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DRIVE2X

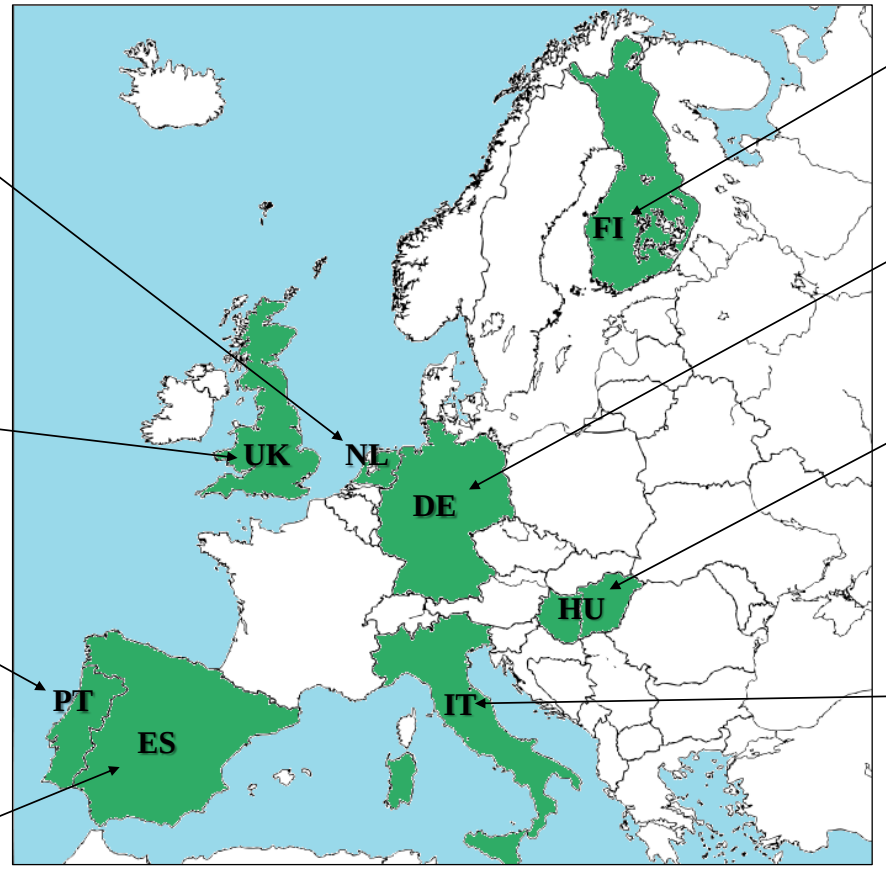
DELIVERING RENEWAL AND INNOVATION TO MASS VEHICLE ELECTRIFICATION ENABLED BY V2X TECHNOLOGIES

- **Call topic**: HORIZON-CL5-2021-D5-01-03 — System approach to achieve optimised Smart EV Charging and V2G flexibility in mass-deployment conditions (2ZERO)
- **Type**: Research and Innovation action

- **Coordinator entity**: LUT University
- **Overall budget**: 10.5 Million Euros
- **Duration**: 4 years (Jan 2023 to Dec 26)

drive2x

18 PARTNERS, 8 COUNTRIES, P. SYSTEMS-LED



ELECTRICITY DISTRIBUTION & POWER SYSTEMS ANALYSIS
(NEW, DUT, ASM, TUDO)

ELECTRIC MOBILITY
(DUT, PRE, EMOT)

ELECTRICITY MARKETS INNOVATION
(TNTU, LUT)

