Co-designing tourism experience systems: A living lab experiment in reflexivity

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ARTICLE INFO	ABSTRACT
	Stakeholders must purposely reflect on the suitability of process models for designing tourism experience systems. Specific characteristics of these models relate to developing tourism experience systems as integral parts of wider socio-technical systems. Choices made in crafting such models need to address three reflexivity mechanisms: problem, stakeholder and method definition. We systematically evaluate application of these mechanisms in a living lab experiment, by developing evaluation episodes using the framework for evaluation in design science research. We outline (i) the development of these evaluation episodes and (ii) how executing them influenced the process and outcomes of co-crafting the process model. We highlight both the benefits of and an approach to incorporate reflexivity in developing process models for designing tourism experience systems.

1. Introduction

Designing and managing destinations to become more sustainable, resilient and inclusive is increasingly receiving attention both in academia (Uysal et al., 2020) and in practice (UNWTO, 2019). However, UNWTO and UNEP (2019) identify a gap between formulated sustainable tourism policies and their actual implementation in destinations. One possible cause of this gap is the fact that destinations are not a natural or legal entity. Consequently, they cannot be managed or developed in the same way as (formal) organisations can be. Rather, destinations should be seen as soft systems (Checkland and Poulter, 2020) consisting of a "group of actors linked by mutual relationships with specific rules, where the action of each actor influences those of the others so that common objectives must be defined and attained in a coordinated way" (Manente & Minghetti, 2006, p. 23). Together, these actors shape the tourism experience system "consisting of products, services, physical and social environments that is experienced by consumers" (Smit et al., 2021, p. 2972). Network approaches to managing tourism experience systems accommodate for these characteristics of destinations by highlighting the interdependence of tourism stakeholders and the necessity for coordinated action to reach shared goals (Sainaghi & Baggio, 2017).

Consequently, process models to co-design tourism experience systems are increasingly receiving attention. Designing tourism experience systems requires adopting an iterative design process that combines aspects of systems engineering and human centred design to create holistic experience concepts (Tussyadiah, 2014). The design process should *not* be a one-directional path from problem to solution, if it is to foster creativity and non-linear thinking (Scuttari et al., 2021). Rather, the process model should facilitate the co-evolution of problem and solution (Dorst & Cross, 2001), as formulating a design problem requires the designer to "frame a problematic design situation: set its boundaries, select particular things and relations for attention, and impose on the situation a coherence that guides subsequent moves" (Schön, 1988, p. 102). Therefore, it should be the result of careful consideration and reflection on knowledge and information needed at different points in time, activities to be undertaken, and stakeholders and disciplines that should be involved (Smit et al., 2021). Such *reflexivity* can be stimulated by posing the right questions (Steen, 2013) and by explicitly addressing these questions in crafting the design process model (Vink & Koskela-Huotari, 2021).

While the process models reported in tourism and hospitality literature form a rich set of alternative and complementary approaches, Smit et al. (2021) argue that further research is required to improve the

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maturity and flexibility of these process models. Maturity in this case refers to the evolution of methods because of using them, whereas flexibility refers to the adaptability of the process model with respect to choices about activities, stakeholder engagement, shortcuts and extensions (Céret, et al., 2013). This study adopts the framework for evaluation in design science research (Venable, 2009) to systematically incorporate *reflexivity* in co-crafting a process model with stakeholders in a living lab experiment. This framework supports the development of evaluation episodes to ensure that the right reflexive questions are asked at the right moment to the right stakeholders. This approach makes evaluation an integral part of co-crafting the process model, to ensure that problem and solution remain aligned, through evaluation before, during and after its conception (Dorst & Cross, 2001). The reflexive questions of each evaluation episode are informed by critical systems heuristics (Ulrich, 1996), which focusses the evaluation on the contribution of the tourism experience system under design to its wider socio-technical environment. Firstly, this study develops a methodology that supports incorporating reflexivity in the development of process models to design tourism experience systems. Secondly, through systematically incorporating reflexivity in this development process, it contributes to the maturity and flexibility of such process models and demonstrates how this changes these process models and the outcomes of applying them. And thirdly, it develops knowledge on design science in tourism literature, through demonstrating its value in a living lab experiment.

