

MARCH 2024



MEASUREMENT INFORMED INVENTORIES: INNOVATIONS IN MMRV TECHNOLOGIES AND DATA ANALYTICS

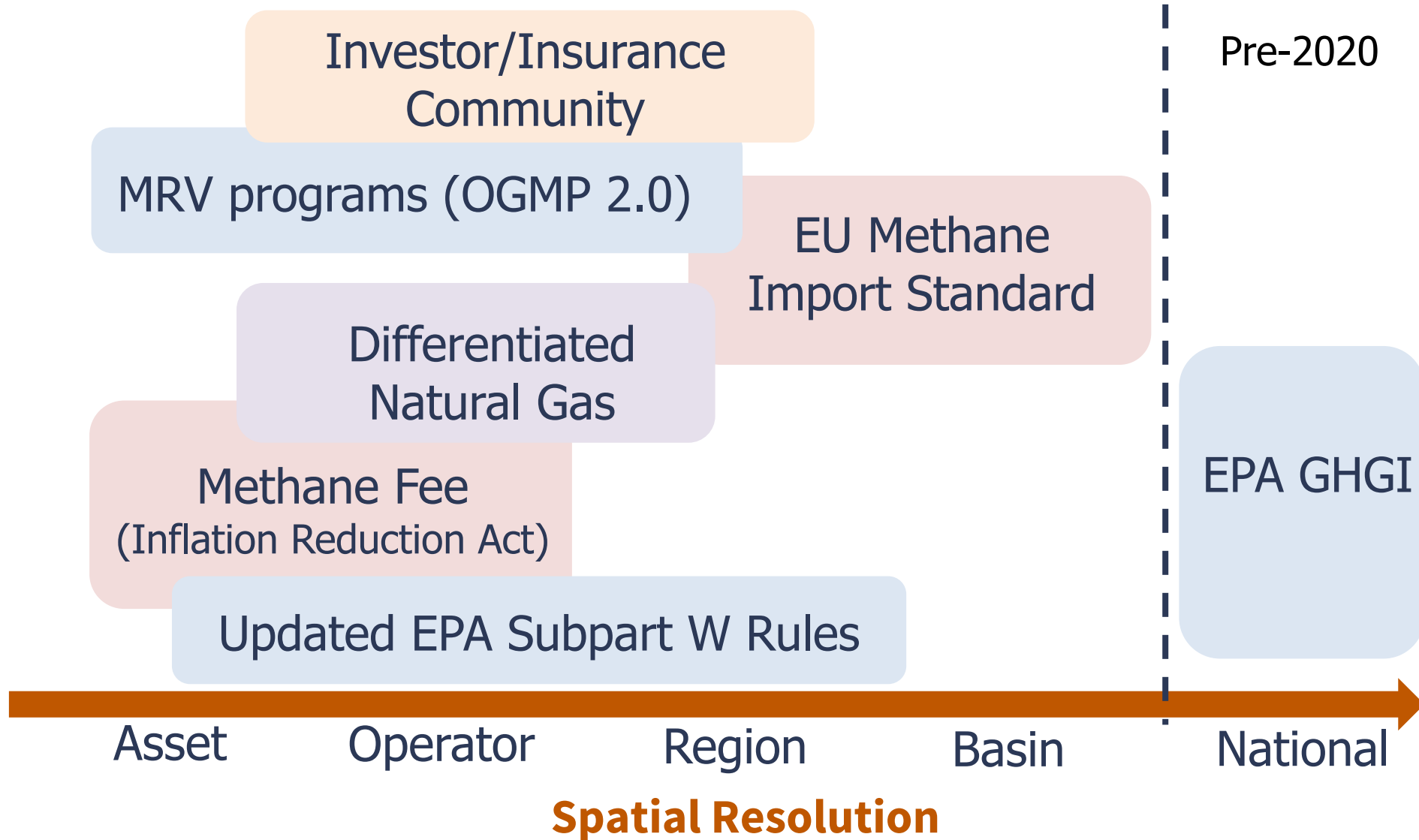


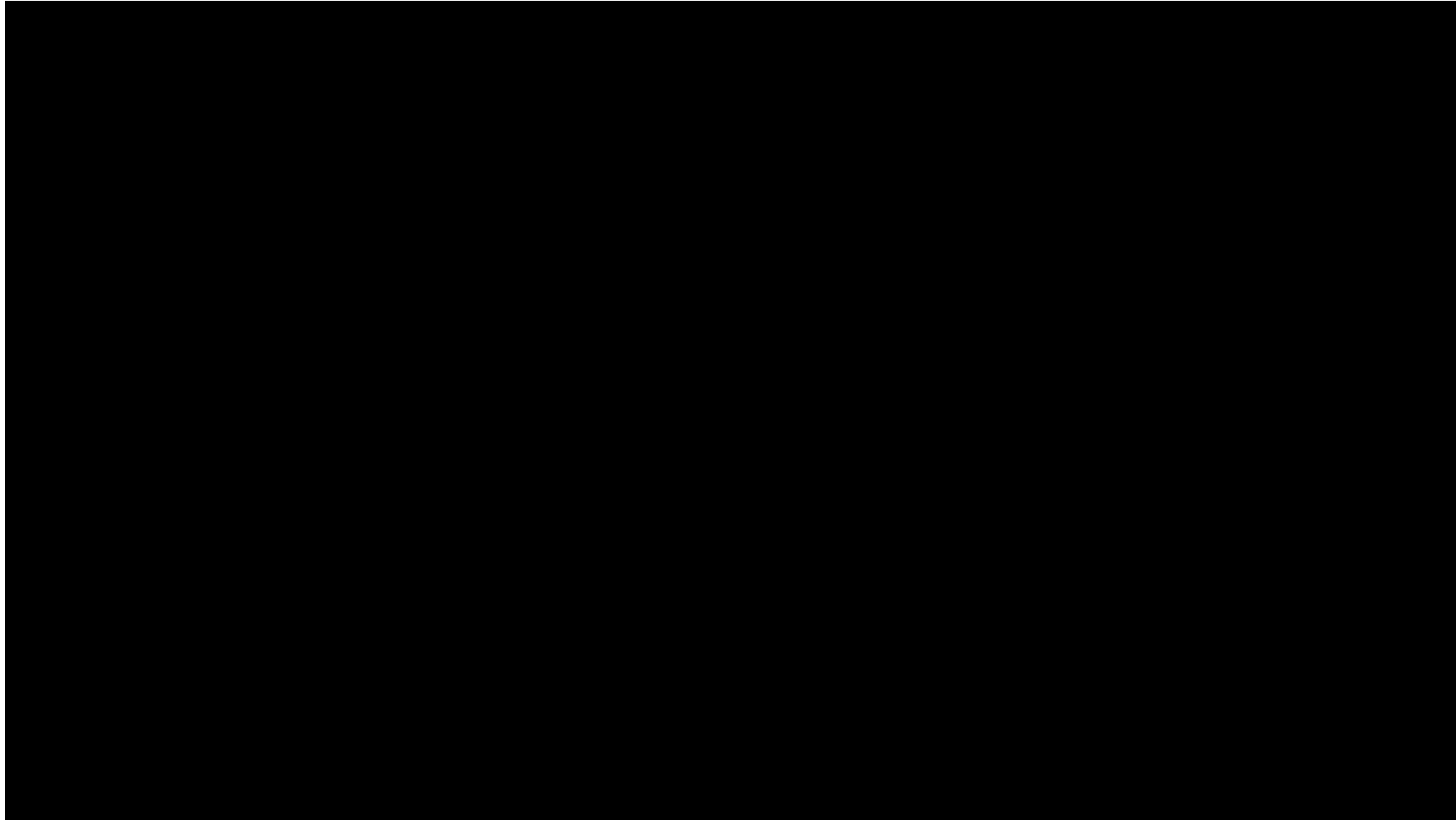
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Co-Director, EEMDL

