smart skills
smart sustainable agriculture

Course 6: Bringing Innovation to Farms

M2: Greenhouse Automation

Co-funded by the European Union

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Objectives and Learning Outcomes

This module is designed to introduce learners to the concept of **greenhouse automation**, focusing on how automated systems regulate key environmental factors such as temperature, humidity, and lighting to optimise plant growth. Learners will explore how IoT sensors enable real-time monitoring and control of greenhouse conditions, enhancing efficiency and resource management. Through case studies and practical examples, learners will gain insight into the real-world applications of automated greenhouse systems, understanding their role in increasing productivity, reducing energy consumption, and promoting sustainable farming practices.

Learn…

…how automated systems regulate temperature and humidity in greenhouses.

Understand…

…how IoT sensors enable remote greenhouse management.

Analyse…

…real-world applications of greenhouse automation for improved efficiency.

contents

This module is about IoT-driven automation in greenhouse farming, where smart sensors, data analytics, and automated controls optimise climate, lighting, and irrigation. Real-time monitoring and precise adjustments enhance efficiency, reduce resource use, and support sustainability.

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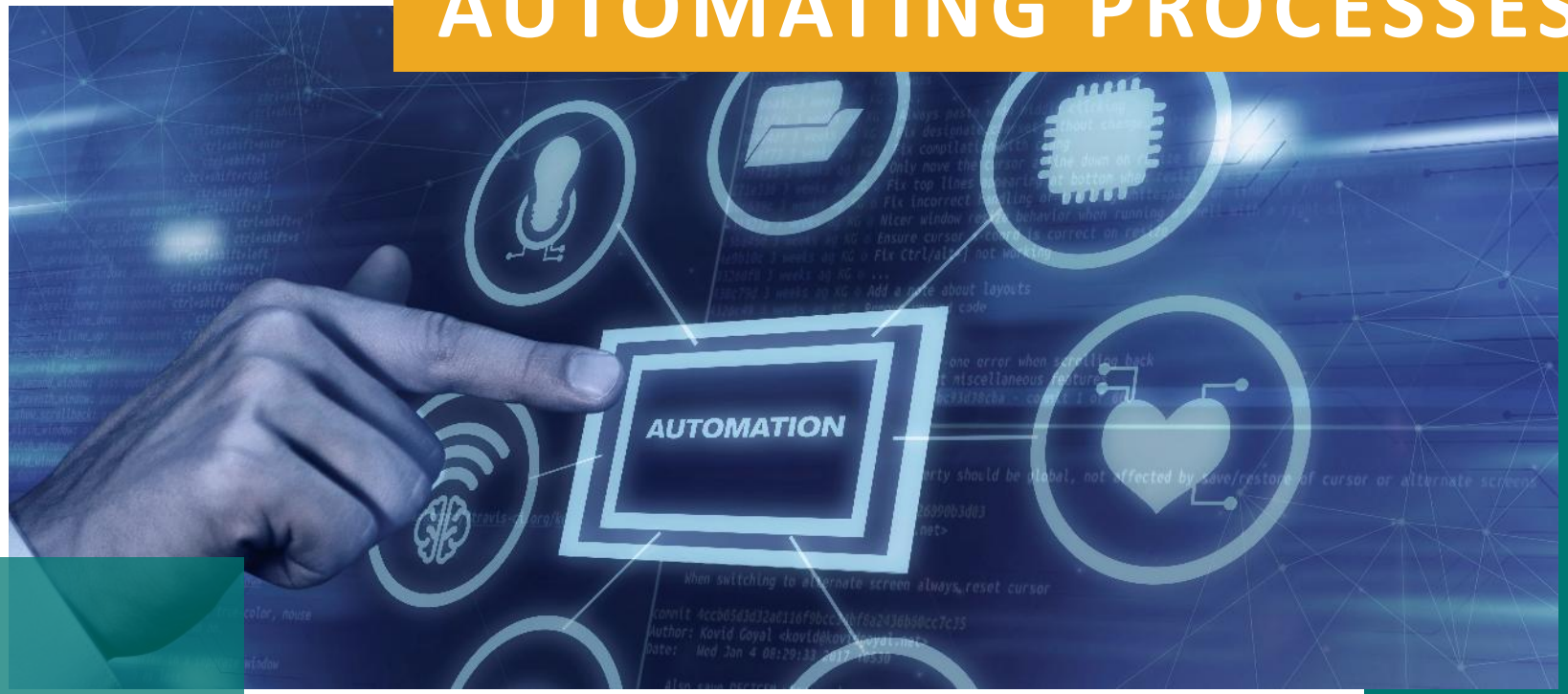
01

