Research article

Fostering learning beyond urban experiment boundaries

E.-(Els) Beukers [*], L.-(Luca) Bertolini

University of Amsterdam, Faculty of Social and Behavioural Sciences, Urban Planning Postbus 15629, 1001 NC Amsterdam, the Netherlands

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ABSTRACT

Urban experimentation has been increasingly applied as a tool for finding new ways to face grand societal and environmental challenges. Social learning and reflectivity that urban experiments might trigger are seen as crucial mechanisms in this process. Nevertheless, it often remains unclear how to concretely enable learning in urban experimentation. In order to address this practice and knowledge gap, an Experiential Learning and Transition Strategy (ELTS) was developed and applied to the Dutch mobile city experiments program (IMS). Its main aim was to foster learning within and beyond the experiment program boundaries. Applying and assessing ELTS to IMS gave a clearer idea of what works (e.g., the use of learning exercises or guiding questions, stimulating "self-learning," strong moderation, enough time, and a diverse group of participants), and what does not work (e.g., input from individual experts), when organizing learning events related to urban experimentation.

1. Introduction

Urban experimentation is a rapidly developing field of practice and research, seemingly holding great potential for creating more sustainable forms of urban building, managing, and living (Evans et al., 2016; Majoor et al., 2017; Potjer and Hajer, 2017; Szejnwald Brown et al., 2003). Experimentation, therefore, has been increasingly applied as an urban development tool (Castan Broto and Bulkley, 2013; Löw, 2013; Potjes and Hajer, 2017). This is evident, for example, in the popular concepts of urban living labs (Bergvall-Kåreborn et al., 2009; De Jong et al., 2015; Maas et al., 2017; Neef et al., 2017; Steen and van Bueren, 2017; Von Wirth et al., 2018), novel practices (Hoffman, 2016), and urban field labs (Majoor et al., 2017).

However, whether and how experiments can generate genuine alternatives and far-reaching transformations in cities remains questionable (Sengers et al., 2016; Evans et al., 2016; Cástan Broto and Bulkeley, 2013; Hoogma et al., 2002). A key area of discussion is the role of learning in urban experimentation. Learning is a, if not *the,* central aim of experimentation, since "an experiment only fails when nothing has been learnt from it" (Nevens et al., 2013, p. 119). In seminal conceptualizations in the field of Transition Studies, learning constitutes a crucial mechanism. In the Multi-Level Perspective, for example, the value of a novelty or niche experiment lies in whether it allows lessons to be learned (Smith et al., 2010). The Strategic Niche Management approach, for its part, emphasizes that experiments can build momentum in social learning processes, generating insights about transitions' problems, needs, and possibilities (Kemp et al., 1998; Naess and Vogel, 2012). Social learning and a reflective mind-set are also central to Transition Management's approach to transition experiments (Kemp and Loorbach, 2006). Hence, Transition Management focuses on the organization of process and content through an interactive and selective procedure with participatory stakeholders, with the aim of learning and experimentation (Grin et al., 2010).

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* Corresponding author at: Universiteit van Amsterdam Faculteit der Maatschappij- en Gedragswetenschappen, the Netherlands.
E-mail addresses: e.beukers@windesheim.nl (E.-(E. Beukers), l.bertolini@uva.nl (L.-(L. Bertolini).

Notwithstanding the understood importance of learning through experiments in transition processes, learning still seems poorly implemented in urban experimentation. In a database analysis of the transformative capacity of urban experimentation (Wolfram, 2016) of 400 experiments in 225 cities, Cástan Broto et al. (2019) found reflectivity and social learning as the least satisfied criterion. It had a satisfaction rate of less than 1%. In a critical assessment of learning in urban experimentation, three key shortcomings have been identified (Beukers and Bertolini, 2021). First, and although (social) learning and reflectivity is often mentioned as an important goal for experimentation, experiments may lack the means (time, project budget, and a strategy for learning) of transferring the lessons gained in an experiment beyond its niche context or boundaries (Majoor et al., 2017; Smith et al., 2010; Beers et al., 2014; Von Wirth et al., 2018; Van Doren et al. 2020). Second, experiments might fail to monitor whether and how learning and transitions took place (Van Mierlo and Beers, 2020; Van Mierlo and Regeer, 2010; Von Wirth et al., 2018). Third, even when learning was one of the initial experiment goals, attention to learning may wane during the experimentation process as other more immediate concerns become dominant (Majoor et al., 2017).

There seems thus to be a discrepancy between a shared understanding of the importance of learning and reflectivity as key mechanisms of the transformative capacity of urban experiments, and a lack of, or unclarity on, fostering learning and reflectivity in the practice of urban experimentation. In order to contribute to addressing the identified shortcomings, a synthesized strategy for experiential learning for transition through experimentation was developed (Beukers and Bertolini, 2021), based on insights from Transition Studies and the experiential learning theory (Kolb, 1984). This strategy could help enabling learning experiences beyond the experiment boundaries for indirectly involved participants, and society at large, with the overall aim to increase the transformative capacity of urban experiments. To understand if and how this strategy might help fostering learning for transition through urban experiments, it was applied to the context of the urban mobility experiments program IMS in the Netherlands (Innovatieprogramma Mobiele Stad). This gave a better understanding of the learning principles of the developed strategy, and helped to improve the strategy along the way through an action research approach.

This paper reflects on this journey of applying, testing, and refining this experiential learning and transition strategy, and shares the lessons learned about how to foster learning – beyond the experiment boundaries – for transition through urban experiments. The paper has the following set-up. In section 2 the experiential learning and transition strategy is introduced. In section 3 we address the methodological choices that were made for putting this strategy into action and assess and refine it to the context of IMS. We share our findings in section 4, and how this led to an refined version of the strategy. In section 5 then, we reflect on and conclude how learning for transition through experiments could be fostered, and the questions that came forth from applying this experiential learning and transition strategy into practice.

2. An experiential learning and transition strategy

To conceptualize a strategy for learning for transitions through experimentation, a literature review in the field of Transition Studies was conducted. This review focused on the used conceptualizations of learning for transition in the context of urban experimentation, the proposed methods for learning, and who should learn (Beukers and Bertolini, 2021). Paragraph 2.1 briefly discusses the insights into learning we attained from this review, and some omissions in the literature in how learning processes are approached. Paragraph 2.2 introduces the experiential learning theory, and how it could complement insights on learning from the review. The components and principles are combined into an experiential learning and transition strategy, as described in paragraph 2.3.

2.1. Learning through experimentation

The main frameworks in Transition Studies conceptualize how to foster learning in transition experiments conceptualizes learning as a process of *deepening.* This should give a better understanding about the culture, practices, and structure of more sustainable approaches for meeting societal needs (Beukers and Bertolini, 2021). In brief, learning as a process of deepening can be fostered through broad, reflective, and social learning (Szejnwald Brown et al. 2003; Van de Kerkhof and Wieczorek, 2004; Van den Bosch 2008; Raven et al. 2010). *Broad learning* emphasizes that sustainable issues are multi-dimensional, and have institutional, technological, socio-cultural, environmental, and economic components. Grasping this complexity in turn requires *reflective learning*: questioning underlying assumptions, norms, and social values through double-loop or second-order learning (Argyris, 1977). And this could be best done in a process of *social learning* in which multiple actors interact and develop an alternative perspective on reality, with a group of relevant experiment participants.