The University of Texas at Austin

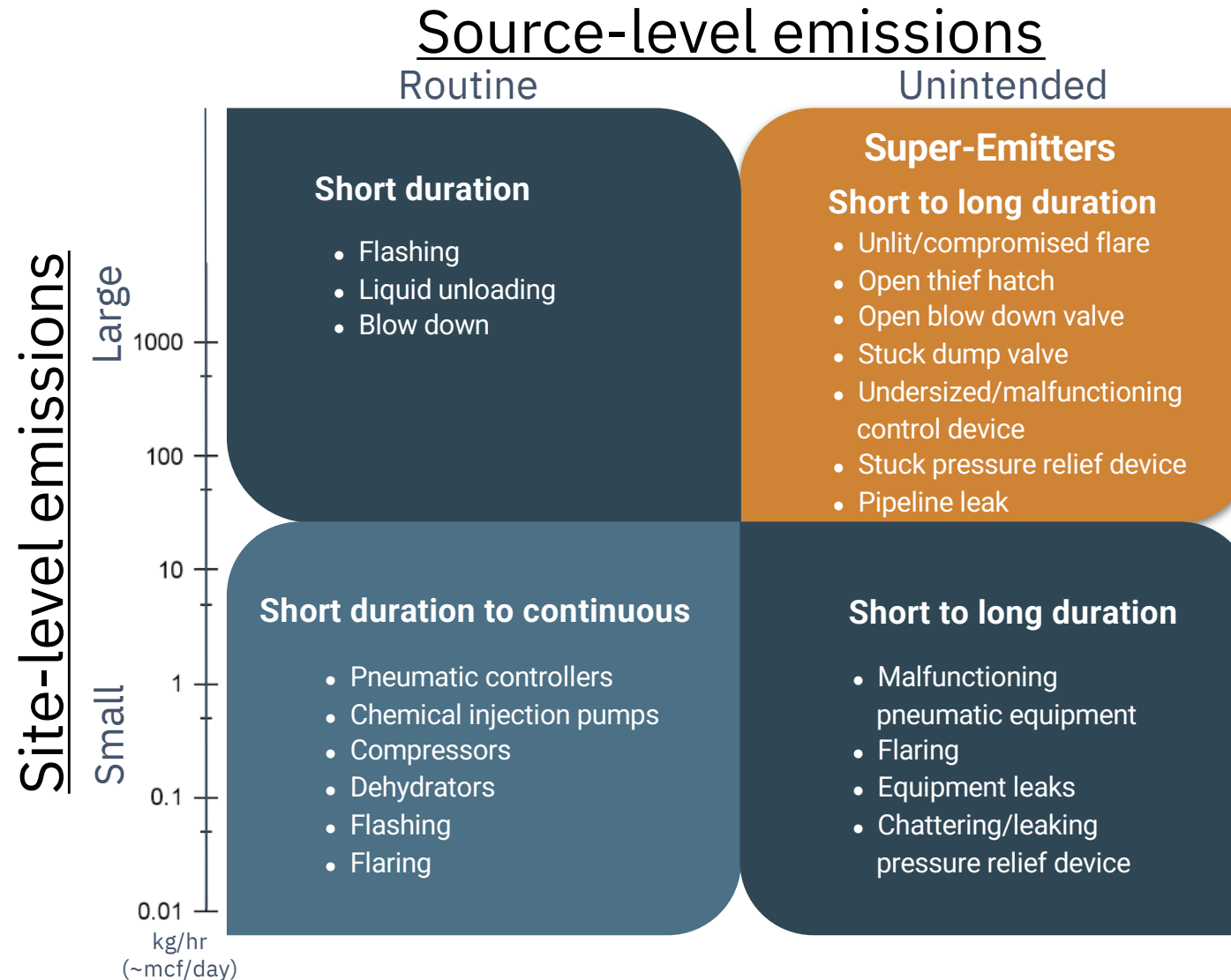
New initiatives in the US and around the world require more accurate carbon accounting than prior approaches with a specific focus on methane emissions