AUTOMATING PROCESSES



Automating Temperature, Humidity, and Lighting Controls

Automating temperature, humidity, and lighting controls is crucial for optimising indoor farming. Temperature sensors, such as NTC thermistors and RTDs, regulate conditions by monitoring plant canopies, growing media, and irrigation water. Capacitive humidity sensors help maintain proper moisture levels, preventing plant stress and fungal growth. By integrating automated climate control systems, growers can enhance yields, conserve resources, and improve sustainability.

Be inspired by this Canadian grower ➔

jetsonoB IE

Benefits of Greenhouse Automation

Zoned Climate Control

Automation allows different areas of a greenhouse or indoor farm to maintain customised temperature, humidity, and lighting settings based on specific crop needs.

Adaptive Lighting Systems

Smart lighting adjusts intensity and spectrum throughout the plant growth cycle, improving photosynthesis efficiency and reducing energy consumption.

Remote Monitoring & Alerts

IoT-enabled sensors provide real-time data access and send alerts for any environmental fluctuations, ensuring quick corrective actions.

Improved Labour Efficiency

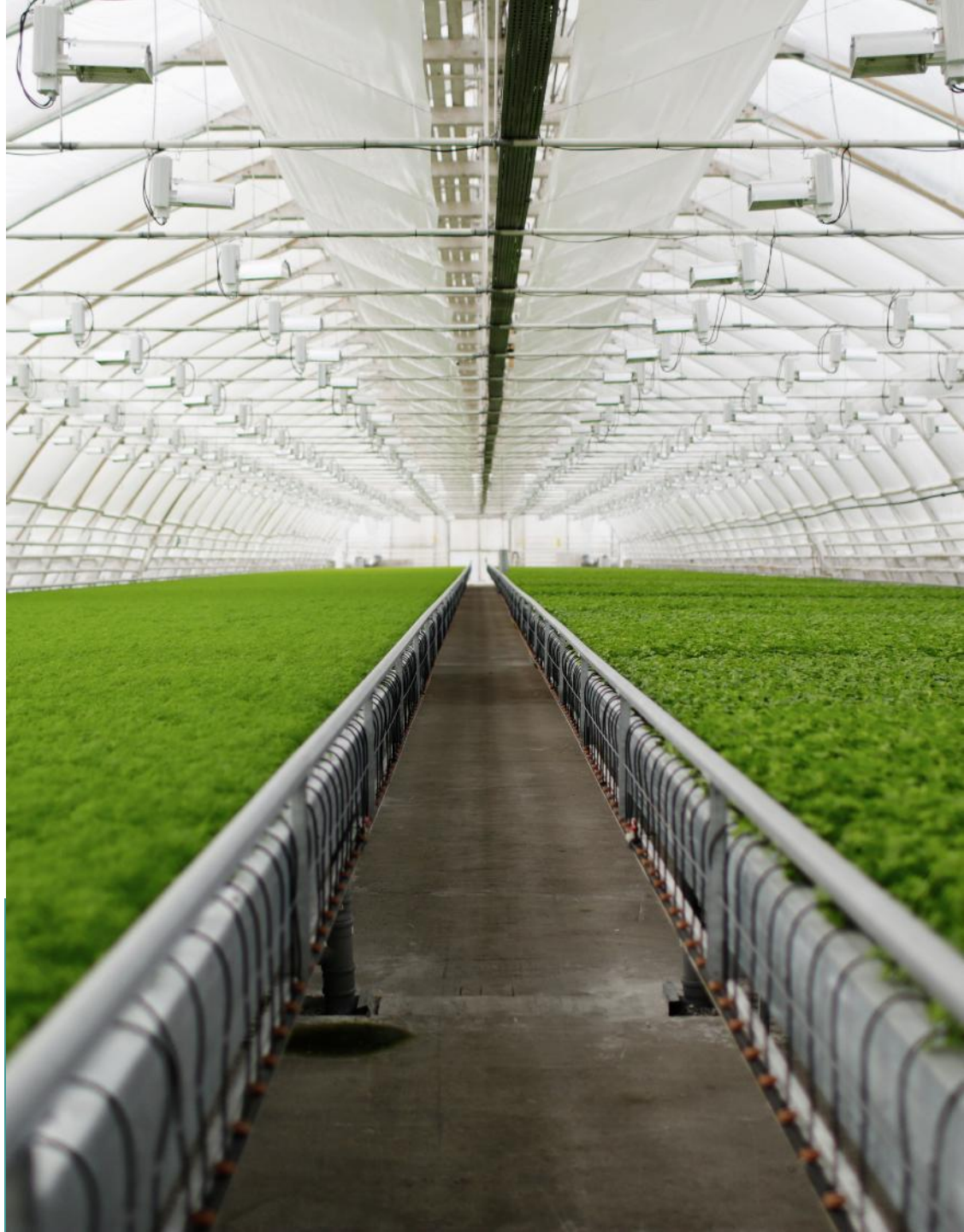
Automating climate controls reduces the need for manual monitoring and adjustments, allowing growers to focus on higher-level farm management tasks.