Furthermore, the review identified a range of modes, methods, and concrete directions on how to facilitate such learning processes, and for whom (Beukers and Bertolini, 2021), including e.g.: formulating explicit learning goals; dedicating time, regular meetings designated for learning, budget, and support by management; have small, stable groups of participants; performing reflective and interactive exercises like focus groups, stakeholder workshops, system analysis, visioning, back casting, aggregation activities, and network events; appointing a process manager, transition manager, or some intermediary between academics and practitioners; creating links among related experiments; a sense of urgency, group commitment, fairness, transparency, and competence; monitoring the transition process; setting up an explicit learning trajectory and monitoring the actual learning. These conditions aim to explicitly organize learning through experimentation, with small, stable groups of committed participants.

Less clear is how learning should take place within a broader societal context, which an experiment ultimately aims to impact. In order to enable a societal transition, not only should the directly involved participants learn, but the indirectly involved actors and society at large should as well, "scaling-up" norms and ideas about more sustainable practices (Szejnwald Brown et al., 2003; Beers et al., 2014). Related to the definition of social learning and reflectivity as part of the transformative capacity of sustainability

experiments (Wolfram, 2016), learning should address all agency levels, be linked to all actions for change, and related to all core development processes, as well as to leadership, governance, and community empowerment.

It seems thus essential to articulate how different actors at different levels of involvement could learn in practice, both within and beyond the experiment boundaries. However, the learning approaches in Transition Studies seem mainly to advocate intense and ongoing learning practices with small, stable groups of committed participants (Beukers and Bertolini, 2021). When embedded in a broader societal context, though, learning for transitions through experiments could be characterized by fragmentation, and should include occasional external participants, alongside a stable core group of learners. At the same time, it seems unrealistic to involve all actors who should learn through transition experiments (directly and indirectly involved, and beyond) in similar ways. Moreover, even the directly involved experiment participants might have insufficient time, involvement, knowledge, or overview to fully grasp the complexity of an issue at stake (Van de Kerkhof and Wieczorek, 2005). As such, the practice of experiments for transitions might not always offer the ideal conditions for learning with diversely involved participants, and may conflict with the intense and ongoing learning practices with small, stable groups of committed participants that Transition Studies advocates.

These less-than-ideal conditions for learning with diversely involved practitioners suggest that it might be useful to consider different levels of learning intensity in the practice of urban experiments, involving different types of participants in different ways throughout the experiment process. It would then be relevant to understand which learning exercises should be performed with whom, and when in the process of experimentation. And to understand how, in a fragmented setting, a valuable learning experience could still be facilitated. For this, the experiential learning theory (ELT) by Kolb (1984) might be of help (Beukers and Bertolini, 2021).

2.2. ELT complementing insights on learning through experimentation

ELT describes (individual) learning as a process through four quadrants in which knowledge is created by iterations of concrete experience, reflection, abstraction, and action, in a cyclical - although not necessarily orderly - fashion (see Fig. 1). The experiential learning process is seen as an interplay between acquiring and transforming[1] knowledge: moving from apprehension (what is grasped or sensed through concrete experiences) through knowledge internalization (reflection on concrete experience, for example relating it to other information) to comprehension (conceptualizing this reflection in abstract models or theoretical concepts) to knowledge extension (applying the conceptualization in interactive experimentation in an external environment) (Kolb, 1984; Kayes, 2002). Furthermore, ELT states that each learning quadrant asks for different cognitions: concrete experiences are grasped through our senses (feeling), reflection requires observation (watching, listening), abstract conceptualization entails thinking, and active experimentation involves doing. These cognitions should be facilitated differently depending on the (educational) contexts, as well as on the learner's characteristics or learning preferences. This determines when to stimulate individual reflection or group interaction, or when to include theoretical input or practical anecdotes.

The practice of urban experiments for transition could be characterized as fragmented and with diversely involved participants, which might conflict with the intense and ongoing learning practices with small, stable groups of committed participants advocated in Transition Studies. To foster learning with such diversely involved participants, it might be useful to consider different levels of learning intensity, involving different types of participants in different ways throughout the experiment process. For this, ELT might help to complement existing theories and methods on learning for transitions through experiments in three ways (Beukers and Bertolini, 2021).

First, ELT underlines that all participants should touch upon all four learning quadrants. This suggests that core group members as well as incidental participants should be enabled to experience the four stages of learning. Second, ELT addresses how participants can be actively stimulated to gain the four different learning experiences, since the four stages require different activities for learning. Third, ELT helps to create awareness that participants have different learning preferences and preferred quadrants, and could together form richer learning experiences (but could also conflict, or stay separate if the process is not well managed). Overall, ELT helps thus to articulate group learning, complementing individual learning experiences. For example, when connecting theoretical knowledge (like technical information, facts, or procedures) to practical know-how (knowing how to put something into practice).

For optimal group learning, ELT suggests that experiment groups should involve participants that are able to diverge, assimilate, converge, and accommodate knowledge (see Fig. 1). An experimental learning community should thus ideally entail participants who together:

- know about the underlying experiment problem and assumed mechanisms through concrete experiences from everyday life or practice
- are able to relate these concrete experiences to other relevant cases and theoretical reflections
- can bring these experiences and reflections together into a comprehensive, conceptualized, and applicable solution
- know how to put this into action
- and know how, and are able, to connect the experiment outcomes to other contexts in time, space, size, participant groups, and institutional context. This facilitates, in other words, accommodating or scaling-up the lessons learned from an experiment to contexts outside of the experiment context.

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[1] Kolb's use of 'transformation', see also Fig. 1, is in relation to the gained knowledge: knowledge transforms through processes of intention and extension giving a deeper understanding of the apprehensively and comprehensively grasped knowledge. Socio-technical innovation for more sustainable urban alternatives also require processes of transformation, but with a much wider societal meaning.
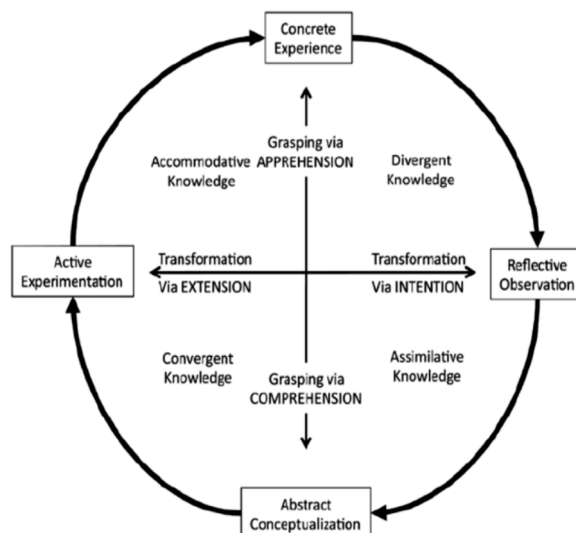
Fig. 1. The Experiential Learning Cycle (Kolb, 1984).

To sum it up, ELT suggests that learning for transitions through experiments requires to facilitate for all types of participants (1) learning activities that stimulate experiencing, reflecting, conceptualizing, and experimenting (2). And moreover, to compose diverse groups to stimulate group learning (3). Overall, these insights seem complementary to the existing discourse on learning in Transition Studies, as they give a more detailed understanding from an educational perspective to how collective learning by deepening could be achieved.

