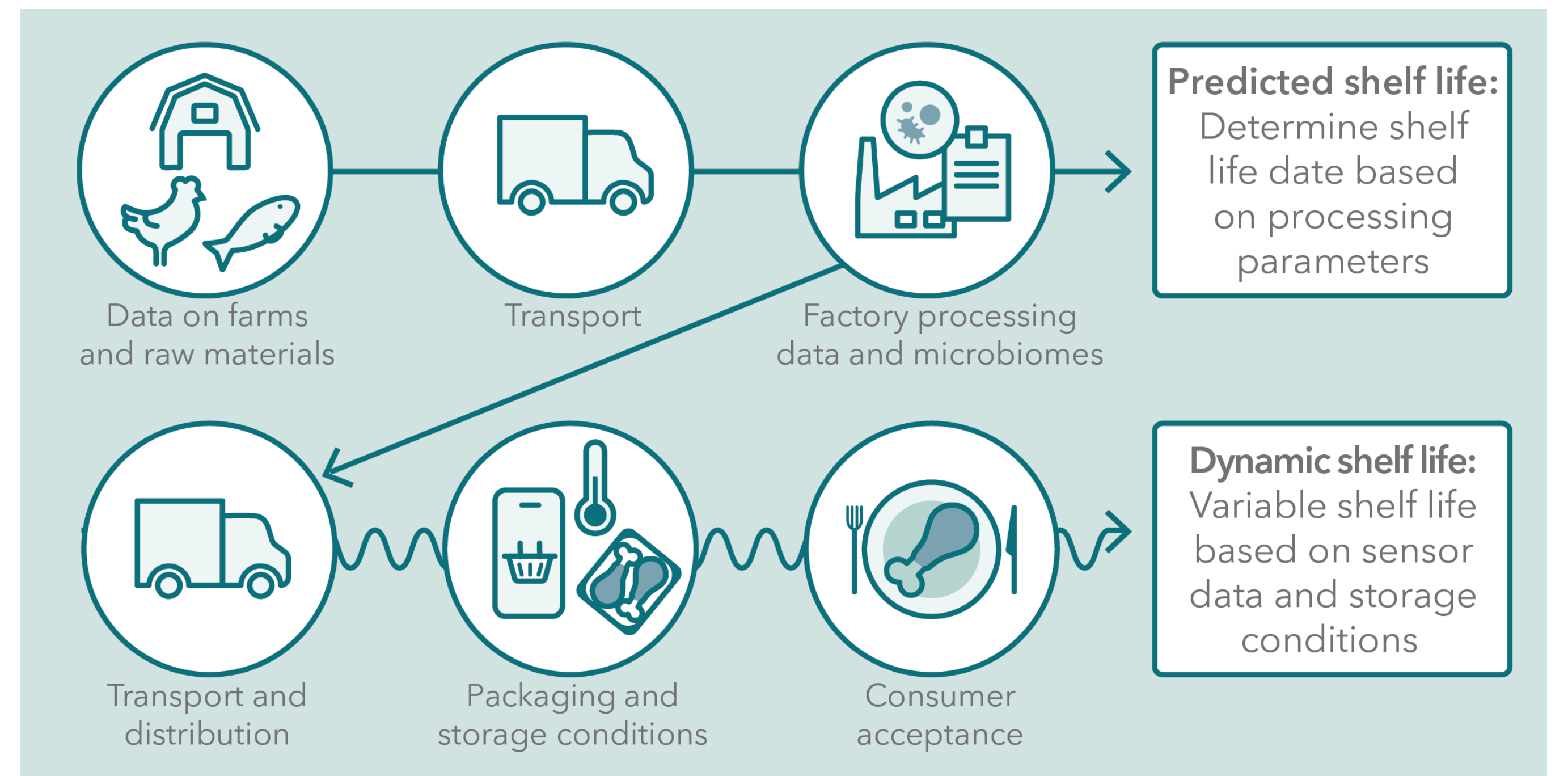


Fig. 2: More accurate shelf life on two dimensions: Predicted shelf life and dynamic shelf life

The second pathway targets microbiome-based protection technologies (food cultures and fermentates) to replace synthetic chemicals for controlling pathogens and spoilage bacteria, extending shelf life. Additionally, sustainable packaging systems will be developed, balancing shelf life, safety, food waste, and environmental impact. Sustainability and policy assessments will guide innovation, with new regulations and policy recommendations co-created with stakeholders. Dissemination strategies will maximize the project's impact.