02

GREENHOUSE MANAGEMENT WITH IOT

The Role of IoT in Greenhouse Management

IoT technology enhances greenhouse farming by providing precise environmental control through smart sensors, automation, and data analytics. By continuously monitoring key factors such as temperature, humidity, soil moisture, and light levels, **growers can create optimal conditions for plant growth**. Automated climate control systems adjust irrigation, ventilation, and lighting in response to real-time sensor data. This **improves resource efficiency, reduces costs, and increases crop yield**. With data-driven insights, farmers can make better decisions to enhance productivity and sustainability.



Key IoT Applications in Greenhouse Farming

Equipment Control

IoT-enabled actuators automate fans, heaters, and irrigation systems, ensuring optimal greenhouse conditions with minimal manual intervention.

Remote Management

Cloud-based platforms allow farmers to monitor and adjust greenhouse conditions from anywhere via smartphones or computers.

Sensors

Networked soil moisture, temperature, and humidity sensors provide real-time data for precise environmental monitoring and control.

Analytics & Machine Learning

AI-driven analytics process sensor data to predict plant health issues, optimise resource use and enhance crop yield.

Watch this video for more information!

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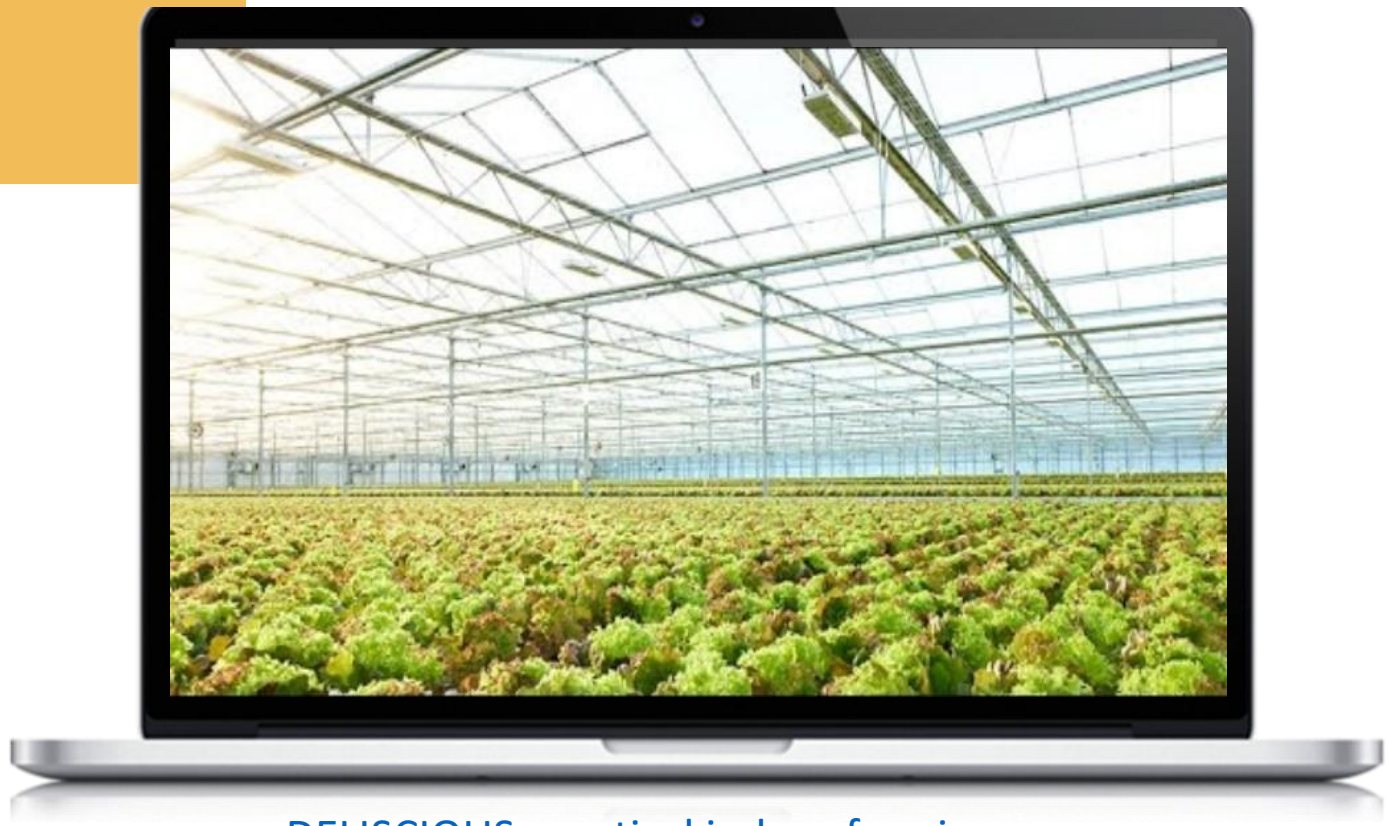
03