2.3. Experiential learning and transition strategy

Insights on learning from Transition Studies and ELT were used for constructing[2] a strategy for guiding learning in the context of an urban experimentation program, named the Experiential Learning and Transition Strategy (ELTS) (Beukers and Bertolini, 2021). Its main added value would be to facilitate learning experiences beyond the experiment boundaries, including indirectly involved participants and society at large. This strategy is not presented as a blueprint, but as a set of guiding principles to foster learning in urban experimentation (Beukers and Bertolini, 2021). These principles are ordered in three parts (see Table 1): How the learning process should be understood (concepts on learning); How to organize the conditions for learning (modes, methods, and concrete directions); And who should be the involved learners (the supposed learners).

To understand if and how this strategy might help to foster learning for transition through urban experiments, it was applied to the context of an urban mobility experiments program (*Innovatieprogramma Mobiele Stad* - IMS) in the Netherlands. Table 1 gives on overview of the ELTS principles, and how it was applied to the IMS context. In section 3, we further elaborate on how ELTS was implemented to IMS, and how it was measured. In section 4, the research findings and lessons learned are shared, including how they led to a reconstruction and refinement of ELTS. In section 5, we conclude how learning for transition through experiments could be fostered, and the questions that came forth from applying ELTS.

3. Applying ELTS to IMS

3.1. The IMS experiment program

IMS was developed as a coherent program of 11 sustainable urban mobility experiments, along with diverse activities to reflect and jointly learn based on ELTS from its very beginning. IMS took place from 2018 to 2020, and was organized by a cooperation between four knowledge institutes (University of Twente, Radboud University, Design Academy Eindhoven, and the University of Amsterdam), five provinces (Utrecht, North-Holland, South-Holland, North-Brabant, and Gelderland), the Ministry of Infrastructure and Water Management, and the process management consultant UUM.

3.1.1. Urban mobility experiments
The 11 sustainable mobility experiments were related to four topics:

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[2] The logic of synthesizing ELTS, combining insights on learning from Transition Studies and ELT, is elaborated in the referred review by Beukers and Bertolini (2021).

Table 1

Principles of ELTS, and its application to IMS.

	Experiential Learning and Transition Strategy (ELTS) (Beukers and Bertolini, 2021)	ELTS applied to IMS experiment program
	A The learning process (concepts on learning):	
1	Pay attention to broad learning: - Gain learning experiences in the four ELT quadrants: by diverging, assimilating, converging, and accommodating knowledge, allowing for new concrete experiences to emerge - Shift the focus of the (individual and group) learning experiences, and learning exercises, along the way from thinking about the societal problem at early stages of the experiment, to conceptualizing alternatives when the experiment matures, and putting these alternatives into action - Have connections with related experiments	- The IMS events had tailored programs for learning with several learning exercises - The events tended to focus on IMS experiments that were in a more mature phase, involving IMS participants in fine-tuning the experiment set-up, its implementation in a real-life setting, and questioning if and how lessons from the experiment could be useful to practice - Actors involved in related experiments were explicitly invited to join the IMS events. Forum 1 was organized with a related experiment program
2	Facilitate reflective learning and questioning underlying norms through a moderator who intermediates between diverse participants;	Events and learning exercises were moderated to facilitate reflective learning, as elaborated in B;
3	Facilitate social learning, involving diverse participants throughout the experiment process, and group learning exercises, intermediated by a moderator.	Both directly and indirectly involved professionals participated, as elaborated in C
	A Conditions for learning (modes, methods, concrete directions)	
1	When setting-up an urban experiment, aim to start a joint experiment program with related experiments;	IMS was set-up as a joint experiment program, entailing small-, medium-, and large-sized experiments that shared a focus on sustainable urban mobility;
2	Think of a strategy for joint learning for transition throughout the experiment process;	ELTS was applied for joint learning for transition throughout the experiment processes;
3	Formulate explicit learning goals;	IMS aimed to better understand how to put sustainable urban mobility experiments into practice; to increase the understanding of the relationship between spatial/urban and mobility developments for professionals from the public administration and other stakeholders; and to share experiences and knowledge about sustainable urban mobility experiments;
4	Involve someone to monitor the learning and transition process and outcome	The research team of the University of Amsterdam was responsible for monitoring and assessing the learning and transition processes and outcome. Learning experiences from former IMS events were used to reflect on what did (not) work to facilitate learning, which helped to set-up the subsequent events
5	Involve a moderator who mediates between participants with diverse backgrounds, is sensitive to creating a sense of urgency, group commitment, fairness, transparency, competence, and connects knowledge of participants related to different ELT quadrants (like, connecting academia to the practical know-how of practitioners, and vice versa)	An experienced process manager was involved to facilitate the overall program of events. Open conversations and reflections were facilitated at all events, by asking what participants learned and how the lessons could be valuable for their practices. Group exercises were moderated by members of the University of Amsterdam and others of the core team
6	Set-up a scheme for regular and irregular (on-demand) learning events for individual and collective learning; ensure time, budget, and management support for joint learning	IMS followed a scheme for different meetings and events: core group meetings in which the experiment teams met, steering group meetings in which the core group met with professionals of the provinces and ministry, and seven public events named Meet-ups (4x), Meet-you (1x), and public Fora (2x)[1]. At these public events intermediary IMS output was shared with a wider audience;
7	At these learning events, have individual and interactive learning exercises for sharing concrete experiences and reflections (e.g., storytelling, site visits), co-creating experiment set-ups, actively participating in experiment applications, and adapting experiences to new contexts (e.g., through training or a manual with strong iconic and communicative aspects). These exercises should enable all actors to reflect on the how and why of an urban sustainability problem, to think about a possible conceptual solution for this, to put this in action, and to experience how this works (or not).	The Meet-ups, Meet-you, and Fora all had tailored programs with interactive learning exercises for sharing concrete experiences and reflections, co-creating experiment set-ups, actively participating in experiment applications, and adapting experiences to new contexts
	A Involved learners (the supposed learners):	
1	Form a core group of directly involved participants, who represent the four ELT quadrants	The core group was formed by professionals from the participating knowledge institutes, and the process management agency. The steering group included members from the provinces and the ministry. Some of the steering group members were intensely involved whereas some participated more loosely. These professionals represented the four ELT quadrants, but showed an overrepresentation of academic knowledge and policy know-how at regional and national levels (relative to e.g., non-academic and non-professional and to local level knowledge and know-how).
2	More incidentally, involve the immediate professional networks of the core experiment participants (business partners, members of the organizations that employ them, other organizations with which they routinely interact), paying attention to representing the four ELT quadrants	The Meet-ups, Meet-you, and Fora were programmed to connect the IMS experiences and knowledge to those of the indirectly involved participants. These events aimed to involve professionals from provinces, and municipalities, business partners, and citizens
3	Interact with society at large	Interaction with society at large mainly took place through the Meet-ups and Fora, and by sharing all output online

[1] See 3.2.1 and Appendix 1 for specifications.

