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Facilitating the Shift Toward Activity-Based Modeling: An EAABM Perspective

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Abstract

The transition from aggregate trip-based models to disaggregate activity and agent-based approaches represents a paradigm shift in European planning practice. Since its inception two years ago, the European Association of Activity-Based Modeling (EAABM) aims to facilitate this transition by connecting stakeholders and propagating best practices through its dedicated committees. Drawing on insights from international exchanges and member surveys, this paper 'takes stock' of the ABM ecosystem. Drawing on insights from EAABM events and exchanges over the past two years, this paper evaluates the current state of the field across four key domains: software, education and training, planning and policy, and research. We identify barriers to the widespread implementation of activity-based modelling in transport planning and its interdisciplinary frontiers such as energy and public health.

Introduction

Transport planning needs more and more tools that are designed to evaluate the growing diversity of modern transport issues such as transport equity, active mobility, mobility pricing, and the rise of on-demand fleets driven by autonomous vehicles. At the same time, questions regarding how to handle complex, human-centered challenges like climate change, energy transitions, and public health become ever more important. Traditional four-step models struggle with these tasks because they rely on static averages, which blur the varied ways different people actually behave.

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Activity-based models (ABMs) address this by simulating individuals as distinct agents. This allows the model to map out complete daily schedules while accounting for personal time constraints, shared household responsibilities, and behaviorally consistent responses to new policy measures (Rezvany et al., 2024).

This behavioral realism is critical for evaluating contemporary policies. Over a decade ago, the landmark TRB Report S2-C46-RR-1, Activity-Based Travel Demand Models: A Primer (Castiglione et al., 2015) underscored that ABMs provide policymakers with the necessary granularity to comprehend how people plan, coordinate, and schedule their daily travel. Today, this capability is vital for testing dynamic travel demand management strategies like mobility pricing and corporate mobility management, evaluating cycling infrastructure and e-bike integration, new shared mobility services and simulating localized proximity concepts such as the 15-minute city. Traditional trip-based frameworks fundamentally fail to capture internal household dynamics, the role of socio-demographic factors and activity-chain context in mode choice decisions, or the specific equity impacts of planning decisions across diverse demographic groups. By tracking fine-grained agent schedules, ABMs move beyond static statistical averages to simulate a dynamic, behaviorally consistent and temporally continuous description of travel demand usually over the course of a day. This empowers planners to rigorously evaluate structural shifts and engineer interdisciplinary solutions at the crossroads of mobility, public health, and urban sustainability.

Despite these clear analytical advantages, the practical adoption of activity-based approaches remains sluggish across Europe. This slow transition is heavily driven by established institutional structures and contractual silos between governmental entities commissioning models, private model developers, and engineering firms as operators. These relationships breed systemic risk aversion, where stakeholders default to legacy methods to ensure predictable legal and financial approval. This institutional inertia is compounded by a profound lack of professional training and a corresponding deficit in dedicated ABM curricula and teaching at universities, leaving new graduates too often unfamiliar with advanced agent-based frameworks and unaware of new computational tools. Furthermore, a perceived lack of incentive to change persists because the benefits of ABMs are not immediately apparent in traditional, day-to-day applications like construction site deviation planning, public transport line planning or macro-level highway capacity expansion.

This perspective reveals a critical lack of foresight regarding the modeling capabilities required for the immediate future. Emerging paradigms—including distance-based mobility pricing, autonomous ridehailing, micro-transit ridepooling, and smart-grid integration for electric vehicle fleet charging—cannot be modeled accurately with aggregated zonal tools. Fortunately, the rise of collaborative, open-source tools like ActivitySim, eqasim and omosim is dramatically lowering entry barriers, allowing developers to explore disaggregated systems. In parallel, the emergence of artificial intelligence and concepts like 'vibe coding' further lowers the technical threshold of the field. While profound conceptual knowledge remains indispensable for actual model development, AI significantly lowers barriers for model operation and the downstream analysis of complex model outputs. Nonetheless, legacy practices endure; newly commissioned public frameworks, such as the

Landesverkehrsmodell Baden-Württemberg, still fundamentally rely on aggregate methods, highlighting the acute divide between research frontiers and mainstream planning execution.