GREENHOUSE SUCCESS STORIES

Deliscious®



DELISCIOUS - vertical indoor farming

Be inspired…

Located in Beesel (Netherlands), Deliscious has been a pioneer in combining vertical farming with greenhouse facilities since 2012. Their approach integrates LED lighting, hydroponic systems, robotics, and artificial intelligence to achieve:

- 10 harvests per year
- 90% reduction in water usage
- Year-round, weather-independent production
- 10-15 times higher yields compared to traditional farming

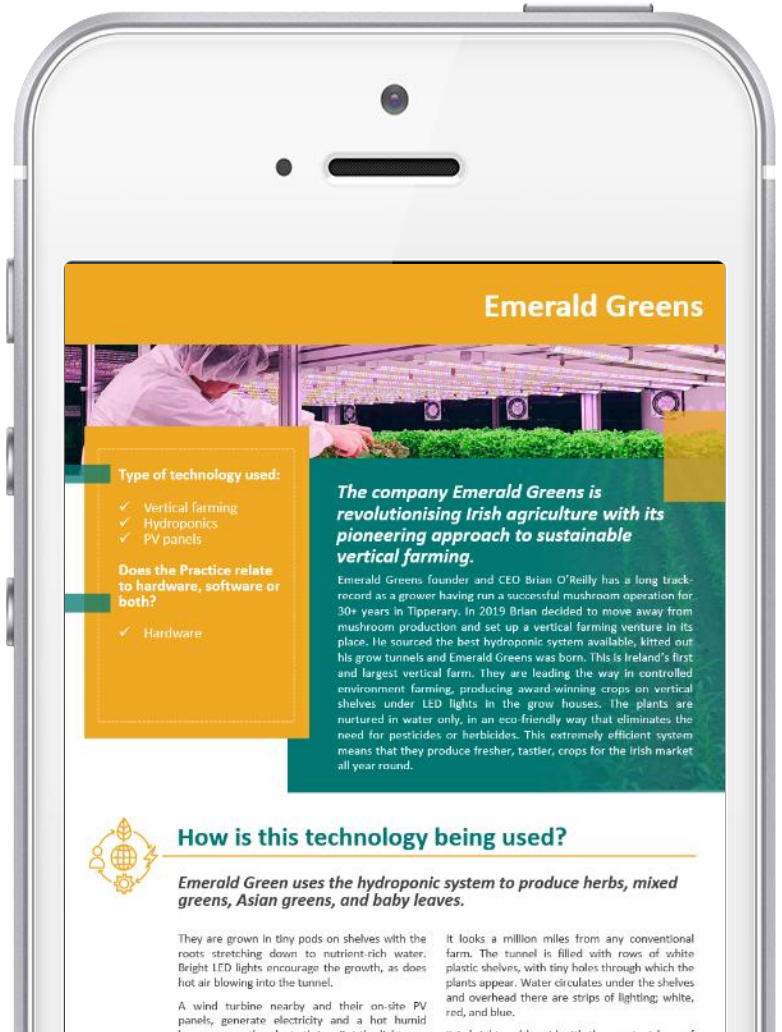
Case Study…

…Be inspired by how Vesa Velhartice farm is revolutionising potato breeding with cutting-edge environmental sensors and automated greenhouses, ensuring optimal growing conditions with real-time data monitoring.

…Visit Vesa Velhartice and discover their unique automatic potato vending machine, innovative microclimate-controlled greenhouses, and state-of-the-art agricultural technology in action.

…Read more in our Good Practice Compendium about how IoT sensors and smart greenhouse systems at Vesa Velhartice are setting new standards in precision agriculture.

emerald greens



Case Study…

…Be inspired by Emerald Greens' innovative approach to sustainable vertical farming, proving that eco-friendly, high-yield agriculture is the future of food production.