A Smart mobility experiments: (1) Developing and applying a Mobility-as-a-Service (MaaS) pilot to the city of Den Bosch; (2) Exploring an autonomously driving vehicle public transport concept in the city of Amersfoort; and (3) A Citizen Sensing experiment for clean and safe bicycle routes in the city of Utrecht.

B Spatial experiments: (4) Developing and applying a dialogue tool for a car-free zone at the World Food Center in Ede; (5) Developing and applying an experiential tool, an empathic journey, to improve the experience of tourists who travel by public transport from Amsterdam Central Station to the touristic location Zaanse Schans; (6) Developing and applying an analogue serious game for developing the urban building program at Knowledge Mile Tilburg.

C Governance experiments: (7) Developing and applying an analogue serious game for transit-oriented development at Utrecht Science Park; (8) Developing and applying an analogue serious game for developing the station area of the city of Leiden; (9) Developing and applying a hybrid (analogue and digital) game for local sustainability zones in Gelderland.

D Financial experiments: (10) Developing and applying a digital serious game for understanding the financial and accessibility consequences of housing and mobility investments in Zaanstreek-Waterland, and (11) Zaandam Kogerveld.

3.1.2. IMS public learning agenda

Along with developing and performing 11 urban mobility experiments, IMS had an agenda of smaller and larger events dedicated to collective learning at which learning experiences were to be enabled for indirectly involved participants. These events were framed as Meet-ups, Meet-you, and Fora. The Meet-ups were half-day thematic public events to which participants with diverse backgrounds were invited. The Meet-you was a dissemination event dedicated to participants from one stakeholder. The Fora were larger public events that lasted about one day, with exchanges across different themes, experiment teams, and stakeholders. All these events were programmed to connect IMS experiences and knowledge to those of the indirectly involved participants, and aimed to involve participants from provinces and municipalities, business partners, and citizens.

Although a lot of learning took place at non–public events (like during closed experiment meetings, and core group and steering group meetings), for this article we focus on the public events; the Meet-ups, Meet-you, and Fora.

3.2. Following an action research approach

To not only better understand the working of the guiding principles of ELTS, but also refine them along the way, the research followed an action research approach (Bryman, 2008) for organizing the IMS public events. The two action researchers (and authors of this paper) fully cooperated in the IMS program, and co-organized the public IMS events together with the IMS process manager. This enabled the researchers to get involved with both the expected problem and to propose possible solutions by influencing how learning beyond the experiment boundaries took place, which gave a deeper understanding of it (Wittmayer et al., 2014). Accordingly, our normative agenda (Loorbach, 2007) was to empower the IMS experiments program by offering theoretical insights on experiential learning and learning for transition.

Moreover, in the process of application we continuously and iteratively reflected on our actions and preliminary research findings (Greenwood and Levin, 1998) to learn lessons for further actions. Also, we shared preliminary results with the other research participants to reflect on, and jointly think of possible improvements. We systematically reported on these actions and reflections, producing rigorous research findings. Furthermore, by applying existing insights on learning and transforming through experimentation, we also aimed to generate new ideas and help to fine-tune the practice of fostering learning in the public events. This deepened our understanding of how learning and transition through experimentation could be fostered, following the tradition of transition research (Loorbach, 2007).

3.2.1. Measuring learning potential

The "action" part of the action research approach was to foster learning beyond the experiments' boundaries by applying ELTS, being part of the IMS organizational team. The "research" part was focused on gathering an understanding of the potential learning effect of ELTS on the participants: to find out if they felt enabled to learn at the public events, and how this learning potential was best stimulated. This potential to learn (framed as learning potential) through ELTS at the IMS events (Meet-ups, Meet-you, and Fora) was therefore measured using several research methods to collect data:

- IMS events were observed, and notes were collected in a log book;
- IMS events were audio recorded, and analyzed;
- The learning experiences of the participants at the IMS events were collected in analogue surveys;
- Each IMS event had a reflection session with all participants at the end, addressing the questions of what lessons were learned and if and how these could be useful for their practices;
- Sixteen selected participants were interviewed (one to six weeks) after the IMS events took place, to complement existing data and discuss preliminary results.

These research methods evolved along the way, and depended on the opportunity to be applied. For example, the IMS events entailed several subgroup sessions, moderated by IMS core group members. The intention was to audio record all these subgroup sessions, but this wasn't always possible. Omissions in the data collection were then filled in by follow-up interviews. Also, the survey for collecting the learning experiences of the participants at Meet-ups, Meet-you, and Fora evolved from a more academically rigorous, systematic approach to more simple, open questioning. The first surveys entailed, for example, a long list of statements, related to the

four ELT quadrants, like *"By sharing the (learning) experiences at this Meet-up, I better understand if and how a serious game could be helpful for the discussed issue."* However, the participants showed so-called survey fatigue. Also, the process manager with whom the IMS events were co-organized expressed unwillingness to devote much time in the program for the participants to fill in the form, and suggested an online survey after the IMS events instead. To cope with this friction, and secure the opportunity to collect fresh impressions of the participants at the events, the survey questions were greatly simplified. Moreover, the first results showed that the statements related to ELT did not give valuable data, as they remained too abstract for the participants. In a final stage, the survey concentrated around three open questions: *Did you learn from the different events sections, and why? How could the learning experience be improved? What lessons can you take to your professional practice?*

The generated data collectively gave insight into how ELTS would foster learning through experimentation beyond the experiment boundaries. By using several research methods, a more complete impression of the learning potential was generated, and bias because of, for example, personal enthusiasm by the action researchers, was compensated for. The data gave insight into who learned, the learning conditions, the learning process, if and how the participants felt supported to learn, and if and how these lessons could be valuable for their practice. The research thus did not explicitly measure <u>what</u> the participants learned. Nevertheless, the data showed differences in the scope of what the participants learned, reported as low/lower or high/higher potential learning effects. For example, sometimes event sections were assessed in the survey with hollow phrases like *"interesting talk,"* which is interpreted as a low potential learning effect, whereas other sections gained more rich responses like *"I see now many options for how to apply serious games for policy development,"* which is then noted as a high potential learning effect. This gave insight into how much potential learning was triggered, assuming that more detailed survey answers indicate more potential learning, and vice versa.

4. Was learning fostered at IMS events?

In this paper we focus on how the seven public IMS events fostered learning (four Meet-ups, one Meet-you, and two Fora). In Appendix 1, the set-up of the learning program, attending participants, and evaluation of how the events fostered learning is reported. We encourage the reader to take a look at it. In this section the iterations and overall findings are discussed, addressing the components for learning as noted in Table 1 the learning process, conditions for learning, and the involved learners.

4.1. The learning process

The learning process principles (see Table 1) state to pay attention to broad, reflective, and social learning, which is further specified with the ELT quadrants. Although these principles were applied to IMS, the research data did not give striking insights in how specific learning process principles directly helped to foster learning. For example, at the two IMS Fora and the Meet-you, IMS experiments were connected to similar experiments outside of the IMS, as part of the application of principle A1. These settings, however, only gave high potential learning effects when this was guided by learning exercises and strong moderation (see further description of this finding in §4.2).