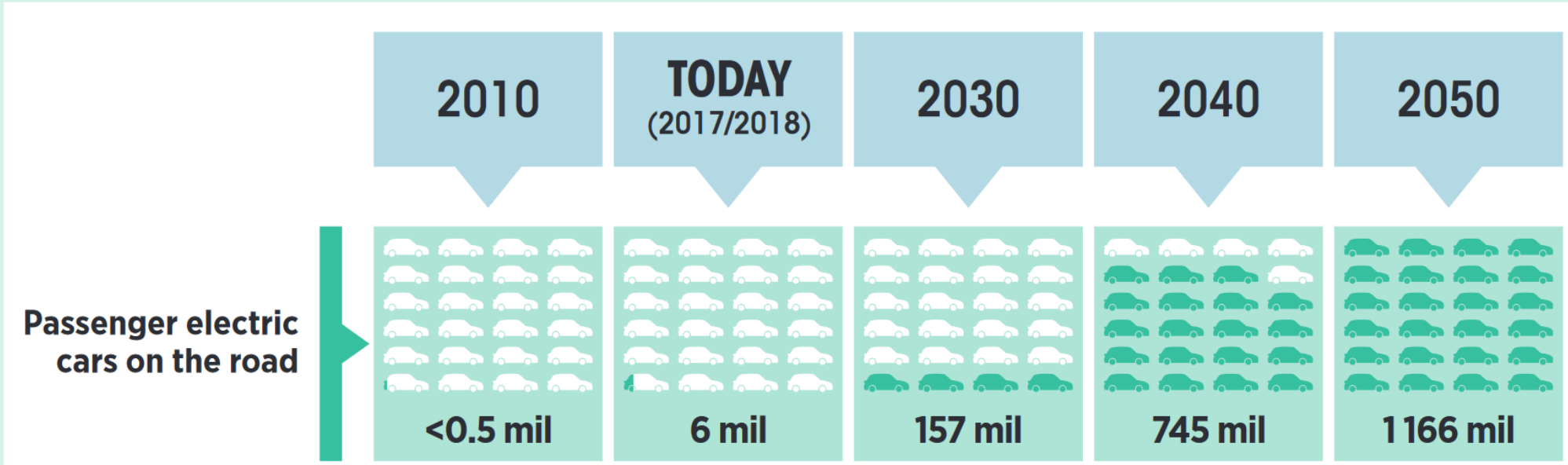
DATA SCIENCE & ANALYTICS
(DLR, ENG)

SOCIAL SCIENCES & HUMANITIES
(TNO)

ENERGY SYSTEMS ASSESSMENT & MODELING
(TEC)

2050 COULD SEE MORE THAN 1B EVS ON THE ROAD

Figure S1: Growth in EV deployment between 2010 and 2050 in a Paris Agreement-aligned scenario



14 TWh of battery capacity!

EV GROWTH AS “DOUBLE-EDGED SWORD”

BAU PATH

FORTHCOMING MASS EV DEPLOYMENT (inevitable)

Uncontrolled, Basic, and V1G charging

(UNIDIRECTIONAL)

Extra burden on energy system **LIABILITY**

2ZERO PATH

FORTHCOMING MASS EV DEPLOYMENT (inevitable)

Systems-optimized ”smart charging” (V2X: V2G, V2B, V2H)

(ADVANCED/BIDIRECTIONAL)

EV charging flexibility **OPPORTUNITY**

DRIVE2X'S OBJECTIVES

To develop new knowledge, tools, models, and technologies to cope with a V2X-based mass EV deployment future for Europe

Objective 1

To improve and consolidate the understanding of V2X concepts and technologies and develop cross-sectoral visions framing the role of V2X in future mass EV deployment scenarios in smart cities

Objective 2

To identify user experience and behavioural challenges, trends, uncertainties, as well as novel operational and economic trade-off models on the EV user side (e.g., from battery degradation) under different V2X charging approaches (V2G, V2B, V2H)

Objective 3

To design and demonstrate a user-centric local V2X marketplace that leverages the flexible energy potential from advanced smart charging in parking lots, homes, and charging stations to optimize welfare for EV owners, building managers, and local distribution network operators alike, while stabilizing the grid and increasing renewable resource utilization

Objective 4

To develop and demonstrate novel, affordable, user-friendly V2X solutions and charging technologies that are suitable to mass EV deployment, while making a contribution to V2X standardization