2. Literature review

Process models structure the activities of designers and contributions of stakeholders to design a new or improved system and are commonly used in many fields, such as architecture, urban planning and software design. Depending on the purpose, context and starting point, different process models for designing tourism experience systems can be distinguished (see e.g. Smit & Melissen, 2018; Tussyadiah, 2014). Each of these adopts different types of activities, creates orders and iterations of activities differently, and involves stakeholders differently in each activity. As the choice of design process can lead to very diverse outcomes, the choice of which process model to guide design activities should be a deliberate and conscious one.

Design experts and scholars agree that every design process revolves around two crucial elements: the problem space and the solution space (Cross, 2001; Smit et al., 2021). Effectively addressing both is essential, often simultaneously or through iterative approaches, to ensure that the design process results in an appropriate solution for the right problem. The British Design Council (2019) has captured this core aspect of the design process through the Double Diamond model (Fig. 1). In this model, the left-side diamond symbolises the problem space, focussing on discovering and defining the problem. Conversely, the right-side diamond represents the solution space, concentrating on developing and delivering solutions. The process concludes when evaluation confirms that the presented design(s) indeed solve the problem defined in the problem space.

Based on the specific starting point and purpose of the design effort, designers need to use a process model that is valid both from a theoretical point of view as well as a performance point of view (Pedersen, Emblemsvåg, Bailey, Allen, & Mistree, 2000). In their meta study of the available literature on process models to design tourism experience systems, Smit et al. (2021) conclude that such a process model should have four specific characteristics: 1) it provides a (visual) structure of the set of activities needed to develop a (partial) system by having a clear purpose and recommended use; 2) it specifies alternative ways to collect tacit and explicit knowledge of relevant stakeholders to define the problem and develop relevant solutions during the various stages of the process; 3) it provides guidelines for the optimal composition of the design team and explicate the capabilities needed to guide the process and activities; and 4) it specifies the procedural knowledge needed to manage and validate the process.

What adds to the challenge of designing tourism experience systems is that destinations are in a state of constant transition. This might not always be visible at the destination level, for instance when indicators such as visitor numbers and expenditure seem to be stable. However, the situation is likely to be more dynamic when analysing the growth, stagnation or decline in lifecycles of specific visitor trajectories and flows in specific areas or neighbourhoods (Beritelli et al., 2020). At a more detailed and operational level, these dynamics are even more visible, for instance in the lifecycles of particular tourist experiences such as accommodations and attractions (Russell & Faulkner, 2004). It is these products, services, physical and social environments, each with their own capacity and availability, that together shape the tourism experience system (Smit et al., 2021) from which tourists select and
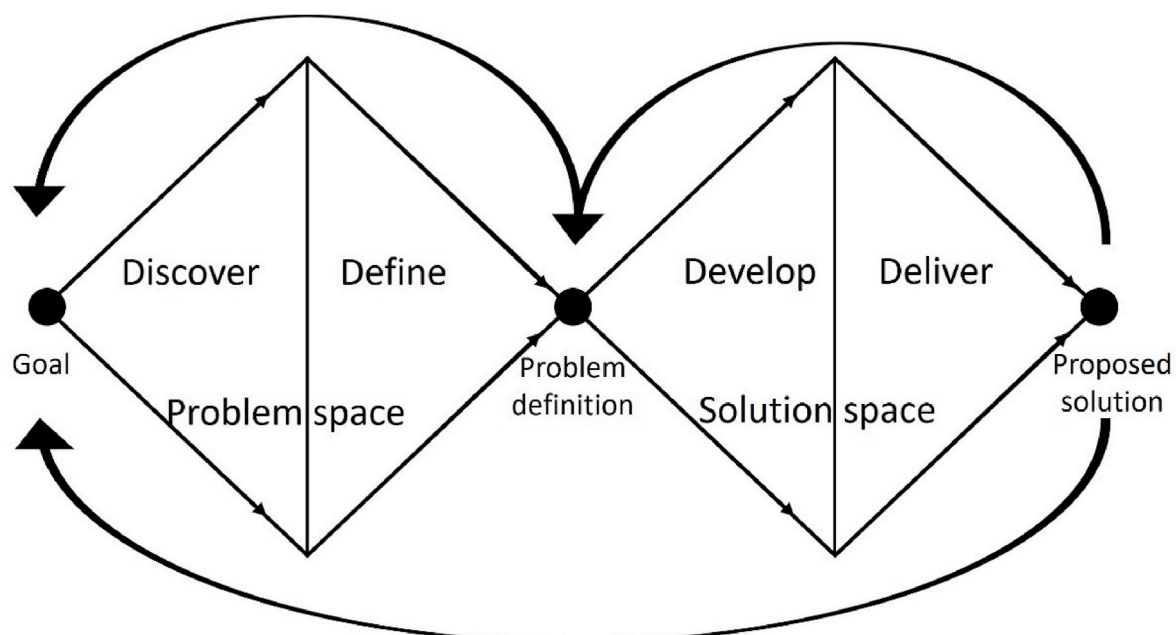