Three selected products serve as case studies: fresh chicken, smoked salmon, and plant-based meat analogues.

MICROORC is organized into seven work packages (Fig. 3).

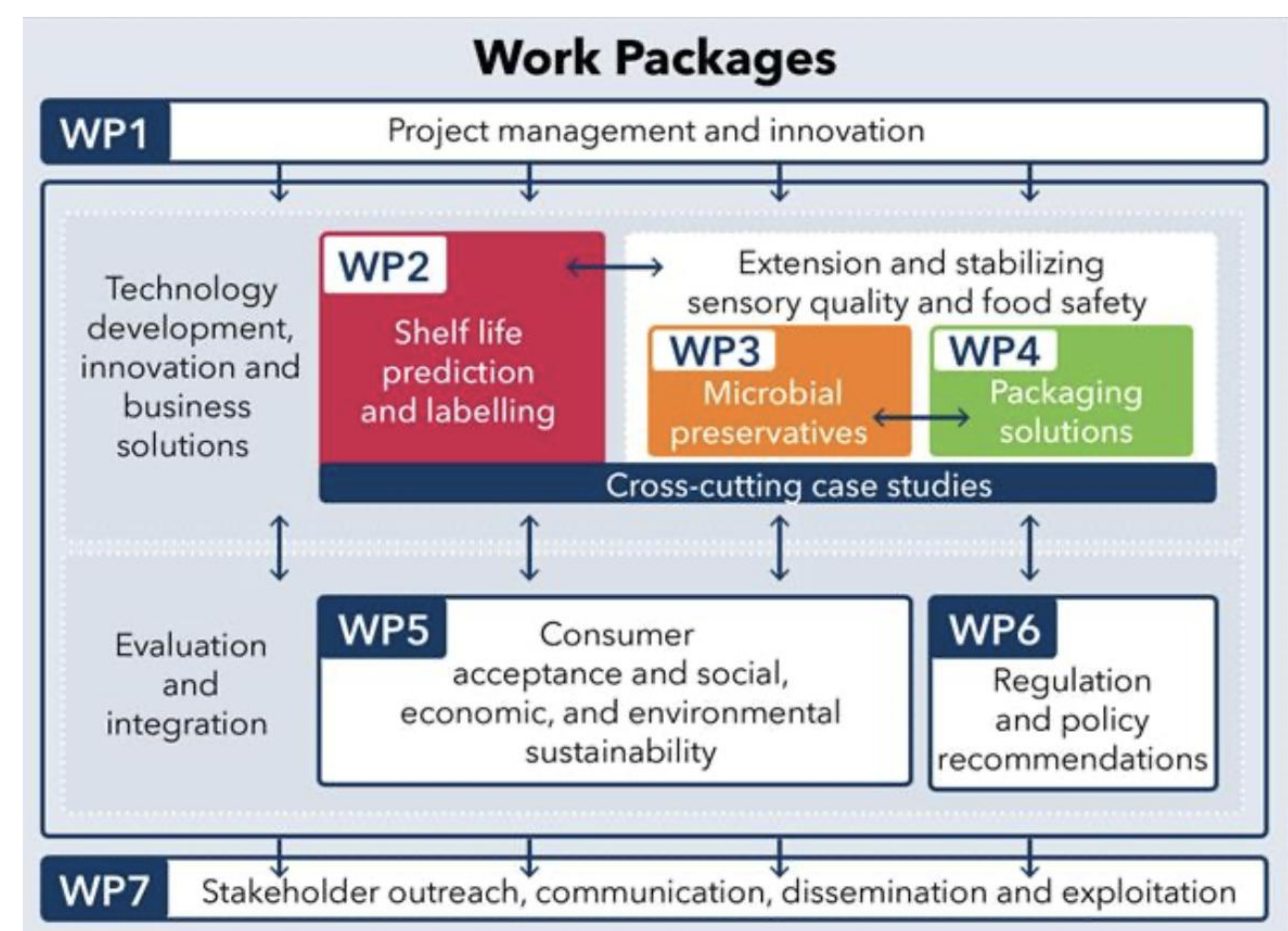


Fig.3: Work Package (WP) structure of MICROORC

Through collaboration between cutting-edge companies and experienced research institutions, MICROORC will fulfil the development needs of the industry to reach TRLs > of 6 and 7 or above.