Objective 5

To assess impacts from mass deployment of V2X technologies on the distribution grids and on the energy markets and energy systems as a whole, as well as its potential to promote growth of renewable energy and decarbonization, for different charging approaches and V2X scenarios, including the collective potential for Europe

Objective 6

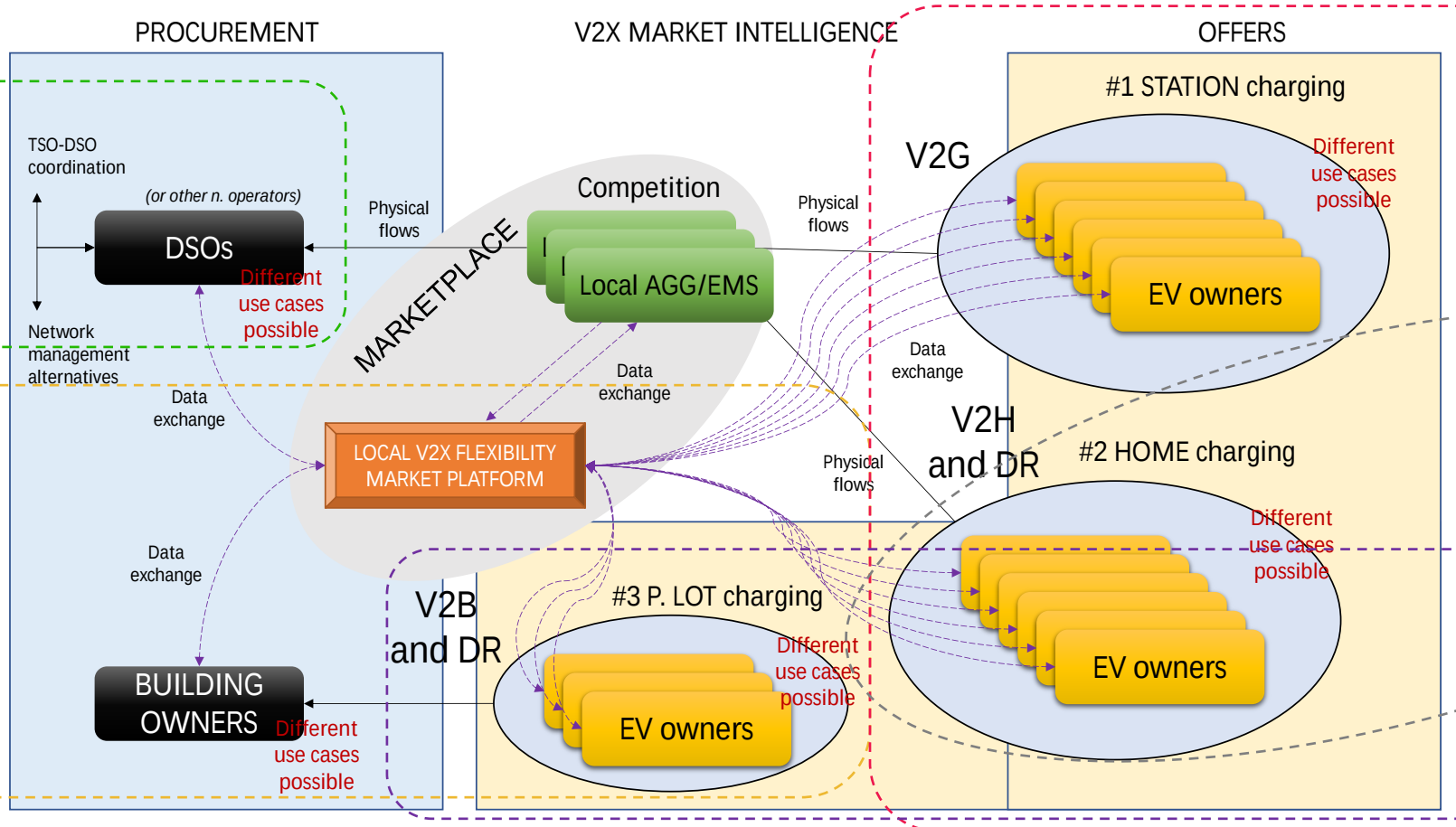
To support the furthering of V2X open research activities and market scale-up by developing and making openly available comprehensive models, sets of data, and tools integrating social, technological, and market dimensions, aimed at informing and facilitating cross-sectoral foresight analyses and V2X roll-out programmes in smart cities and in Europe