Fig. 1. Double Diamond model (adapted from British Design Council, 2019).

combine elements to create their personal experience itineraries. Consequently, the actual development of the tourism experience system, in practice, takes place at the operational and visitor flow levels of design (Koens et al., 2021), rather than at the destination level. The development of tourism experience systems should therefore focus on bottom-up development by involving local stakeholders who influence and are affected by tourism.

Consequently, empowering stakeholders active at the operational level by the decision makers at the strategic level (i.e., local government) is a key aspect of destination development (Koens et al., 2021). However, it is important to realise that initiatives for bottom-up development are often instigated by decision makers at a higher level who also determine the goals, resources and level of empowerment. This problem could be circumvented by incorporating collaborative goal setting and empowerment in the design process. Therefore, successfully co-designing tourism experience systems depends on mobilizing actors in and outside the existing system, at different levels, to aggregate their resources and knowledge to create added value for tourists (Sainaghi et al., 2019; Sainaghi & Baggio, 2017). Simultaneously, this co-design effort should contribute to the capability of the destination to properly host its residents by being conscious of the stakes of beneficiaries and victims of the tourism experience system (Jóhannesson et al., 2015; Koens et al., 2019). Moreover, it should acknowledge system boundaries such as carrying capacity and availability of natural, physical, financial and social resources. While conceptually this may all sound logical and natural, operationalising these principles is complex because the question remains how to identify these stakeholders, how to decide when and how to involve them, and how to weigh their stakes in (activities of) the design process.

Involving real stakeholders in shaping real (tourism experience) systems comes with real world implications (Venable, 2009). Regardless of whether those leading the design process are practitioners or (design) researchers, they need to be aware that they are responsible for the impact of their choices and actions through three mechanisms. First, that whoever defines the problem or objective is likely to control the entire process (Selener, 1998). Second, that controlling the methods to develop solutions makes it likely that they also control the ultimate choice for specific solutions. Ateljevic et al. (2005, p. 11) refer to these two mechanisms as double reflexivity.

However, design science requires a third type of reflexivity. As the outcome of a design project generally is a solution, designers are also responsible for determining the (potential) role(s) of other stakeholders in (decision-making) activities in the design process. Therefore, those initiating and leading the design process should not just reflect on their own role and power in developing the process model (Pathumporn & Nakapaksin, 2015), but they must also critically reflect on the tourism experience system to identify which stakeholders should be involved in the first place and what the stakes and stakeholding issues are (Ulrich & Reynolds, 2010) to avoid reinforcing unsustainable local social structures, and to identify opportunities for changing these structures (Vink & Koskela-Huotari, 2021). Consequently, the process model to design tourism experience systems needs to be informed by conscious decisions on the three mechanisms of problem, method and stakeholder definition.