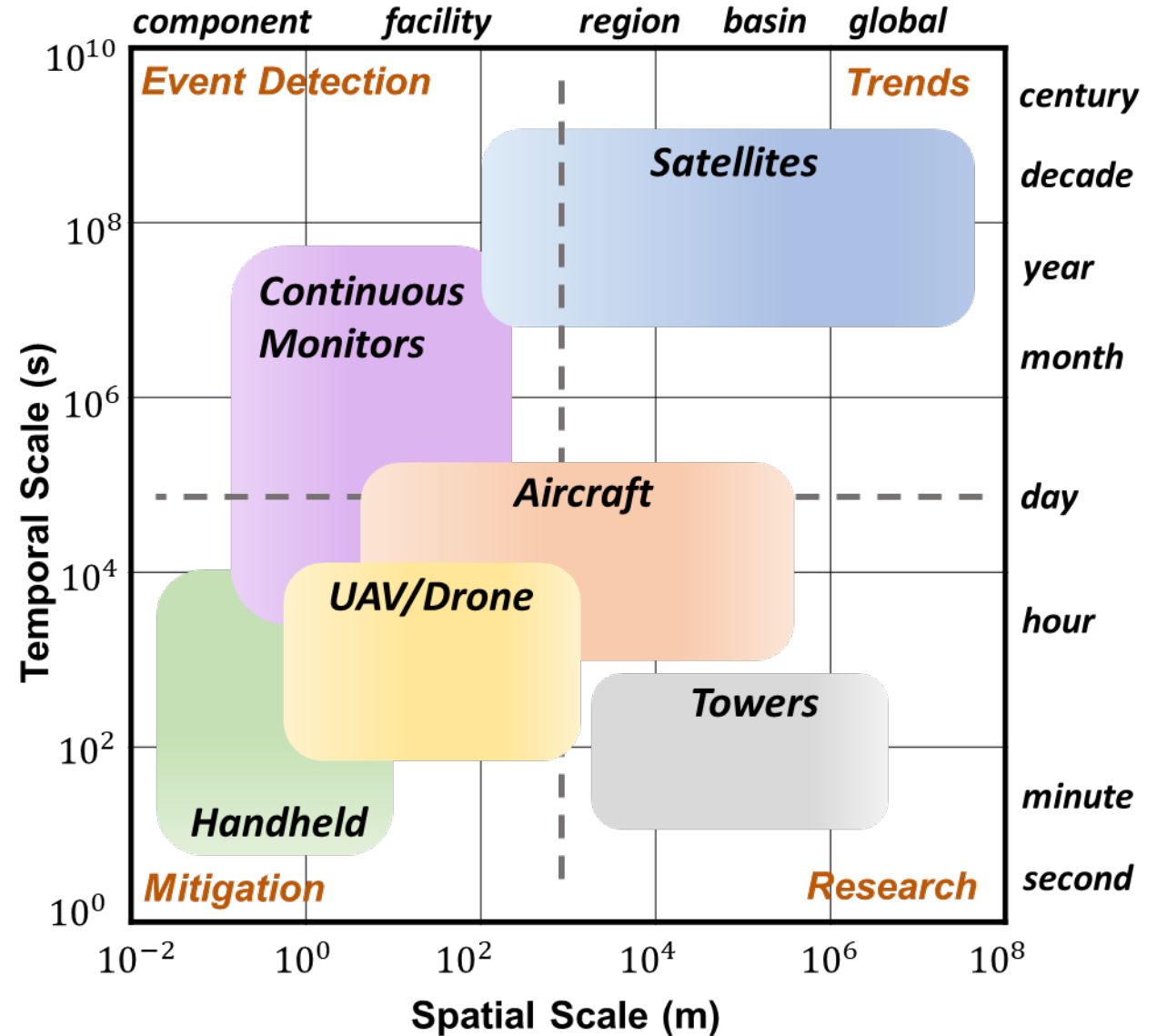
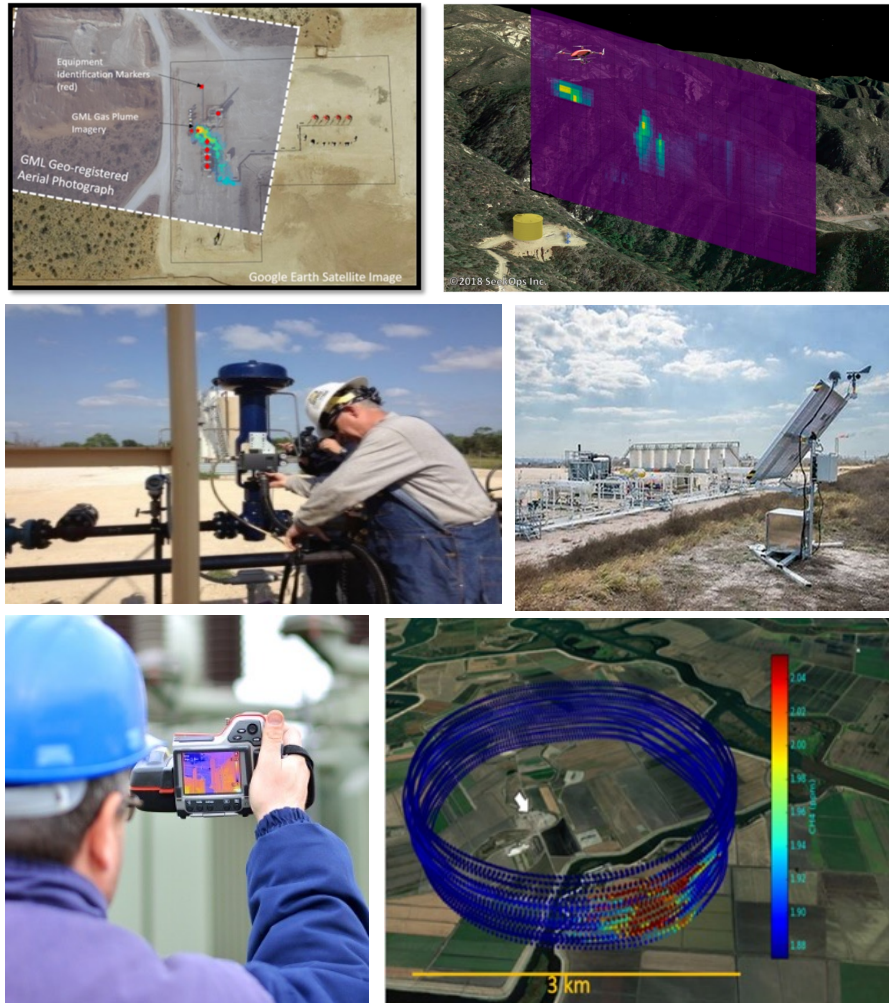