OVERARCHING CONCEPT AND TESTED BMS

BM6 Distribution network management through procurement of local V2X flexibility

BM5 Flexibility services offered by building or facility managers to DSOs

BM4 Building tariff optimization leveraged by parking lot smart charging



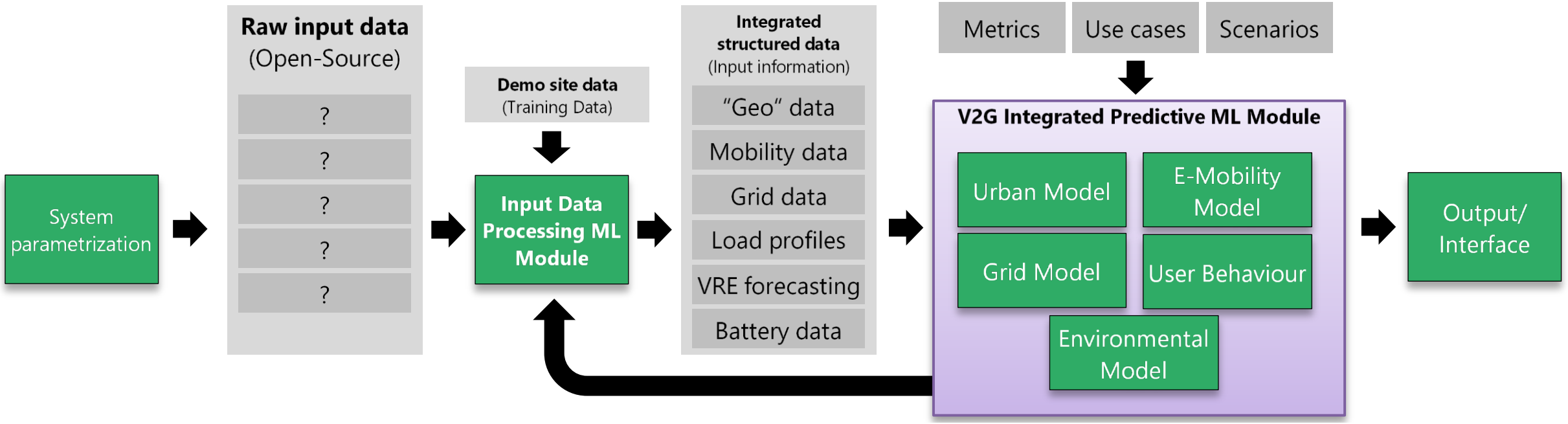
BM1 Flexibility services offered by EV owners or prosumers to network operators

BM3 Prosumer tariff optimization leveraged by residential smart charging

BM2 Flexibility services offered by EV owners to building managers

OPTIMIZING ENERGY & MOBILITY THROUGH DATA

We leverage the power of data from distribution grid, driving and electric demand patterns, and mobile batteries, to match location-specific flexibility needs and offers