This process of reflecting and (re)acting throughout the design effort, also referred to as design reflexivity, requires systems thinking. Systems thinking can be described as a way of investigating reality by looking at the relationships between elements and subsystems that form a system rather than at the collection of individual elements (Meadows, 2008). Critical systems heuristics (Ulrich, 1996) helps us demarcate the stakes and stakeholders to be included in complex contexts, such as tourist destinations. Originally developed as a framework for reflective practice (Ulrich & Reynolds, 2010), critical systems heuristics has proven its value in social planning and governance systems (Reynolds, 2007), but also as an integral part of design science research (Venable, 2009).

Critical systems heuristics supports the identification of consensus and tensions through twelve boundary questions that address the sources of motivation, power, knowledge and legitimacy in the relationships between elements of the system. Consequently, critical systems heuristics forces its users to look at a system from the perspective of each stakeholder and from the perspective of what 'is' and what 'ought to be'. These boundary questions reframe the point of reference of those designing the tourism experience system through reflecting on its practice and purpose within the wider socio-technical system (Joore & Brezet, 2015). Moreover, critical systems heuristics supports identifying tourism beneficiaries and victims, and determining how these stakeholders ought to be represented. Integrating the critical systems heuristics boundary questions and accounting for the three reflexivity mechanisms illustrated above better engages stakeholders. To test this potential, a living lab experiment was set up as part of a European Commission Horizon 2020 project on sustainable cultural tourism development.

3. The living lab experiment

The city of Rotterdam (the Netherlands) has undergone an incredible transformation over the last 20 years. In 2022, it had 655,000 inhabitants with 170 different nationalities, living in 39 neighbourhoods, each with its own council responsible for development. As a result of investment in urban development and daring architecture, Rotterdam is attracting more visitors. The 2020 tourism vision (Gemeente Rotterdam, 2020) states that tourism development should contribute to the quality of life of (all) inhabitants and to sustainable development of its neighbourhoods. The municipality does not define the growth of tourist numbers and revenues as a success perse. This vision is being translated to other levels of design, putting neighbourhood councils and local stakeholders in a position to see how tourism could contribute to their needs. The Rotterdam SmartCulTour living lab was set up to support participatory development of a cultural tourism experience system in three distinct, historically different, and geographically dispersed neighbourhoods (Hoek van Holland, Afrikaanderwijk and Bospolder Tussendijken, see Fig. 2) which are destination subsystems, while also being part of the larger system of the destination and the city of Rotterdam.

4. Methodology

This paper makes a methodological contribution by adopting the framework for evaluation in design science research (Venable, 2016) to systematically incorporate reflexivity in the development of a process model to design a tourism experience system. The framework provides a four-step methodology to incrementally develop and evaluate artefacts: 1) explain the goals, 2) choose the evaluation strategy, 3) determine the properties to evaluate, and 4) design the individual evaluation episode (s). According to Pries-Heje et al. (2008), evaluating a soft artefact, such as the process model developed in the living lab experiment, requires a naturalistic approach as the process model needs to be tested in its natural setting to solve real problems involving real users (Sun & Kantor, 2006). As design science research focusses on designing, developing or building new artefacts, evaluation of such artefacts is an integral part of the process for the rigorous demonstration of the "utility, quality, and efficacy of a design artefact […] via well executed evaluation methods" (Hevner et al., 2004, p. 85).

Due to the iterative and incremental nature of design, evaluation in design science research is not only a summative activity but also a formative, integral and parallel aspect of the development process of the artefact under design which means that actual evaluation takes place ex-ante (before), interim (during) and ex-post (after) completing the activities that constitute the development process. Formative evaluation is not necessarily only applied in ex-ante or interim testing, nor does summative evaluation necessarily imply ex-post testing. In many design projects, summative evaluation episodes are applied in ex-ante and

Fig. 2. Impression of participating Rotterdam neighbourhoods in the living labs.

interim testing, for instance to get approval to move to a next stage of the design process (i.e., develop a prototype). Similarly, a formative evaluation is often applied ex-post when interim tests of the artefact under development were evaluated using summative evaluation episodes. This approach to evaluation stimulates the iterative nature of learning through building (Kuechler & Vaishnavi, 2008) and therefore supports the co-evolution of problem and solution throughout the development of the artefact (Dorst & Cross, 2001).