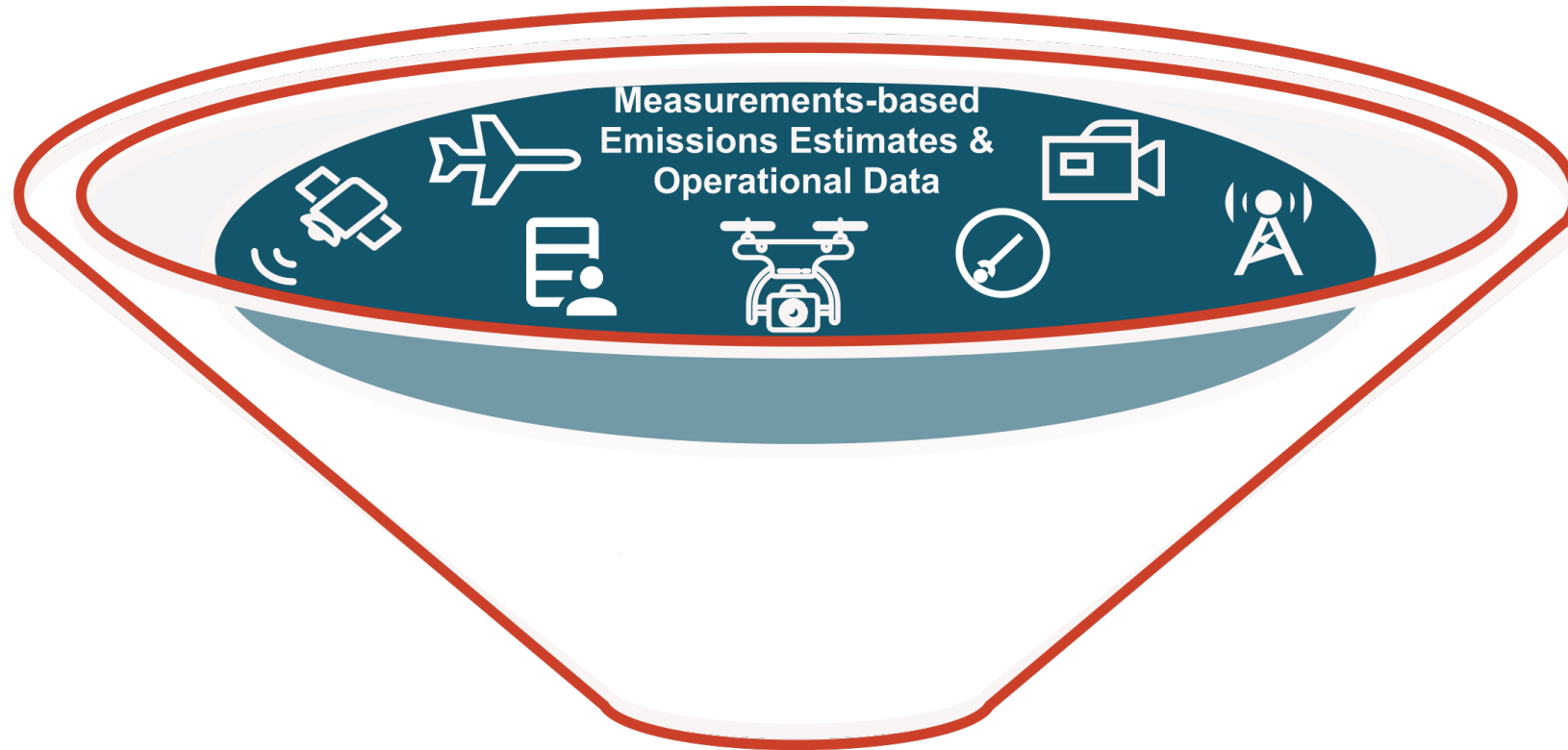
What do methane emissions look like at basin scale?

What are the characteristics of the emissions that we are trying to measure?



Measurements have been evolving rapidly – we now have a powerful portfolio of measurements at multiple scales.