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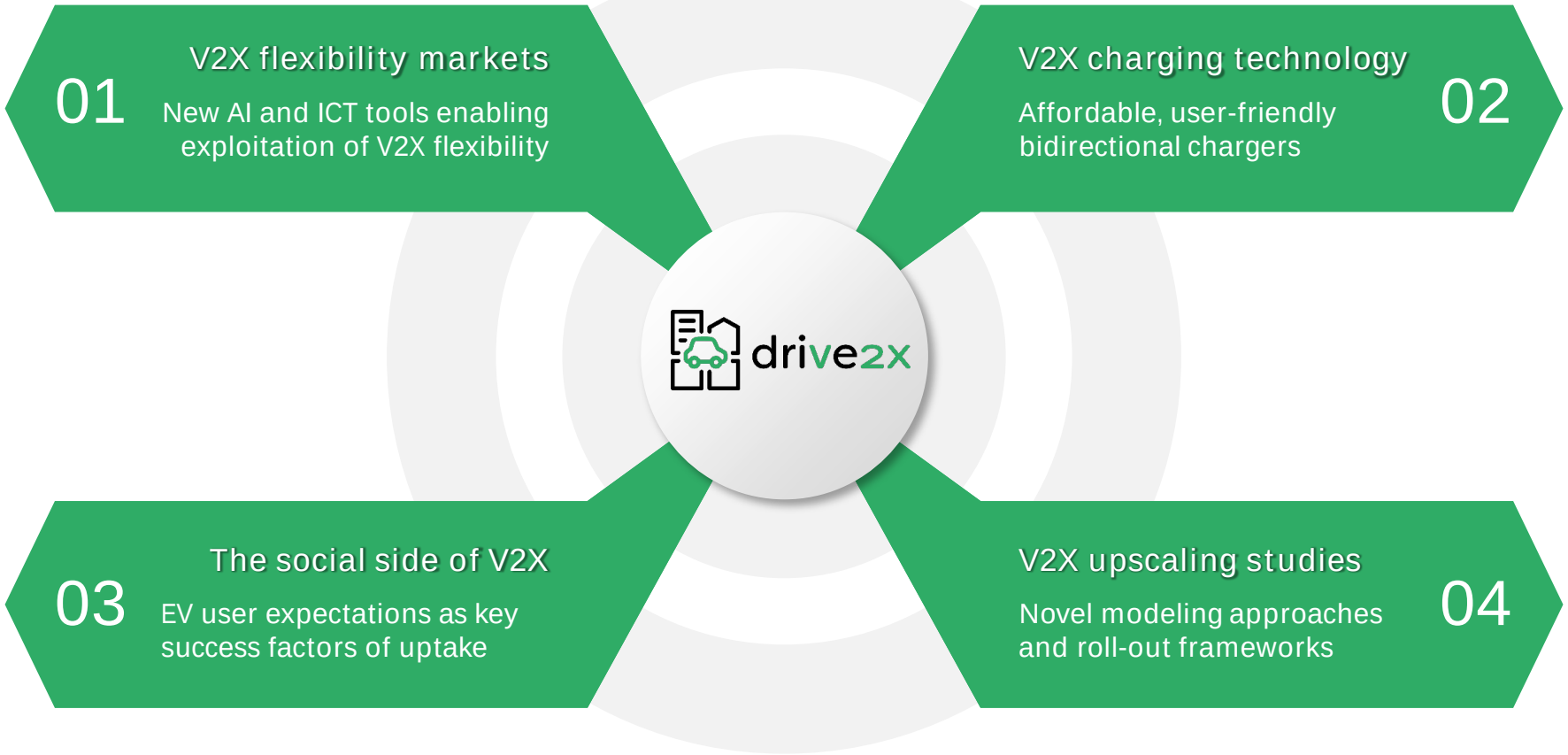
NEW TECHS, TOOLS, AND POLICY FRAMEWORKS



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TESTING AND VALIDATIONS SITES

BM2, BM4

Isle of Wight (UK)

Sustainable island energy community facing RES congestion

UC1 – Medium-term V2B charging in hotels as a sustainable means to promote eco-tourism and local economic growth
UC4 – V2G integration in public charging stations for addressing technical grid constraints

City of Budapest (HU)

V2H integration with DER & HEMS in prosumer & EV owner homes

UC3 – V2H integration with HEMS for renewables' integration and tariff optimization in prosumer homes

Székely Family & Company Llc.