Still, the process principles might have influenced the set-up of IMS and ELTS. For example, to facilitate broad learning, the IMS events focused on experiments-in-progress. This allowed participants to think along with premature work, even though this was sometimes uncomfortable for the experiment teams. Furthermore, the IMS experiments aimed to develop alternative approaches that questioned business-as-usual, and invited diverse participants to think along. This enabled reflective and social learning. However, for broad, reflective, and social learning to take place, the learning conditions (see §4.2) were pivotal.

Nevertheless, one issue related to the learning process stands out, namely the ELT semantics. When ELT terminology was used literally, participants perceived this as too abstract. It even provoked resistance. For example, principle A1 in Table 1 is stated as *"gain learning experiences in the four ELT quadrants by diverging, assimilating, converging, and accommodating knowledge, allowing for new concrete experiences to emerge"*. However, the terms "diverging," "assimilating," "converging," and "accommodating" seemed less familiar to the participants, and were reflected on as being forced. Instead, the ELT specification in A1 could be translated into: *"gain learning experiences in the four ELT quadrants by enabling participants to think, conceptualize, do, and experience themselves, and relate these insights to their own practices."*

4.2. Conditions for learning

The conditions for learning principles in Table 1 give a detailed description of what to organize to facilitate learning. Still, the set-ups of the public IMS events showed a clear development through iterations (see also Appendix 1).

4.2.1. Keynotes resulted in low potential learning effects

What stands out mostly is that whereas the first two events programmed several keynote speakers, this became far less dominant in the following events. These keynote speakers were authorities in the field, who shared their insights in lectures guided by a Power Point presentation. Although these lectures were appreciated by participants and of high quality, the surveys nevertheless showed that they resulted in low potential learning effects, a finding that was confirmed time after time when a lecture was programmed. Nevertheless, the process manager initially felt that programming well-known speakers was needed to present an appealing program to attract participants. The survey findings were however very clear about the low potential learning effects of the keynotes, in contrast to the potential learning effects of the other activities and learning exercises. This eventually convinced the process manager to downsize this program element in the following IMS events.

4.2.2. Enough time for learning; putting learners at the center

Lack of time was frequently noted as a factor that hindered learning at early IMS events: lack of time to get to know each other, to ask questions, to discuss the event theme, to perform the event activities, and to reflect on the event experiences. This lack of time, interestingly, was strongly related to the time-consuming keynotes. It appeared less of an issue when the event set-ups chose the active program elements as their focal point, at the expense of keynotes. Lessons were learned in how to set-up a balanced program to enable group and individual learning, facilitated through enough time. Related to this, since the participants themselves appeared of key importance, facilitating a thorough personal introduction was highly appreciated, and missed if left out.

4.2.3. Exercises that activate the four ELT quadrants for smaller groups

Relatedly, the IMS events showed progress in programming learning exercises for small subgroups, that is, clear assignments (mostly as part of an event) that stimulated individual and/or group learning that touched upon the four ELT quadrants. Like, "first discuss the central topic or experiment in small groups: its potential working, and pitfalls; second, perform the actual experiment; third, write down its potential for your own practice (individually); fourth, share your ideas." This was more easily organized for those events that focused on the smaller IMS experiments, which could be carried out during the event, like the analogue serious game for transit-oriented development at Utrecht Science Park (experiment 7), or the dialogue tool for (re)designing car-free streets (experiment 4). The participants could play and apply these games and tools, even in demo versions, and had moderated talks about their potential for their practices.

A too-premature prototype, though, mostly provoked a conversation about the tool or game itself, and not about its potential lessons for one's own practice, which happened for experiment 10 (a digital serious game about financial and accessibility consequences of housing and mobility investments in Zaanstreek-Waterland).

4.2.4. Quality of learning exercises

Part of the set-up of Forum 1 was that participants in three groups would perform an interactive "liberating structure" exercise named "Troika consulting" (Lipmanowicz and McCandless, 2013). However, one group decided instead to have an open conversation for their group exercise. This difference gave an unexpected opportunity to compare the potential learning effects of these three sessions for the variable of the "Troika consulting" exercise. The participants showed similar high overall appreciation of all the sessions. However, when asked about the valuable lessons learned for their own practice, the answers of the participants that attended the "Troika consulting" exercises were much richer and more insightful, compared to the participants who attended the open conversation. Analysis of the audio recordings of the group session without the "Troika consulting" exercise showed that the IMS core group members dominated the conversation, whereas the other non-IMS Forum participants had a very modest contribution. This was not the case for the other two groups. It seems thus that the non-IMS Forum participants at the "open conversation group" had less opportunity to learn, as their thinking, reflecting, and conceptualizing were less activated. The quality of the learning exercise thus matters (further described in 4.2.1).

4.2.5. Moderator crucial for quality of learning

Furthermore, when playing a serious game or applying a development tool, the potential learning effects depended on the quality of the dialogue it provoked: was it well moderated using guiding questions, was there enough time, and were diverse participants included, sharing their experiences/thoughts/doubts/etcetera? All this appeared to be relevant. The events thus showed that doing something actively does not immediately lead to high potential learning effects, but depend on the guidance through moderation.

4.2.6. Learning as shared goal: embracing "failures"

A large merit of ELTS was that joint learning became a shared core goal throughout the IMS program. It was not only advocated by the action researchers, but also by the experiment teams and core group members. Since IMS embraced the ELTS learning approach, it also became acceptable to have experiments "fail," albeit without defining it as such, which initially was more of a taboo. For instance (although this anecdote did not take place at one of the public events), the experiment with an autonomous vehicle (experiment 2) was initiated, but eventually did not work out. The first tendency of this experiment team was to leave it out of the records. However, they were encouraged by the other experiment teams and the action researchers to report on this experiment anyway and to collect and share the lessons learned. This reflects a generative logic of experiments, where failing is taken as an important opportunity to learn (Collins, 2020).

4.2.7. Learning goals of experiments were missing

Finally, although IMS and overall program for learning and reflection had clear learning goals, most IMS experiments did not. This was sometimes felt at the events, when it appeared unclear what issue (societal problem) the developed experiment should actually solve, and who would, could, and should be the problem owner.

4.2.8. An illustrative case: Sharing MaaS lessons at learning events

Whereas the IMS experiment program entailed 11 larger and smaller experiments that evolved along the way, the MaaS experiment lasted throughout the whole program. This experiment was classified as large, and entailed the development of a MaaS application, its delayed implementation in Den Bosch, the Netherlands, and its premature cancellation due to the COVID pandemic. This makes it interesting to zoom in on the events at which this experiment was a subject (Meet-up 2, the first Forum, the Meet-you, and the second Forum), and the related potential learning effects.

This series starts at Meet-up 2. The program entailed four keynote speakers, a (defect) demonstration version of the to-be-developed app, a site visit of the to-be-shared travel modes, and a final plenary reflection with about 40 participants. Although the atmosphere was noted to be very good – it felt to some as a pleasant school trip – the feedback for the participants showed low potential learning effects. This was due to a lack of time to get to know each other and ask questions, inability to use the MaaS app, and inability to actively join the reflection.

Following this first event, at Forum 1, the IMS MaaS experiment was the subject of the "Troika consulting" exercise, and related to another MaaS development outside of IMS. The experiment leaders of these two MaaS experiments were asked to formulate a request for help, which the group of participants discussed in two rounds to form an advice. Both experiment leaders were surprised by the new insights they gained by listening to others. Also, the participant feedback documented high potential learning effects, showing an in-depth understanding of the pitfalls and opportunities for MaaS, even if participants were not familiar with the theme beforehand.