To actively dismantle these institutional barriers and accelerate the adoption of disaggregate modeling, the European Association of Activity-Based Modelling (EAABM) was established two years ago. Serving as a pan-European network, EAABM bridges the gap between public authorities, academic institutions, and industry practitioners. Through its dedicated committees, the association works to propagate best practices and standardise deployment methodologies. By organising targeted webinars and international knowledge exchanges, EAABM raises tool awareness, fosters professional capacity, and cultivates a collaborative ecosystem. This effort aims to empower European planners to confidently transition from aggregate approaches to dynamic, behaviorally sound modeling frameworks.

Over the past two years, the transport modeling field has experienced substantial progress across several technical dimensions, yet persistent gaps remain. At professional gatherings like the Modelling World and MoMo conferences, industry discourse has increasingly centered on big data integration strategies, LLM applications and moving ABM into mainstream planning workflows. Concurrently, academic venues such as TRB symposia and hEART 2025 have advanced the state of the art in synthetic population generation, intra-household behavioral modeling, and high-resolution multi-day agent scheduling (Rezvany et al., 2024).

However, a significant gap remains between academic advances and practical implementation. While academic research successfully demonstrates integrating the latest technological advances into disaggregate modeling, practical application is stalled by a pervasive lack of professional training and systemic risk aversion among the entities that commission and operate models. Additionally, interdisciplinary integration at the frontiers of mobility and energy systems, such as coupling vehicle schedules with dynamic smart-grid simulations, remains largely isolated within research labs. This position paper "takes stock" of this evolving ecosystem, identifying paths to bridge these gaps and enable more widespread practical implementation.

Software

The development of activity-based models (ABMs) has closely followed the evolution of available software tools. Although ABM theory dates back to the 1970s, early software lacked the computational power required for practical application. In the early 2000s, scalable academic frameworks like TASHA (Miller and Roorda 2003), CEMDAP (Bhat et al. 2004) and ALBATROSS (Arentze and Timmermans 2004) emerged. Simultaneously, consultants built the first commercial models for US cities such as San Francisco and Seattle. To lower development costs, consulting firms soon generalized these custom builds into standardized in-house frameworks, including DaySim (Bradley et al. 2010), CT-RAMP (Davidson et al. 2010), and TourCast (Cambridge Systematics, Inc., 2015). These frameworks allowed modelers to efficiently deploy models by transferring existing behavioral rules to new regions and recalibrating them locally. However, these early tools only handled travel demand and required separate external software for network assignment.

Around 2015, commercial transport software vendors like PTV, Caliper, and INRO (now Bentley Systems) began embedding ABM functionalities directly into their packages. This change integrated demand generation with standard network assignment algorithms, lowering the technical risk and deployment costs. Today, commercial ABM software is increasingly used in practice and is sometimes included in public procurement specifications. Planners favor these commercial tools because they manage large synthetic populations within familiar graphical interfaces and offer stable technical support.

A key example of this commercial implementation is SIMBA MOBi, a national-scale model developed by Swiss Federal Railways (SBB) for corporate planning (Hillel et al., 2019; Scherr et al., 2020, 2019). SIMBA MOBi uses PTV Visum as its central database to manage individual tours, destinations, and mode choices. This setup solved an important staffing challenge by creating a shared working environment. Experienced modelers with deep knowledge of rail operations and enterprise GIS databases could collaborate directly with newly hired university graduates who had academic experience using open-source ABM tools and MATSim. The structured commercial database format reduced the learning curve and helped transfer academic methods into operational practice.

Concurrently, open-source platforms remain popular due to concerns over vendor lock-in and licensing costs. For example, US planning agencies funded ActivitySim to maintain control over their model source code, while MATSim continues to be used globally for dynamic traffic assignment. Today, the boundary between commercial and open-source software is increasingly blurred. Most commercial packages now include native Python APIs, allowing modelers to use commercial platforms for data management, network editing, and visualization while calling open-source libraries to run specific behavioral modules.

Alongside these hybrid systems, a new class of interactive software platforms has emerged to simplify how planners interact with agent-based simulations like MATSim. Historically, modifying a MATSim scenario required writing custom Java code or code based editing of massive XML files. Today, cloud-native and desktop applications such as Tramola by Simunto, replan.city, and Mobility Studio provide graphical user interfaces for visual scenario editing, cloud-based computation management, and direct output analysis. Planners can adjust network capacities, redesign transit routes, or alter fleet sizes directly through a web browser or desktop software. Additionally, automated pipeline engines like Simunto's Creario can assemble ready-to-run baseline models anywhere on Earth within hours or days by combining open datasets like OpenStreetMap, GTFS transit feeds, and regional census data.