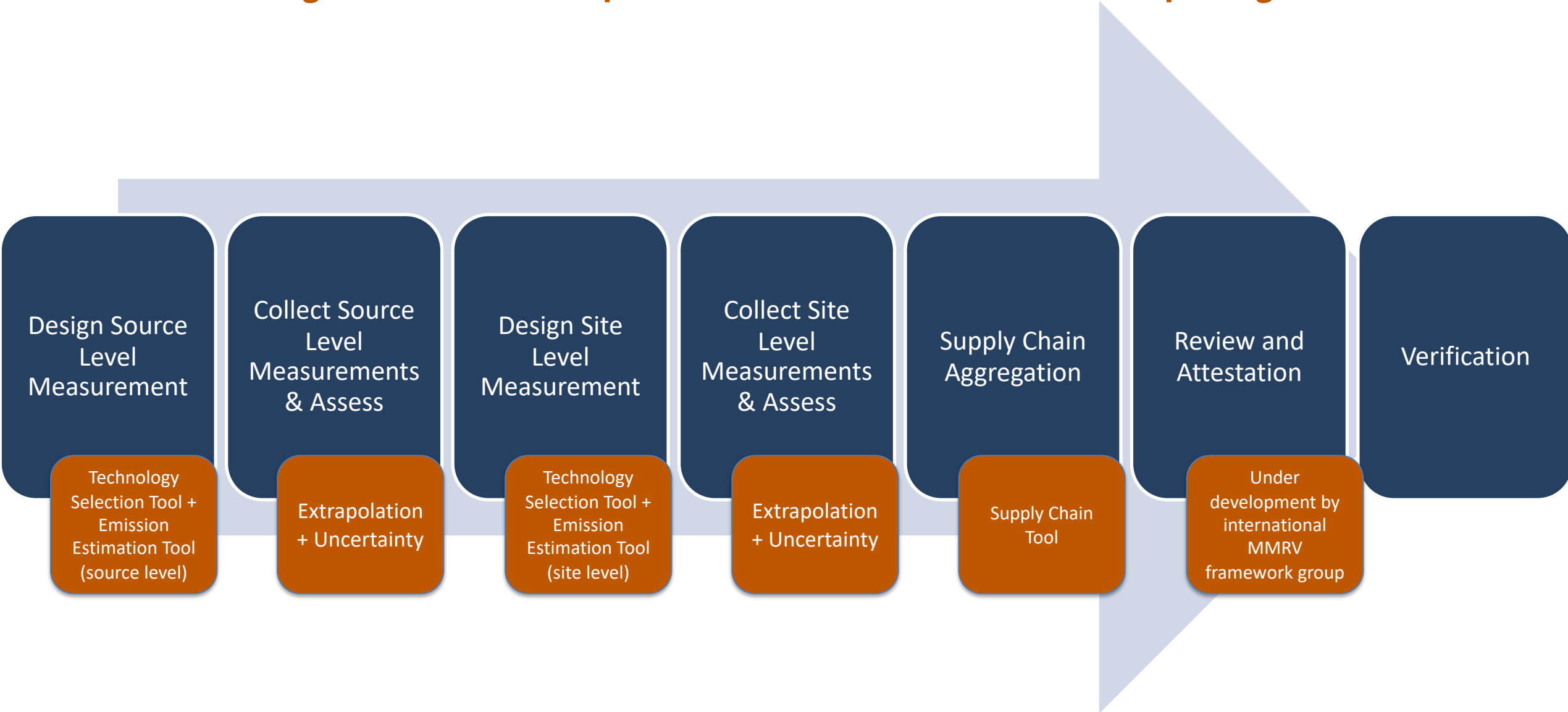
Need to reconcile and integrate data from multiple measurement tools at multiple scales.

MMRV for oil and gas emissions reporting



WHAT TOOLS WILL
WE NEED?

A series of technologies and tools are required to achieve MMRV of emissions reporting