The next IMS event, the Meet-you at the Ministry of Infrastructure and Water Management, documented instead very low potential learning effects. Since the IMS MaaS experiment had faced many difficulties in its development and implementation, the set-up was to collectively learn from this. However, the conversation was dominated by a person who extensively explained that other MaaS developments were much better than the one under discussion. A clear moderation that allowed others to also share their thoughts was missing. Not surprisingly, the survey showed very low potential learning effects from this session.

At the final IMS event, Forum 2, the MaaS experiment again formed part of the program. It was connected to an urban post-industrial redevelopment area, "Coberco," that could possibly benefit from the MaaS lessons learned. This time, the session was steered by two questions that guided the conversation ("What lessons can be learned from the MaaS experiment?" and "How could these lessons be valuable for the Coberco area?"), had a strong moderation, and asked all participants to report about the session on a poster. This event apparently facilitated suited learning conditions, and showed very high potential learning effects.

To sum up, learning about the MaaS experiment at the IMS events was less supported by: time-consuming keynotes, a defect demo-version of the app, reflection in a large group of approximately 40 participants, and a lack of strong moderation. Conversely, learning through this MaaS experiment was supported when IMS enabled clear small sub-group learning exercises, with 5 to 10 participants, guided by strong moderation.

4.3. Involved learners

The third component for learning in Table 1 relates to the involved learners. They should represent the four ELT quadrants. Besides a core group, other professionals should be involved incidentally, and interaction should take place with society at large.

4.3.1. Some disbalance in representation

IMS involved a group of loyal professionals from the involved knowledge institutes, the process management agency, the provinces, and ministries. These professionals represented the four ELT quadrants, but brought an overrepresentation of academic knowledge and policy know-how at regional and national levels (relative to e.g., non-academic, non-professional and to local level knowledge and know-how). Besides this loyal group, a wider circle of professionals from provinces, municipalities, business partners, and citizens participated at (one of) the IMS event(s). Civil servants from municipalities were especially well represented at the events, whereas citizen and business actors were less present. Nevertheless, at those events where citizens and business actors participated, this was highly appreciated, mostly by participants from governmental organizations who valued this as an opportunity to better understand their perceptions.

4.3.2. Well-mixed groups: no guarantee for learning

The research showed high potential learning effects for some events with well-mixed groups of participants: core group members, incidentally involved professionals from provinces and municipalities, and citizen and business actors. However, the research also showed low potential learning effects for an event that had the desired mix of diverse participants, but failed to organize strong learning exercises. It seems thus that the crucial element for achieving high learning effects is not only the mix of diverse participants, but also, or mainly, the strong learning exercises. Nevertheless, if this condition for learning is fulfilled, the learning effect indeed can get enriched when a diverse group participates.

4.3.3. Lessons for one's own practice: more difficult at national and regional levels, but easier at local level

The research also showed that IMS had a disbalance between being supported by regionally and nationally operating governmental institutions, and performing experiments that partly addressed local issues. This disbalance appeared notable when regionally and nationally operating actors were asked to relate the lessons learned to their own practices, which they found difficult. On the contrary, participants from municipalities who operated more locally gave richer answers when asked how lessons from experiments could be of help in their practices.

4.4. How to foster learning?

Overall, the ELTS principles (as articulated in Table 1) were shown to be helpful to fostering learning at the IMS experiment program. At the same time, the application generated useful insights on how to improve ELTS. The lessons learned are summarized in Table 2. The most crucial element for fostering learning appeared to be the principles about the learning conditions. The principles about the learning process seemed too general, and were mostly helpful to underline the importance of learning for transition through

experiments. Conversely, when designing a strategy for learning and transition through experimentation, the learning conditions appeared far more important to focus on and to elaborate carefully. When these conditions are facilitated in a suitable manner, the principles about the involved learners (representing the ELT quadrants, directly and indirectly involved participants, and society at large) were shown to be of high importance, too. Applying ELTS to IMS partly confirmed this, but also showed that thinking about how lessons learned could be valuable for one's own practice was easier for local participants than for regionally and nationally operating participants, as the concerns and experiences of the former were more directly relatable to the themes of the experiments.

Furthermore, applying ELTS to the relevant context of the IMS experiment program at several events showed that refinements were needed to achieve higher potential learning effects. Its application offered an increased understanding about the importance and articulation of active learning exercises at such events when indirectly involved but interested (semi)professionals join. Even though the urge to facilitate active learning exercises was discussed at the start of IMS, this was apparently not yet fully grasped in terms of know-how. The operational insights gained were, for instance, that active exercises needed to be organized at the expense of keynote speakers, that the participants themselves should be placed at the center, and that an effort is needed to facilitate individual and group learning by using learning exercises, guiding questions, strong moderation, and enough time.

The lessons learned in Table 2 also prompt a reconsideration of the ELTS principles as articulated in Table 1. This led to a reconceptualization of ELTS into refined ELTS (r-ELTS) as shown in Table 3. For example, the importance of the learning process principles should be relativized, with respect to the principles of the learning conditions and involved learners. The order of the learning principles of r-ELTS was therefore reversed. Also, a simplification and/or further explication of the learning process principles is needed. Moreover, the principles related to the learning conditions and the involved learners were more explicated[3]. As such, r-ELTS addresses the lessons learned in applying ELTS to IMS, and might better help to foster learning in future urban experiment programs.

5. Conclusions: learning for transition through experimentation

ELTS was developed in reaction to a noted discrepancy between a shared understanding of the importance of learning and reflectivity of urban experiments, and a lack of, or unclarity on, learning and reflectivity in the practice of urban experimentation (Beukers and Bertolini, 2021). This discrepancy entails three main concerns: (1) lack of an explicit strategy for learning for transitions through experiments; (2) lack of monitoring whether and how learning and transitions take place; and (3) lack of maintaining attention for learning throughout the whole process of experimentation for urban change. Testing ELTS in the IMS context showed that ELTS helped to address these concerns. ELTS is an explicit strategy for learning, potential learning effects were monitored, and attention for learning not only maintained throughout the whole process, but increased over time.

ELTS appeared to help fostering learning for unstable groups of participants with diverse backgrounds, who are more or less loosely involved, but possibly can broaden or scale-up the lessons learned. The Experiential Learning Theory, as an add-on to learning approaches from Transition Studies, appeared valuable to approaching learning as the main goal and having learning exercises as a means for reaching that goal. However, ELTS was effective for this aim only after several iterations, when it was better understood how the learning principles should be applied to the IMS context. This enabled ELTS to fully unfold, and led to a refined ELTS. It gave a clearer idea of what worked (e.g., the use of a learning exercise or guiding questions, stimulating self-learning, strong moderation, enough time, and a diverse group of participants) and what did not work (passive input of individual experts) when organizing a learning event related to experimentation. It thus helped to underline the importance of active "self-learning" (stimulating diverse participants to experience, think, conceptualize, and do themselves) at the expense of keynote presentations.