The clear sweet spot for these applications is rapid prototyping, sketch planning, and stakeholder communication. They significantly lower the technical entry barrier to agent-based analysis by enabling non-programmers to quickly test new public transport extensions or new mobility policies—such as zero-emission zones, pricing adjustments, or on-demand transit services—and immediately share interactive performance dashboards via web links. However, these tools have operational limits. Because automated models rely on generalised open data and standardized behavioral parameters, they lack the localised demand calibration provided by travel surveys, the manual refinement needed to resolve network topology issues, and rigorous validation against local traffic counts. However, with reasonable calibration efforts, these models can provide a viable simulation environment for academic research—such as assessing how pricing schemes for on-demand ridepooling impact travel behavior (Schlenther et al., 2025).

Another approach is followed by Senozon, a company that uses mobile phone network data records blended with travel diary information and census data on the spatial distribution of population and jobs. They combine these sources with OpenStreetMap data for the road network and buildings, as well as public transport schedules, to derive an activity-based travel demand that serves as the base for MATSim scenarios. Their models cover the entirety of Germany and Switzerland, allowing them to extract custom-built regional models that serve as a ready-made basis, which are calibrated against local traffic counts and public transport ridership to answer specific planning questions. This pipeline allows clients to access behaviorally rich, operational simulation outputs for infrastructure and public transport planning as well as site assessments without long, bespoke model development cycles.

Teaching

While activity-based models (ABMs) represent the cutting edge of travel demand forecasting, a significant gap exists between research, industry practice and academic instruction. A survey conducted by the European Association for Activity-Based Modelling (EAABM) teaching committee highlights a stark reality: Developing activity-based models is rarely included in general university curricula; consequently, most students only gain practical exposure to ABMs during their PhD studies. Despite growing industry demand for professionals proficient in these advanced forecasting methodologies, higher education institutions have been slow to adopt them.

This gap exists because of the way universities currently teach the subject. Rather than teaching ABMs as integrated systems, universities typically focus only on isolated components. For instance, students frequently receive instruction in discrete-choice modelling, but this training is almost exclusively applied to specific applications such as mode-choice or mobility-tool ownership. Consequently, students are seldom exposed to the integrated modelling pipelines inherent to activity-based frameworks, which require sequencing specific models for population synthesis, long-term decisions, tour generation, and tour-level choices.

Beyond this theoretical fragmentation, severe practical barriers prevent professors and lecturers from introducing comprehensive ABM courses. Effectively teaching activity-based modelling requires a stable baseline framework or software package. However, the existing platforms still require a high level of coding expertise and feature steep learning curves. A professor attempting to teach an ABM course must cover both theory and practical application in a single term. This becomes especially challenging when introducing software frameworks to students with different coding backgrounds, particularly when managing open-source software dependencies on various student devices.

Consequently, there is a low willingness among faculty to teach such courses. The instructional effort required to build an ABM curriculum from scratch is high, while the immediate value or return for a single university or professor remains low. To bridge this gap, developing a standardised curriculum paired with dedicated, education-friendly software seems highly appealing. By pooling institutional resources to create shared, modular lecture materials and a course-tested software interface, the academic community could drastically lower the barrier to entry, transforming how advanced demand forecasting is taught across different educational institutions.

Planning and Policy

United Kingdom

The United Kingdom presents a distinctive case within the European landscape: a country with genuine world-class capability in activity-based and agent-based modelling research and practice, yet one where the mainstream planning toolkit has remained largely anchored to aggregate, trip and tour based four step frameworks. The publication of TAG Unit M5.4, Agent-based Methods and Activity-based Demand Modelling represents an important institutional signal (Department of Transport, 2024): for the first time, the national appraisal guidance formally acknowledges ABMs as legitimate tools within the UK planning process, particularly for exploring policy options and informing the strategic dimensions of business cases. However, the guidance is explicit that their use in formal economic appraisal still requires further research, and that evidence from operational models in the UK remains limited.

The UK has at times got caught in the catch 22 - not wanting to explore new methods until there is confidence in them, and yet since we don’t explore new methods we don’t build the evidence base needed.