The aim of the living lab experiment was to develop a process model to design cultural tourism experience systems. For step 1 of the framework for evaluation in design science research, Venable et al. (2016) suggest to 'explain the goals' of evaluation using generic types of goals: (i) rigour; (ii) uncertainty and risk reduction, (iii) ethics and (iv) efficiency. Depending on what is being designed, goals related to one or more of these types can be formulated. This led to identifying four distinct goals:

1. The process model should provide a guideline for the way stakeholders agree to collaborate and aggregate their resources and knowledge to design a tourism experience system, which is a rigour related goal as it aims to evaluate the efficacy and effectiveness of the process model.
2. The process model should ensure that the designed tourism experience system contributes to the wider socio-technical environment, which is an ethical goal.
3. The process model and its constituent activities need to fit the abilities of its users but also reflexively involve participants from the multi-logical context, which is a risk and rigour related goal.
4. The evaluation of rigour, risk and ethics goals needs to be balanced against the resources available for evaluation through a smart combination of formative and summative evaluation episodes, which is an efficiency related goal.

In the second step of the framework, an *evaluation strategy* or combination of strategies needs to be chosen. Based on the selection criteria provided by Venable (2016, p.82, see Table 1) the human risk and effectiveness strategy is most applicable, as the process model under development focusses on effective stakeholder engagement and collaboration in co-designing a tourism experience system. According to Venable (2016), the human risk and effectiveness evaluation strategy is characterised by naturalistic, empirical evaluation using methods such as surveys, ethnography, field experiments and action research for

Table 1
Selection criteria for evaluation strategies in the framework for evaluation in design science research (Venable, 2016).

Evaluation strategies	Selection criteria
Quick & Simple	- Small and simple artefact, with low social and technical risk and uncertainty.
Human Risk & Effectiveness	- The major design risk is social or user oriented, and/or - It is relatively cheap to evaluate with real users in their real context, and/or - A critical goal of the evaluation is to rigorously establish that the utility/benefit will continue in real situations and over the long run.
Technical Risk & Efficacy	- If the major design risk is technically oriented, and/or - If it is prohibitively expensive to evaluate with real users and real systems in the real setting, and/or - If a critical goal of the evaluation is to rigorously establish that the utility/benefit is due to the artefact, not something else.
Purely Technical Artefact	- If artefact is purely technical (no social aspects) or artefact use will be well in future and not today.

formative and summative evaluation episodes for ex-ante, interim and ex-post testing.

For the third step, 'the properties to be evaluated', the so-called evaluands need to be determined. Venable et al. (2016) suggest to first create a frame of potential evaluands as a set of features, objectives, and requirements of the artefact. These evaluands need to be aligned and cross-checked with the goals of the evaluation determined in step 1 and the strategy determined in step 2. Given the first and third rigour related goals (determined in step 1), the process model under development needs to adhere to the four characteristics of process models for tourism experience systems (Smit et al., 2021). Moreover, the evaluation needs to test and improve the reflexivity incorporated in co-crafting the process model. Hence, critical systems heuristics (Ulrich & Reynolds, 2010; Venable, 2009) was used to translate the four process model characteristics from Smit et al. (2021) into a frame of evaluands (see Table 2).

Taking such a heuristics approach to design evaluation allowed the researchers to specifically reflect on the four characteristics of the design process model, while stimulating a reflection on its potential to contribute to sustainable development (Cross, 2011; Scuttari et al., 2021). The boundary questions from critical systems heuristics allowed the researchers to identify the sources of motivation, control, knowledge and legitimacy of the stakeholders influencing or affected by tourism. A

Table 2
Frame of evaluands for process models to design tourism experience systems.