Applying ELTS to IMS also raised new questions. Such as, why were participants with local practices (e.g., from municipalities) better able to formulate how the lessons learned could be valuable for their practices, compared to participants with regional and national practices (e.g., from provinces and ministries)? Heiskanen et al. (2015) describe in their research that local participants of experimentation were more focused on concrete results, on "what's in it for me,". Also, new ideas were more extraordinary for them compared to their daily practices, and appreciated for that. This was in contrast to national politicians who were more looking for well-established solutions. A similar dynamic might have been at play at IMS. This raises the question of what does this difference in engagement mean for the scaling-up of the lessons learned, and how it could be coped with.

Furthermore, considering the aim of this study – fostering learning beyond the experiment boundaries –ELTS showed potential learning effects for those who attended the IMS learning events. But how do these participants bring the lessons back to their work fields? Lessons learned from experiments or at a learning events might be difficult to share with those that were not attending, or even outside one's own department or sector (Van Doren et al., 2020). Still, you need others to address structural (institutional) barriers. Regional, national, or transnational governmental networks, partnerships, and sector collaborations can be used to create momentum and disseminate ideas. Also, knowledge codification (like writing a handbook or evaluation report) and distribution might help to disseminate. However, a personal strategy for sharing and learning seem most effective, since *"project reports often end-up on a shelf"* (Van Doren et al., 2020, p. 9). Possibly the principles of r-ELTS could help too for disseminating experiment knowledge with an even wider circle of interested people?

Bringing these thoughts back to Transitions Studies research: when aiming to facilitate processes of deepening through broad, reflective, and social learning, having an explicit strategy for learning might be crucial, and for this ELTS could offer some inspiration. Thereby, this research suggests that it takes several iterations to find the right set-up to foster learning. Only by applying a learning

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[3] The main differences comparted to the principles in Table 1 are written in Italics

Table 2
Lessons learned through applying ELTS to IMS.

A. Lessons on the learning process (What concept/concepts on learning, and the learning process?)
1 Learning process principles did not foster learning directly, but (mostly) through the principles of "Conditions for learning";
2 These principles influenced the set-up and content of the IMS program and events:
○ Broad learning was enabled through: Joint learning from/with experiments-in-progress; organizing interaction with other experiments outside the IMS program
○ Reflective learning was enabled through: Learning from IMS experiments that form an alternative to business-as-usual; connecting lessons learned to participants' practices.
○ Social learning was enabled through: Involving diverse participants
3 ELT semantics were too abstract
B. Lessons on the conditions for learning (What modes, methodologies, and/or conditions for learning?)
1 Following a learning approach and reflective monitoring helped to create an overall acceptance of learning as a shared goal;
2 The learning condition principles were most relevant for fostering potential learning effects;
3 Keynotes gave lower potential learning effects;
4 Active learning exercises gave higher potential learning effects when these exercises gave clear assignments for group and individual learning, with strong moderation and enough time to be executed;
5 Facilitating personal introduction was of high importance and appreciated;
6 Several iterations helped to organize balanced events with higher potential learning effects.
C. Lessons on involved learners (Who are the supposed learners and/or their characteristics?)
1 When the conditions for learning were fulfilled, a diverse group of participants gave high potential learning effects;
2 The disbalance between support from regionally and nationally operating governmental professionals, and experiments that mostly addressed local issues, appeared problematic. Especially when these regionally and nationally operating actors were asked to relate the lessons learned to their own practices. It resulted in lower potential learning effects compared to locally operating actors. The ELT quadrants helped to understand this apparent mismatch.

Table 3
Refinement of the Experiential Learning for Transitions Strategy (r-ELTS) (main differences compared to table 1 are in Italics).

I Conditions for learning (modes, methods, concrete directions):
a Follow a strategy for joint learning for transition throughout the experiment process. *The potential learning effect, however, depends on the other learning conditions, like active learning exercises, strong moderation, and enough time*
b Set-up a scheme for regular and irregular (on-demand) learning events for individual and group learning; ensure time, budget, and management support. *Enable generation of an overall spirit of learning as a goal of experimenting*
c Organize learning events that focus on individual and group learning exercises, *devoting plenty of time to them*
d The learning exercises should stimulate both group discussions and individual learning (*to think, reflect, design/conceptualize, and act for/on yourself*)
e Involve a researcher to monitor the learning and transition process and outcome. *Enable participants to reflect on the events, think of the lessons learned, and connect these lessons to their own practices*
f Involve a moderator *who is aware of the diverse backgrounds of participants, and creates a safe space for learning. Have participants properly introduced (enable them to get to know each other)*
g Formulate explicit learning goals*, and consider for whom these lessons might be relevant*
I Involved learners (the supposed learners):
a Form a core group of directly involved participants, *who represent practices for which the experiment could be relevant*
b More incidentally, involve the immediate professional networks of the core experiment participants (business partners, members of the organizations that employ them, members of other organizations with which they routinely interact), *who represent practices for which the experiment could be relevant (e.g.. experiments with a local focus might be mostly relevant for locally oriented participants)*
c Interact with society at large (*e.g., when appropriate, invite citizens or citizen groups*)
I The learning process (concepts on learning):
Organize broad, reflective, and social learning:
a Broad learning = *Learn from/with experiments-in-progress, and other comparable experiments*
b Reflective learning = *Learn from/with experiments that question business-as-usual; learn through connecting experiment experiences to one's own practice*
c Social learning = *Learn from/with each other, involving participants from the whole experiment context*

strategy to other practices of urban experimentation can a fuller, and above all more situated understanding and specification of the know-how in that specific context, be facilitated. As such, for each following application a possibility for further refinements and adaptations of r-ELTS should be taken into account.

Declaration of Competing Interest

Data availability

Data will be made available on request.

Appendix 1. IMS learning events, 2018 – 2020

In the period 2018 to 2020 seven public events for learning through experimentation were organized by the IMS experiment program. In this Appendix, these events are described, addressing the set-up of the learning program, the participants, and how they fostered learning. These events were framed as:

- Meet-up: Public event, open to anyone interested in sustainable urban mobility experiments, mainly professionals from municipalities, provinces, consultancies, and knowledge institutes. They focused on one of the (to-be-developed) IMS experiments, or a bundle of related IMS experiments.
- Meet-you: An event that was organized specifically for professionals from the Ministry of Infrastructure and Water Management, since they did not attend the other IMS events.
- Forum: Public event with a comparable but larger set-up as the Meet-up. At the two Fora an exchange between the IMS experiments and other related sustainable urban mobility experiments were organized.