As has generally been the case, Transport for London have been key players in pushing on modelling practice. Their AB-MoTiON model has been used for multiple applied use cases. What characterises TfL as an early mover is a combination of in-house analytical depth, a complex and politically sensitive policy environment, and a clear set of use cases, fare capping, daily charging schemes where individual-level behavioural consistency is not a modelling nice to have but a practical necessity.

The Department for Transport has made significant efforts in fundamental capabilities, with the creation of the Household Population Synthesiser (HoPS) and the national Activity based Model (ANDeS) are both in Alpha level testing. They will likely unlock innovation by giving a consistent base from which models can be deployed across the UK.

Continental Europe

Over the past decade, pioneering public agencies and transport operators have successfully moved activity-based modeling (ABM) from academic research into core planning and policy-making. A prominent example is SIMBA MOBi, developed in-house by Swiss Federal Railways (SBB) and operational since 2020 (Scherr et al., 2019). Driven by the need to evaluate disruptive mobility schemes and Mobility-as-a-Service (MaaS) frameworks alongside traditional rail infrastructure, SBB built this national-scale model using a hybrid approach combining PTV Visum and MATSim. It directly supports corporate management decisions regarding future line concepts, rolling stock investments, and long-term service changes.

A similar shift toward behavioral realism occurred in Denmark with COMPASS (Copenhagen Model for Passenger Activity Scheduling), developed between 2018 and 2020. Commissioned by the Municipality of Copenhagen and orchestrated by a consultancy team led by Artelia, COMPASS replaced legacy trip-based tools to better support the city’s low-carbon goals. The model explicitly captures complex household activity chains—such as multi-modal combinations like taking bicycles on trains—and allows planners to simulate future scenarios involving autonomous vehicle fleets and on-demand micro-transit.

Technically, running the COMPASS model, updating the networks, and showing model results is performed via the COMPASS User Interface, which is based on ArcGIS Enterprise and Traffic Analyst (Overgård et al., 2021). The resulting demand is then paired with a specialised, large-scale Dynamic Traffic Assignment (DTA) engine by Rapidis (Rasmussen et al., 2021). This architecture highlights a key practical takeaway: by linking custom disaggregate demand choices with established, industry-tested network platforms, public agencies can successfully capture detailed spatial-temporal dynamics and traffic bottlenecks without needing to build a proprietary simulation engine from scratch.

The Swedish National Transport Model is built on the Emme software platform (originally developed by INRO, now also part of Bentley Systems). The system is orchestrated through an in-house user interface and database architecture known as SamKalk (Parishwad and Jia, 2023). While the core demand model uses a disaggregate, tour-based logit approach to predict individual travel patterns, the network data management, path calculations, and multi-class traffic assignments are executed directly within the Emme environment using its native macro languages and APIs.

The three approaches illustrate a common trend among first-generation institutional ABMs: rather than using pure open-source engines, they utilised commercial platforms (PTV Visum, Cube and Emme) as the foundational software framework to handle the data architecture and/or network assignment, while the disaggregate demand generation is handled with customised extensions.

In the Netherlands, the public partnership SIVMO emphasises that traditional models are not suited for complex applications such as Quality of Life, Mobility as a Service (MaaS), micro-mobility, smart mobility, car-sharing, e-commuting, and e-commerce (Kiel et al., 2024). The prevailing policy consensus favours a gradual, modular transition, focusing initially on key components like national population synthesiser, managed through collaborative frameworks that unite government agencies, academia, and private consultants. This cooperative shift is increasingly reinforced by pan-European networks like the European Association of Activity-Based Modelling (EAABM), facilitating knowledge exchange across the continent.

Concurrently, commercial providers have streamlined this transition for municipal operators. Senozon blends mobile phone records, travel diaries, and census data to deploy calibrated MATSim scenarios. A key practical use case is their long-term partnership with Berlin's public transport operator, BVG. Senozon's pipeline allows BVG to maintain an activity- and agent-based model which is used in daily practice for targeted passenger group analysis and specific operational effect studies.