EEMDL DIGITAL STRATEGY



All tools go through a development lifecycle before widespread deployment

The expected use and intended audience will define the development lifecycle

Concept



Mass
Balance
Flight



Action Level



Measurement
Informed
Inventory



Sankey



Supply
Chain



Detection
Limit



Public Methane
Data Dashboard



FEAST
Pipelines



Gridded
Inventory

Demo



Technology
Selection



Event
Duration



Dashboard



Shipping

Public Showcase
Expert Testing

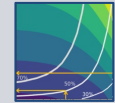
Beta



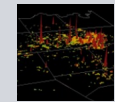
Supply Chain
Mitigation

EEMDL Testing

Deploy



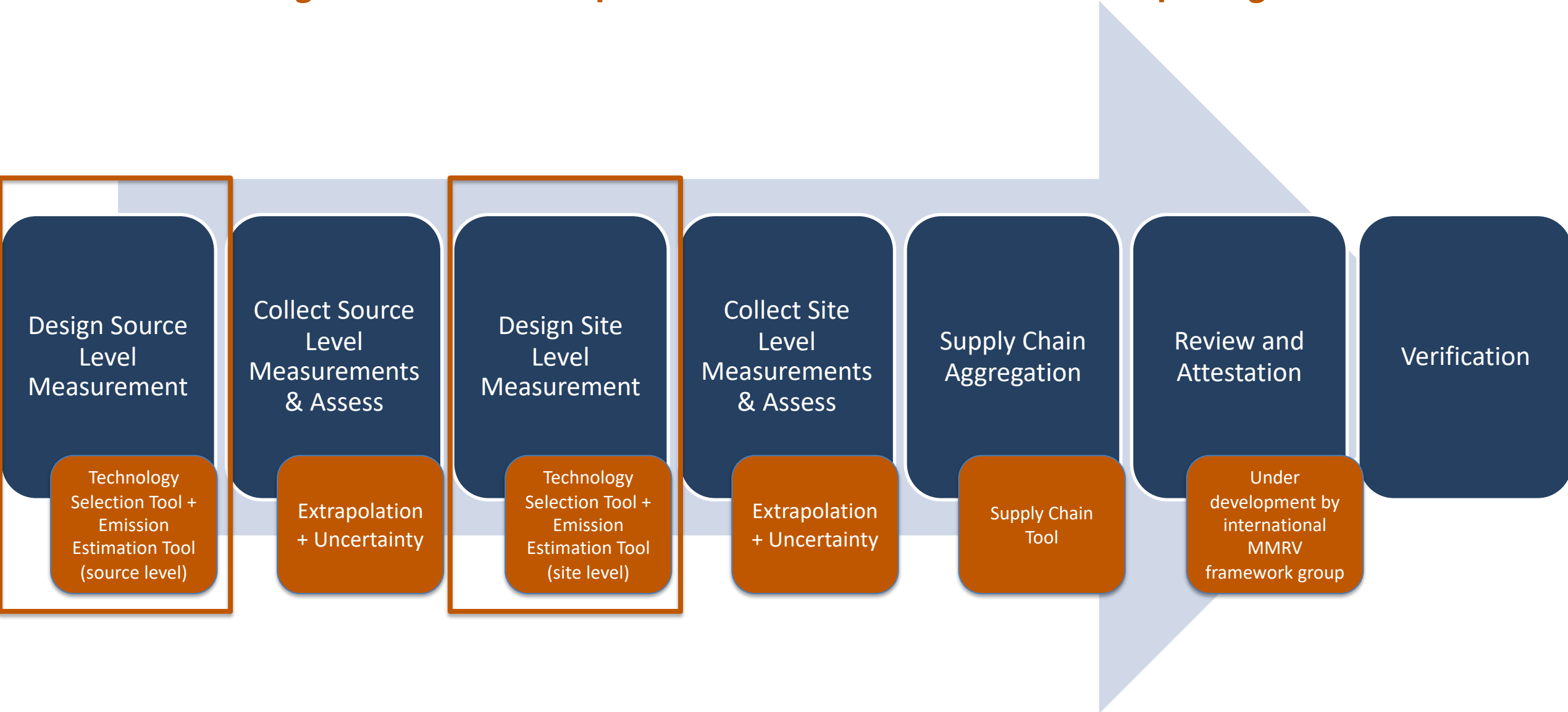
FEAST



MEET

Public Release;
User Groups;
Training

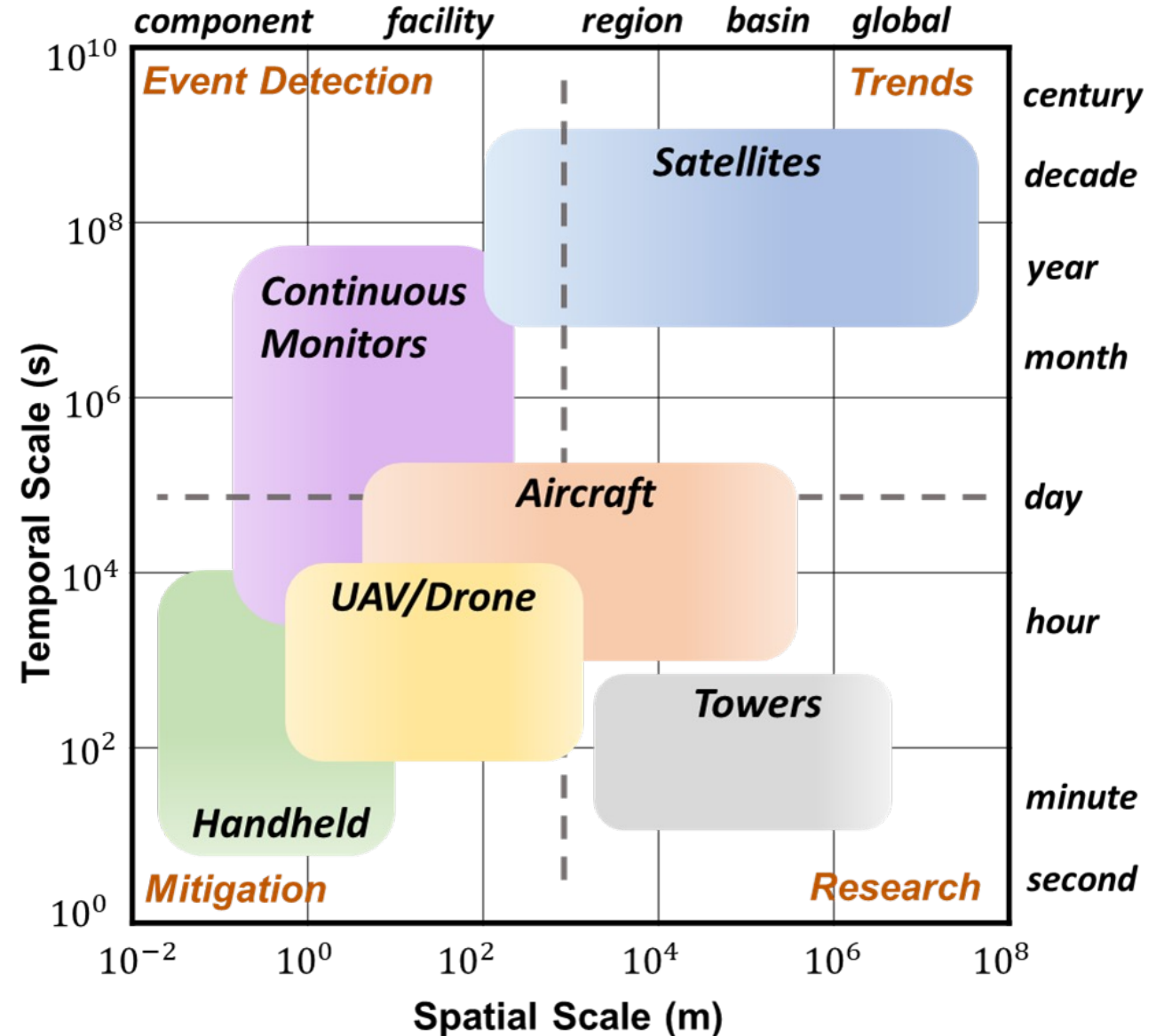
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What measurement technologies should be used?

No single technology is suitable for all needs; the best portfolio of technologies depends on:

- Supply chain segment
- Facility type
- Emission characteristics (magnitude, intermittency)
- Cost
- Detection limit
- And more.....



TECHNOLOGY SELECTION TOOL

Analyze best practices by integrating a comprehensive database of measurement techniques, drawn from scientific literature and industry best practices. Unlike existing solutions that offer mere lists of vendors, our tool delves deeper, categorizing methods based on insightful performance characteristics and real-world applicability, thus providing a nuanced understanding of each technique's potential.