BM1, BM3, BM5

DriVe 2X marketplace

enabled by user-friendly, lower cost, lower impact bidirectional charging solutions

BM1, BM2, BM4

City of Maia (PT)

V2B in airports and commercial spaces and public V2G charging

UC2 - Long-term V2B charging with load aggregation in parking lots for dynamic load balancing and BEMS integration
UC4 – V2G integration in public charging stations for addressing technical grid constraints

City of Amsterdam (NL)

V2B and V2G in extremely congested grid environments

UC6 - Peripheral smart renewable energy and mobility hubs for V2G uptake in highly congested urban grids

BM1, BM2

City of Terni (IT)

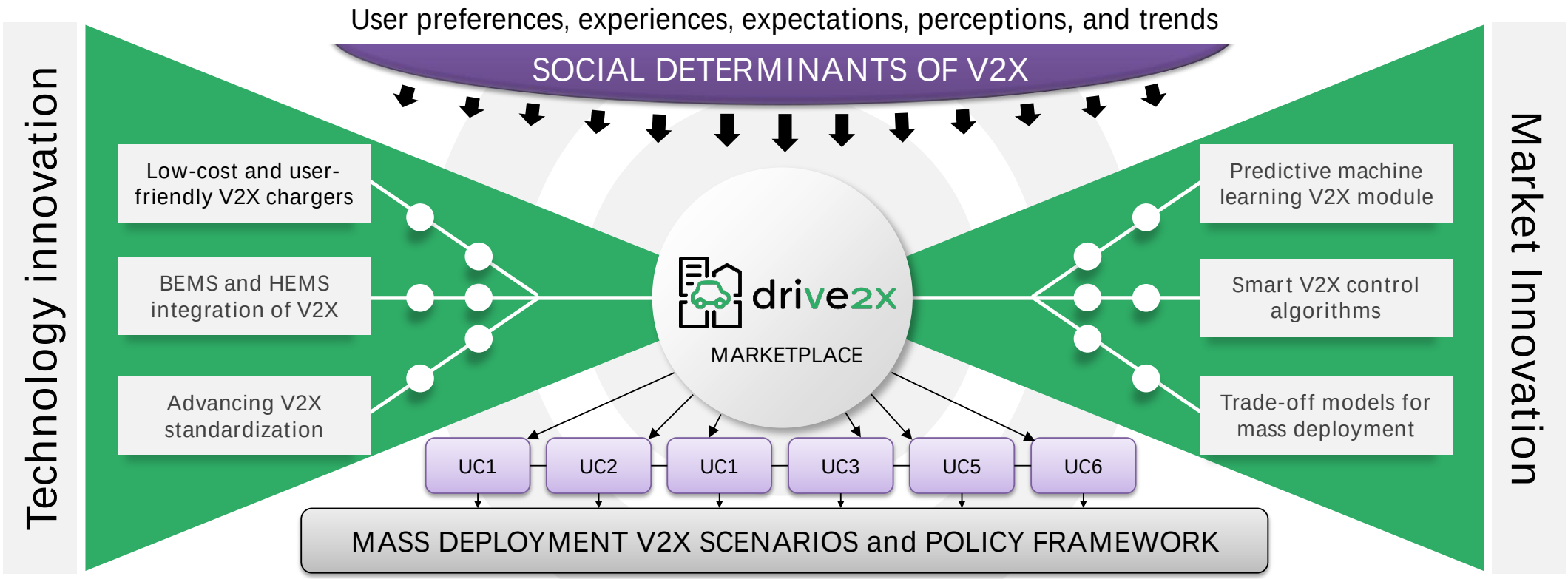
V2G integration into highly RES-congested hybrid AC and DC grids

UC4 – V2G integration in public charging stations for addressing technical grid constraints
UC5 – V2G for network stabilization of locally-managed RES-congested grids

ASM TERNI S.p.A.