Despite these examples of the operational readiness of activity-based transport models, a significant paradox persists in European planning. Major new large-scale public transport models still default to traditional macroscopic, aggregate four-step paradigms. A notable case study is the newly commissioned statewide transport model for the German federal state of Baden-Württemberg (Landesverkehrsmodell). Choosing a classic aggregate approach reflects a broader institutional risk aversion. Decision-makers often place greater weight on the disadvantages of ABMs such as increased modelling effort and added complexity that does not automatically result in better policy outcomes, while assuming that specific applications where ABMs excel are deemed to have limited regional relevance.

Research

While a detailed review of the activity-based modelling literature is outside the scope of this paper, we evaluate here an overview of six key research themes in activity-based modelling research across the past 5 years (2021-2026):

Emerging methodologies for joint modelling activity scheduling: Whilst *sequential choice-based* (i.e. compositional) and *rule-based* approaches to activity scheduling are still dominant in practical applications of activity-based models, recent research has clustered around two different methodologies for *joint/simultaneous* scheduling of daily activities: (i) deep learning and generative AI; and (ii) joint optimisation frameworks. Generative AI approaches treat scheduling as a *black-box process*, learning their joint distribution from data rather than modelling decisions sequentially. Applications include neural network-based models of full activity patterns, variational autoencoders for schedule synthesis, and inverse reinforcement learning to recover latent preferences (Fredriksson and Karlström, 2025; Liao et al., 2026; Shone and Hillel, 2025)

Generative AI for Activity Schedule Generation

A major future direction for activity-based modelling is the use of machine learning—particularly generative AI—to model complete activity-travel schedules. While most ML applications have focused on isolated choices such as mode selection, emerging techniques such as transformers, diffusion models and large language models can learn the joint structure of activities, locations, timings and travel decisions directly from behavioural data. Rather than predicting one decision at a time, these models can generate coherent daily or weekly schedules while capturing complex behavioural dependencies. Future research is likely to focus on hybrid approaches that combine the behavioural foundations of traditional ABMs with the predictive power of generative AI, enabling more realistic modelling of behavioural adaptation under emerging conditions such as autonomous vehicles, flexible working and disruptive policy interventions.

Data Fusion and Dynamic Synthetic Populations

The next generation of activity-based models will be built on richer and more dynamic representations of populations. Traditional travel surveys and census data provide important socio-demographic information but lack the spatial and temporal detail required for modern applications. Future ABMs will increasingly integrate census records, mobile-phone data, GPS trajectories, smart-card transactions, land-use information, employment records, school data and digital activity traces to reconstruct activity patterns at population scale. Advances in data fusion and synthetic population generation will enable continuously updated “living populations” that reflect demographic, economic and behavioural change in near real time. This shift will significantly improve model realism, transferability and responsiveness to evolving travel patterns.

Activity-Based Models as the Behavioural Engine of Transport Digital Twins

Activity-based models are expected to become a core component of transport and urban digital twins. Rather than serving solely as offline forecasting tools, future ABMs will operate within data-rich digital environments that continuously assimilate information from sensors, connected vehicles, mobile devices and public transport systems. By providing behavioural predictions of how individuals and households respond to changing conditions, ABMs can support real-time scenario testing, adaptive traffic management, public transport operations and policy evaluation. This integration will transform ABMs from long-term planning models into operational decision-support systems capable of helping planners and policymakers evaluate interventions dynamically and at scale.

Conclusion

Gaps and avenues

While activity-based models offer unparalleled opportunities to analyse individual-level travel behavior and evaluate complex distributional impacts, the aggregated models that are typically used in practice face notable structural limits. Most of those models remain bound to traditional trip-chaining frameworks, failing to capture critical behavioral dimensions. For instance, they typically do not account for the fact that mode choice is usually restricted on the level of tours, but instead model each trip individually. In addition, they do not directly account for how in-home activities, such as telecommuting or online shopping, substitute for physical travel entirely. Furthermore, the reliance on historical survey data for calibration prevents these models from generating emergent, unobserved activity chains in response to major infrastructure or policy changes. For example, introducing a parking fee at a workplace might not only trigger a modal shift from car to public transit for that specific tour, but also prompt a rescheduling of activities—such as shifting a shopping trip to a separate tour rather than making it an intermediate stop between work and home. Furthermore, intra-household interactions and constraints are omitted, including joint childcare responsibilities, the allocation of a shared vehicle, and how fixed work schedules constrain individual departure windows.