- **Intelligent Filtering**

Navigate through a vast array of measurement techniques with our smart filtering system design to match your specific requirements and asset characteristics

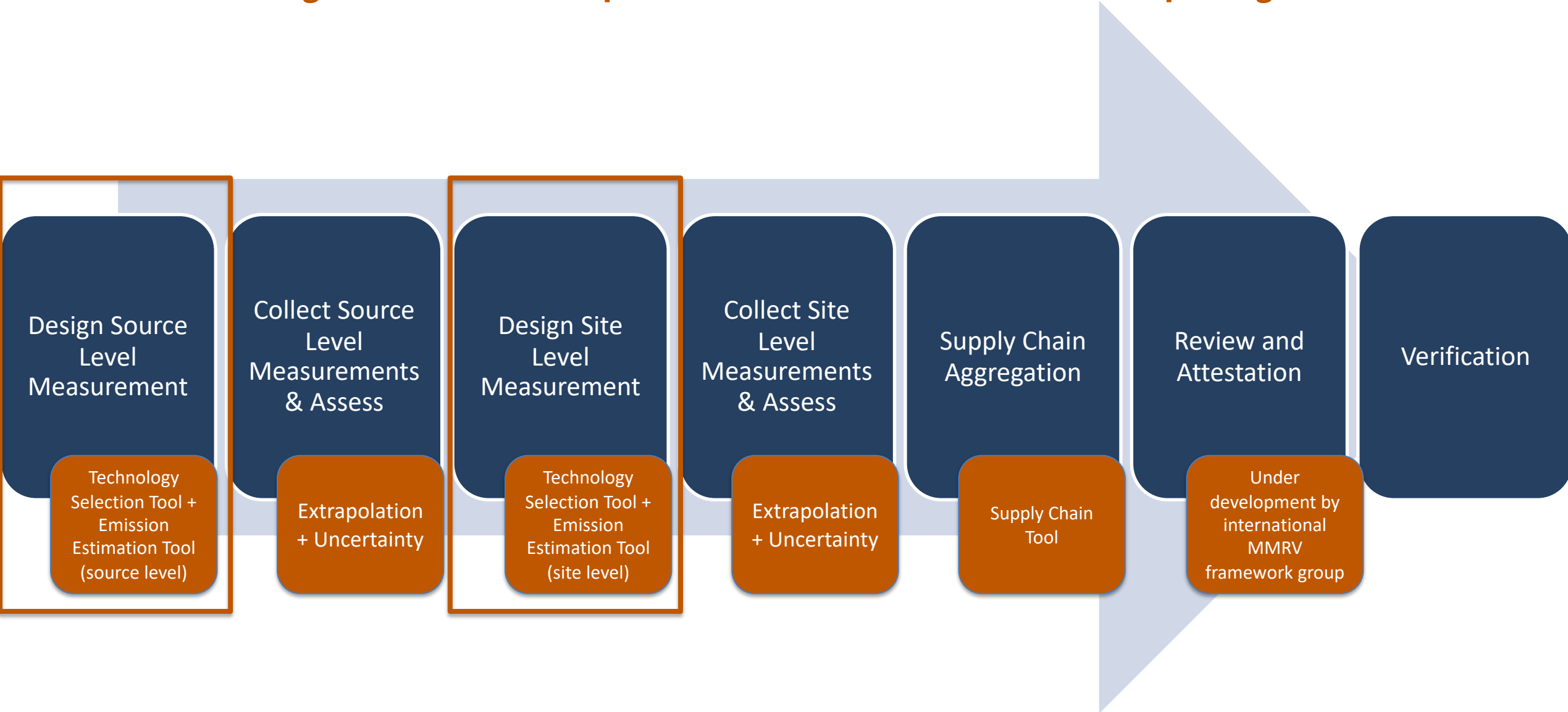
- **Comprehensive Database**

Access an unparalleled compilation of measurement methods synthesized from scientific research and practical insights

- **OGMP Compliance**

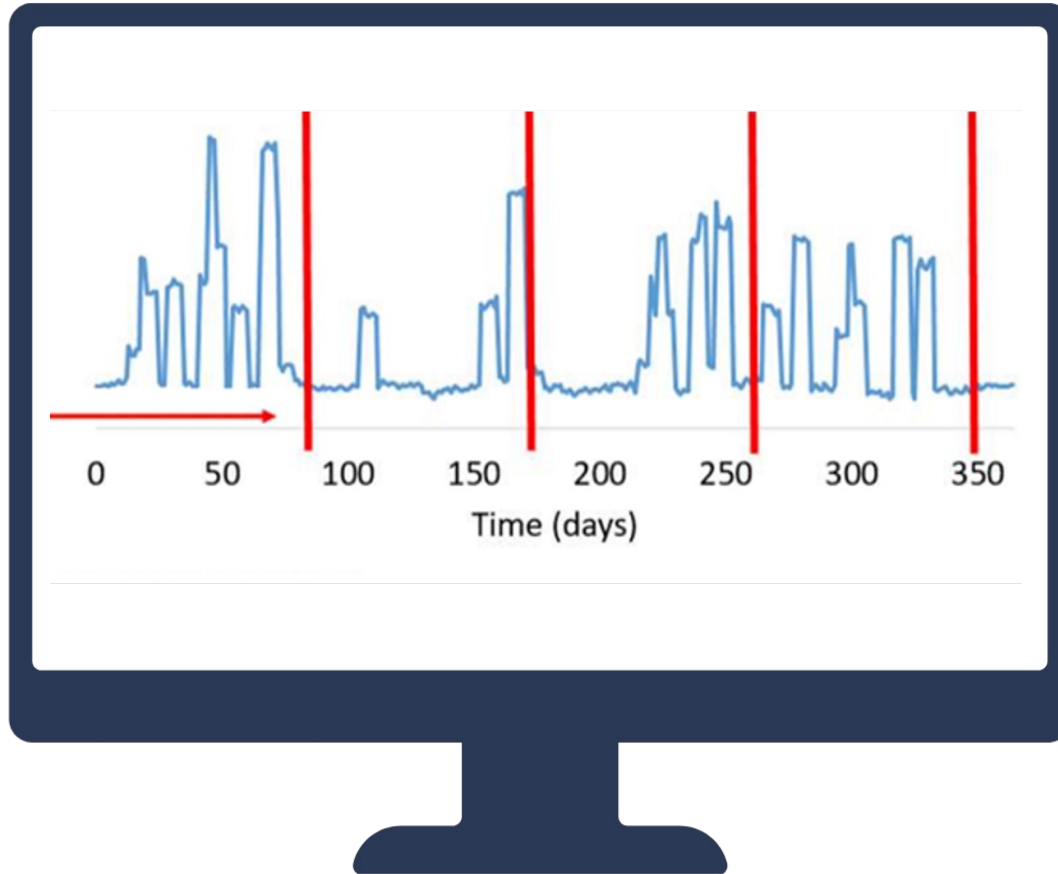
Ensure your measurement strategies are in full compliance with OGMP Level 4 & 5 standards