IMS event + Attending participants	Set-up learning program	Evaluation fostering learning
Meet-Up 1: gaming with regional housing and mobility effects *Attending participants:* 14 participants: A game developer with an academic background; 9 Regional mobility policy makers from a regional government; 4 Academic participants of the Mobile City program.	1. Welcome 2. Academic introduction of gaming for policy development, by 4 speakers: from knowledge institutes, real estate company and regional government; 3. Playing a serious game, with comparable game logic to the to be developed game on regional housing and mobility effects; 4. Jointly reflecting on the potential of gaming for policy making.	What worked: The vision presented by the real estate developer was valued as a refreshing market perspective on mobility related to housing development. Playing the serious game was experienced as a nice contrast to "passively learning things through the head". What did not work: A round of letting the participants introduce themselves was forgotten, and strongly missed. An often reported shortcoming was a lack of time. Participants mentioned that they needed more time to fully explore the workings and potential of the demonstrated game.
Meet-up 2: Mobility as a Service (MaaS) *Attending participants:* 40 participants joined the Meet-up, with diverse backgrounds: from surrounding municipalities, the province, consultants, and citizens.	1. Welcome, and introduction; 2. Three presentations by MaaS experts; from academia, the province and the app developer; 3. Experience the demo app (which did not work), and walk to the vehicles (bike and car) in public space; 4. Participants were asked to share their impressions; 5. Onstage interview with two professionals from the participating municipality and province	What worked: The meet-up was valuable for learning for those participants that were not familiar with MaaS beforehand. The diverse backgrounds of participants was valued. What did not work: A round of introducing oneself was missed. Several participants experienced the event as premature; the app was still to be developed and implemented and the demo version failed. The walk outside was valued for the opportunity to meet and chat, but did not add to an understanding of the topic. The presentations and onstage interview have hardly fostered learning. The meet-up suffered by a lack of time: hardly time for the audience to ask questions, the scheduled moment of reflection was kept unintentionally short. Interactive discussion and a user perspective was missed.
Meet-up 3: Next level transit oriented development (TOD) *Attending participants:* 20 professionals attended the Meet-up: from municipalities, provinces, the ministry, market parties, knowledge institutes, and a citizen interest agency.	This Meet-up was organized as a portfolio of different related initiatives. 1. Welcome and introduction, 2. Participants choose a program slot: visit TOD location by bike, or play the IMS TOD game; 3. Participants again choose a program slot: presentation about sharing TOD knowledge, or playing the IMS TOD game; 4. Two cases related to TOD were introduced by professionals of two provinces and discussed by the participants through intervision. 5. Final round of reflection.	What worked: The set-up enabled that all participants could play the game in not too large groups, which was valued. The game and visit to the potential TOD location were perceived to have a high learning value. Especially the interaction with other participants was appreciated. The participants gave rich answers to the question if and what lessons they would take from the event, valuable for they practice. What did not work: The presentation about sharing TOD knowledge was less valued for learning; time for reflection and its potential value for practice was missed. The fourth round was characterized as

(*continued*)

IMS event + Attending participants	Set-up learning program	Evaluation fostering learning
		intervision, but the set-up did not fit: the group was too big, two cases was too much, and the participants already had enough impressions from the other program activities.
IMS Forum 1: Sustainable urban mobility experiments, IMS meets Amsterdam Smart City *Attending participants:* 30 people attended the IMS Forum: professionals from municipalities, provinces, the ministry, market parties, and citizens.	The Forum was set-up as an exchange between IMS experiments and similar experiments in Amsterdam, and connected to three Amsterdam areas 1. Welcome and introduction; 2. Traveling to locations: having a moderated, in-depth peer-to-peer intervision using a 'Troika consulting' method; 3. Participants collected their insights on posters, and presented back at the convention center; 4. Participants had moderated dialogues about how to connect urban mobility experiments to policy making. 5. Reflection of a keynote speaker of the Ministry of Infrastructure.	What worked: The participants appreciated the perceived large variety of participants. Especially, the attendance of professionals from market parties and citizens were highly valued by participants from governmental parties. Findings point at added value of learning exercises, like Troika consulting, for high potential learning effects. Most participants reported to have gained unexpected, and new insights. What did not work: The added value of traveling to the three locations was assessed as modest; participants appreciated the traveling to get to know each other, but it took a lot of time, and the exercises themselves took place in office rooms. The program rounds 4 and 5 were perceived as "high over". Even though the participants assessed the poster presentations, and group conversations as "interesting discussions", their answers stayed superficial. The participants who did not attend the morning session found it difficult to understand what these groups did, and the participants who did attend the morning sessions felt a lack of energy at the end of the day.
Meet-up 4: Playing Serious Games *Attending participants:* 25 participants: planning professionals from provinces, municipalities, and game development and urban planning consultancy firms. No citizens and representatives of the ministry participated.	Meet-up 4 focused on the two IMS serious games; an analogue game [experiment 7], framed as 'high social', and a digital one [experiment 10], framed as 'high tech'. 1. Introduction: IMS and logic of serious games by IMS core group members 2. All played both games in two rounds. 3. The event finalized with a round of reflection about the possibilities of the serious games for planning.	What worked: The event went smoothly, without time pressure. Playing the two types of serious games gave the participants the opportunity to experience both. Both games were mainly valued for the ability to provoke a dialogue between the participants, for which strong moderation was crucial. At the reflection, the participants had an in-depth discussion about how the plusses of both game types could be combined in a hybrid form: with a high social game structure and rules, as well as the accuracy of the high tech game. This inspired the IMS experiment teams to indeed develop such hybrid games [experiments 9 and 11]. What did not work: The introduction was perceived as too long, and giving a modest potential learning effect.
Meet-you: IMS lunch event *Attending participants:* 22 participants: professionals from the Ministry of Infrastructure and Water Management, and the Ministry of Internal Affairs, with a focus on spatial and mobility development issues	Due to a lack of participation by professionals from the ministry, a 'Meet-you' was organized exclusively for them: A lunch break session at the Ministry of Infrastructure and Water Management. 1. Overall introduction of the IMS program 2. Three parallel sessions (playing the social serious game [experiment 7], experiencing the dialogue tool for car-free area development [experiment 4], and discussing the MaaS app [experiment 1]) 3. An update of the experiential learning set-up of the IMS.	What worked: The participants gave the impression of an overall appreciation of an experiment program. The active program parts (playing the game and the dialogue tool) gave some valuable potential learning effects. What did not work: Participants were less convinced about its potential impact; they did not perceive the experiments as innovative, did not see the relevance for their policy related work, and felt disappointed about the state of the experiments as work in progress. Similar comments were given for the learning approach. The event suffered from a lack of time.
Forum 2: Arnhem as IMS City Lab *Attending participants:* 20 participants attended the Forum: planning professionals from provinces, municipalities, consultancy and area development firms, knowledge institutions, and citizens.	The set-up was to apply four IMS experiments to cases in the city of Arnhem, the Netherlands, to facilitate local experiences and an understanding of how to apply the experiments at other locations. 1. A relatively short overall introduction 2. Groups traveled to the Arnhem case locations where they performed the experiments. 3. The participants collected the main lessons of the session on a poster 4. Posters were presented in a marketplace setting, where the participants could walk around and have one-to-one conversations about it.	What worked: Participants were unanimous positive about valuable for learning of the experiment sessions at the location. The participants also gave rich answers when asked about the lessons learned. They valued: the input of the diverse participants; that the sessions took place at the case locations; and noted to have learned new insights or perspectives. As such, this event had the highest potential learning effect of all the IMS events. Even the plenary sessions of the introduction and reflection at the end of the event were perceived mostly positively, as well as the time frame of lasting half a day.

(*continued*)

IMS event + Attending participants	Set-up learning program	Evaluation fostering learning
	5. A keynote speaker of a regional alliance for sustainable mobility.	

Experiencing both games showed an interesting dichotomy. Participants who strongly valued the high social game, were more negative about the high tech game, and vice versa. As if the participants had different preferences; valuing the accuracy of the high tech game, or the increased understanding of the inter-relationality of the mechanisms in the high social game.

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