BM1

A NEW PARADIGM OF SOLUTIONS' DESIGN



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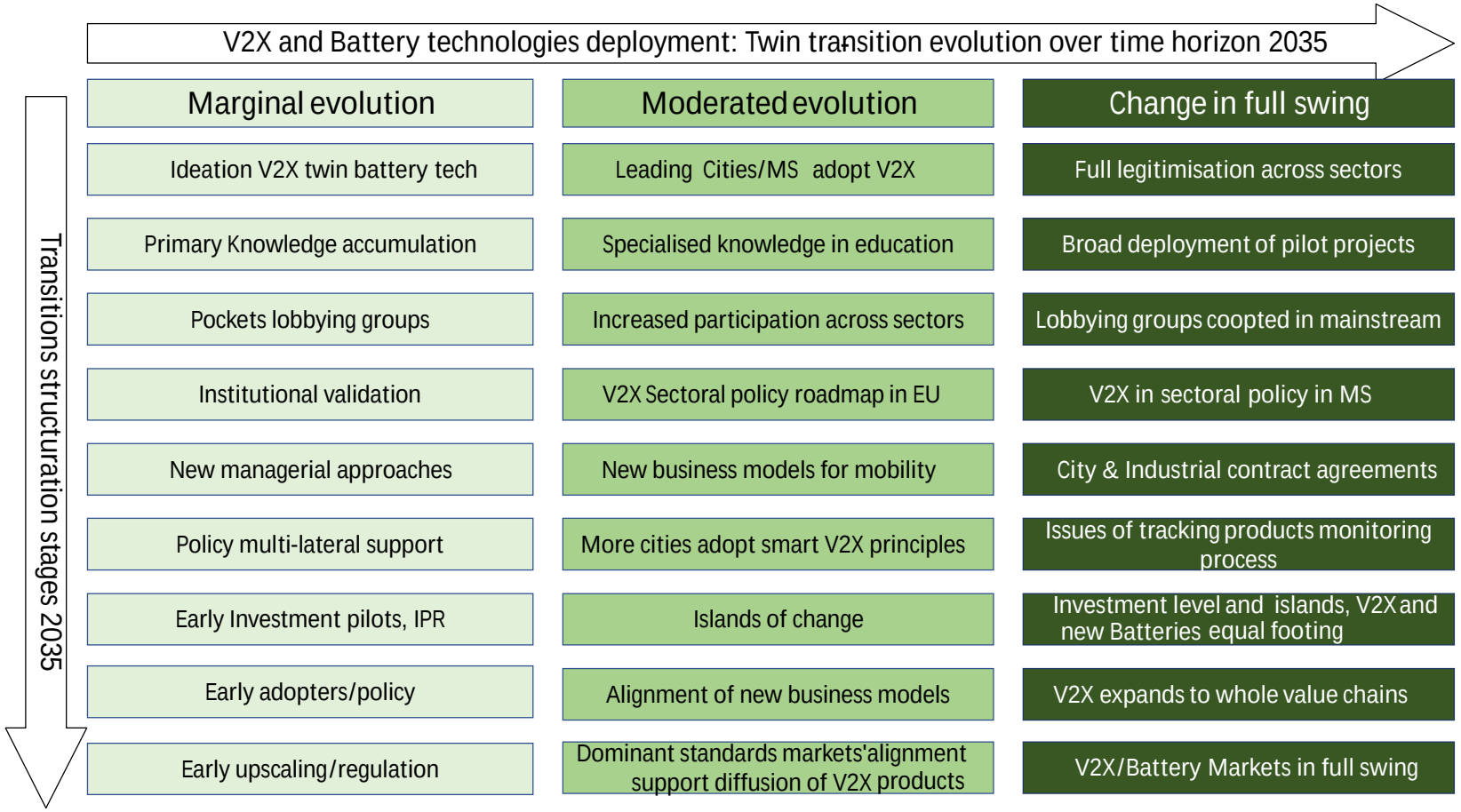
SUPPORTING V2X ROLL-OUT IN EU SMART CITIES

Reference policy framework for structuration and evolution of future V2X markets over the next 5-10 years



Will help city planners, policy makers and businesses in locating and assessing the advance of their initiatives in a long-term transition landscape

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