A series of technologies and tools are required to achieve MMRV of emissions reporting



METHANE EMISSIONS ESTIMATION TOOL

Generate emissions time-series information for a diverse range of sources and sites



- **Source Analysis**

Assess event frequency and duration across a defined geographic area, aiding in regional emission management and planning

- **Site Analysis**

Individual equipment modules can be coupled into site/facility simulations and used in OGMP level 4 & 5 reporting

- **Basin Analysis**

Simulations of thousands of individual sites have been assembled into datasets that can be compared to regional estimates

LNG SHIPPING EMISSIONS ESTIMATION TOOL

To provide a standardized analysis framework for estimating methane and carbon dioxide emissions from LNG shipping by carrier and trip characteristics



- **Carrier Database**

Information on propulsion technology and carrier capacity for more than 500 vessels

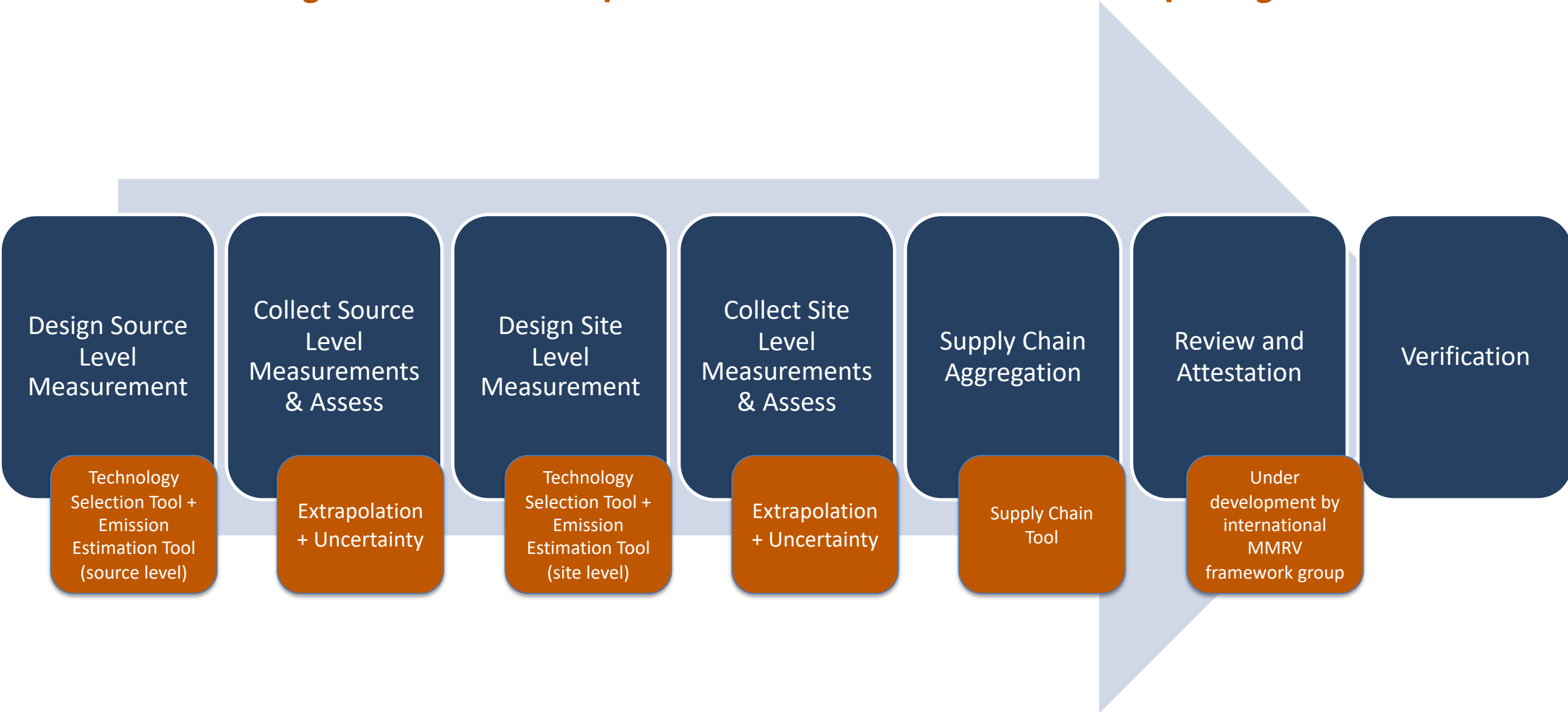
- **Trip Characterization**

Trips are divided into three modes: time spent underway, time spent maneuvering into port and the time spent in port. The user identifies trip start and end points (or travel distance), and time spent maneuvering and in port

- **Adaptability**

Current emission estimates are based on a very small number of voyages on which measurements have been made; the tool has been structured to allow users to input their own emission factors and for developers to update the tool as more data become available

A series of technologies and tools are required to achieve MMRV of emissions reporting



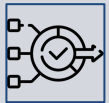
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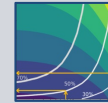
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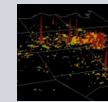
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Training

Overview short courses

Virtual and in-person courses providing an introduction to science, engineering, technology and policies related to greenhouse gas emissions from oil and gas supply chains

Tools based courses and webinars

Technology selection
Emission estimation
LNG Shipping emissions
Event duration estimates
Continuous monitoring system tools
FEAST
And more....

**Education
and Training
Ecosystem**

User groups – ongoing support

Methane emission estimation tool
FEAST

Bespoke training and certificates

Custom courses developed for individual organizations
Continuing education credits and certificates

**SCAN FOR MORE DETAILS
ON OUR LATEST
MMRV TOOLS &
RESOURCES**