Looking ahead, a major opportunity to unlock the full value of ABMs lies in broadening their scope to interface with external sectors. By incorporating resource consumption metrics, such as tracking real-time electricity demand from electric vehicle charging or water consumption at specific destinations, ABMs have the potential to evolve from isolated transport tools into comprehensive urban metabolism platforms. This expansion would enable planners to model not just movement, but the broader environmental and infrastructural resource footprint of human behavior.

Path Forward: From Methodological Gaps to Practical Implementation

Bridging the gap between the advantages of ABMs and planning practice requires a structured, pragmatic approach. For public agencies and operators ready to transition, the following proposed sequential strategy outlines the next steps:

- **Align Frameworks with Future Challenges:** Do not implement ABMs for the sake of it. Begin by defining specific model requirements based on current and foreseeable mobility challenges, such equity analysis, dynamic pricing or ridehailing and ridepooling with autonomous vehicles, and objectively evaluate the capabilities of different modeling frameworks against these needs.

- **Capitalise on National Synergies:** Avoid reinventing the wheel. The transport planning discipline will shift collectively with ABM adoption. For instance, a synthetic population or ABM-based demand module developed for a national model can serve as an advanced foundation for regional applications. Local planners can then enhance this base by incorporating a highly detailed transport network, specific regional attractors—such as an airport, zoo, or leisure park—and tailored behavioral parameters during local calibration.

- **Adopt an Incremental Modular Approach:** Take it step-by-step rather than attempting a high-risk, all-in-one overhaul. Begin by generating a synthetic population, transition to modeling continuous activity chains, and only then introduce dynamic traffic assignment or agent-based simulation.

- **Leverage the Evolving Digital Toolbox:** Exploit modern, diverse software ecosystems. Utilise specialized open-source tools like ActivitySim for demand generation, harness large language models (LLMs) and machine learning for data cleaning and sub-model estimation, and rely on established GUI-based commercial suites (such as PTV Visum or Bentley) or robust database frameworks to keep network data organized.

- **Pace Development to Existing Expertise:** Respect your institutional learning curve. If you are building your first ABM after years of aggregate modeling, it can make a lot of sense to embed the new demand structures within your existing commercial software environment. Do not force an immediate shift to entirely new programming environments until the core concepts are institutionalised.
- **Foster Multi-Disciplinary Collaboration:** Assemble a diverse team. Developing and operating a production-grade ABM requires a highly differentiated skillsets: combining data science to integrate data and develop the various behavioral models , domain-specific planning knowledge for policy evaluation and computer science for computational efficiency if advanced simulations are required. Because it is highly unlikely that one or two individuals possess all these skills, agencies must foster collaborative environments and actively participate in industry-wide knowledge exchanges.
- **Educate the Next Generation:** Modernise university curricula and professional training programs to build the necessary pipeline of future planners. Rather than teaching aggregate four-step modeling as the default standard, transportation engineering modules must introduce disaggregate, activity-based approaches early on. This includes training students in data science and spatial analysis tools (such as R and Python) alongside traditional transport planning software, preparing them to manage the advanced micro-simulation frameworks increasingly required by the industry.
- **Enforce Fair Framework Comparisons:** Evaluate model performance using the appropriate metrics. Do not compare the compute times of a single aggregate assignment to an ABM without acknowledging that a full-day agent simulation inherently replaces 24 separate hourly macroscopic assignments. Also remember that high model fits achieved via additional correction matrices do not reflect a model's actual ability to realistically forecast responses to infrastructure and policy interventions.
- **Seek Alternative Funding Shortcuts:** When budgets are constrained or development stalls, look for funding beyond the traditional local planning allocations. Tap into applied research funds or joint international grants (such as EU Interreg) to co-fund the development of an ABM. And look to other sectors, such as energy.
- **Acknowledge and Celebrate Milestones:** Sustaining long-term institutional change requires morale management. Explicitly celebrate incremental technical achievements and regularly review your baseline to appreciate how far your modeling capabilities have progressed.
- **Nurture Knowledge Exchange:** Actively contribute to the growing ABM community to accelerate collective progress. Peer-to-peer learning is vital for overcoming implementation hurdles, so agencies should prioritise sharing technical progress, attending international

modeling conferences, and actively supporting collaborative exchange networks. Founded in 2024, the European Association of Activity-Based Modelling (www.eaabm.org) facilitates open exchange between researchers, industry, and policymakers to advance the practice of activity-based modeling.

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