…Visit Emerald Greens' website to witness Ireland's largest vertical farm in action and see how technology is transforming local food production.

…Read more in our Good Practice Compendium to explore how Emerald Greens is revolutionizing agriculture with its pesticide-free, water-efficient vertical farming model.

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04

LET'S PRACTICE!

Match the Sensor to Its Function

Temperature Sensor – Humidity Sensor – Soil Moisture Sensor – Light Sensor

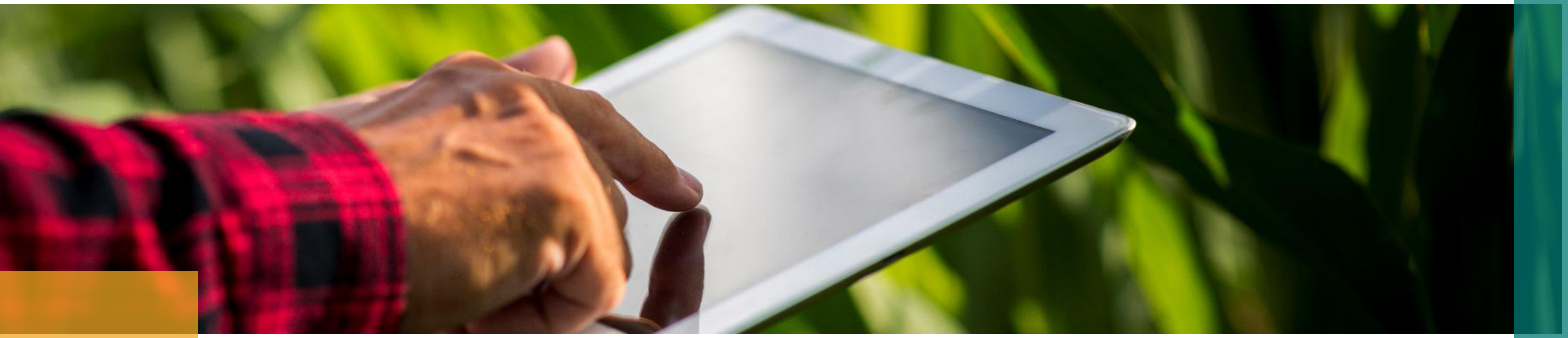
_____ → Monitors plant canopies, growing media, and irrigation water to regulate temperature.

_____ → Adjusts light intensity and spectrum to improve photosynthesis efficiency throughout the growth cycle.

_____ → Measures water levels in the soil to optimize irrigation and prevent overwatering or drought stress.

_____ → Maintains proper moisture levels to prevent plant stress and fungal growth.


EMBRACE TECHNOLOGY
TODAY TO GROW A MORE
SUSTAINABLE AND EFFICIENT
TOMORROW.



Great job!

You made it through the second module of Course 6!

Continue your learning path to the next module;

Livestock Monitoring Systems!

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Follow our journey

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