Process model characteristics	Evaluands based on critical systems heuristics			
Characteristic 1 The design process model has a purpose, recommended use and provides information on the starting point of the process and subsequent activities, often visualised in a model or flowchart.	**Sources of motivation**	1. **Beneficiaries** Who ought to be/is the intended beneficiaries of applying the design process model?	2. **Purpose** What ought to be/is the purpose of applying the design process model and its subsequent activities?	3. **Measures of improvement** What ought to be/is the design process models' measures of success (empirical validation)?
Characteristic 2 The design process model provides recommendations for composition of the design team and capabilities needed for the process and activities.	**Sources of Control**	4. **Decision maker** Who ought to be/is in control of the conditions of success of the design process and the activities?	5. **Resources** What conditions of success ought to be/are under the control of the decision maker?	6. **Decision environment** What conditions of success ought to be/are outside the control of the decision maker?
	Sources of legitimacy	13. **Witness** Who ought to be/is representing the interests of those (potentially) positively or negatively affected by the tourism system under design in the design team?	14. **Emancipation** What ought to be/are the opportunities for the interests of those (potentially) positively or negatively affected to have expression and freedom to speak out?	15. **Worldview** What space ought to be/is available for reconciling differing worldviews among design team members?
Characteristic 3 The design process model proposes alternatives for activities for collecting tacit and explicit knowledge on the problem and solution with relevant stakeholders.	**Sources of tacit and explicit knowledge**	7. **Expert** Which stakeholders ought to be/are providing relevant tacit and explicit knowledge?	8. **Expertise** What ought to be/are relevant tacit and explicit knowledge gathered?	9. **Guarantor** What ought to be/are regarded as assurances of successful integration of this knowledge?
	Sources of legitimacy	10. **Witness** Who ought to be/is representing the interests of those (potentially) positively or negatively affected by the tourism system but not involved with the design process?	11. **Emancipation** What ought to be/are the opportunities for the interests of those (potentially) negatively affected to have expression and freedom from the worldview of the tourism system?	12. **Worldview** What space ought to be/is available for reconciling differing worldviews among those involved and affected regarding the tourism system under design?
Characteristic 4 The procedural knowledge and design competence required to manage and validate the design process are defined.	**Sources of procedural knowledge**	16. **Expert** Who ought to be/is providing procedural knowledge for managing and validating the design process?	17. **Expertise** What ought to be/are relevant new procedural knowledge and skills for managing and validating the design process?	18. **Guarantor** What ought to be/are regarded as assurances of successful management and validation of the design process? (structural validation)

distinction was made between the sources of 'tacit' and 'explicit' knowledge of participants (characteristic 3) and the sources of 'procedural' knowledge of involved design researchers (characteristic 4). Similarly, a distinction in the sources of legitimacy within the design team (characteristic 2) and within the activities of the design process (characteristic 3) was made. Compared to the original set of 12 boundary questions of critical systems heuristics (Ulrich & Reynolds, 2010), this resulted in twice adding three additional evaluands (Q13, Q14, Q15 & Q16, Q17, Q18) leading to a rich frame of evaluands for the design process model (Table 2).

The development of the frame of evaluands and evaluation episodes according to the framework for evaluation in design science research, as explained above, indicates how transparency and awareness of the three reflexivity mechanisms can be integrated in co-crafting the process model to design tourism experience systems. The evaluands stimulate reflexivity with respect to stakeholder definition by creating transparency about the sources of motivation, knowledge, control and legitimacy for stakeholder participation as beneficiaries (Q.1), decision makers (Q.4), experts (Q.7/Q.16), witnesses (Q.10/Q.13) or guarantor (Q.9/Q.18) (see Table 2). Reflexivity related to stakeholder definition is further supported by identifying sources of legitimacy both within the design team (Q.13, Q.14 and Q.15) and in the design activities (Q.10, Q.11 and Q.12). The evaluands related to sources of control within the design team (Q.4, Q.5 and Q.6) and sources of procedural knowledge (Q.16, Q.17 and Q.18) force both designers and other key stakeholders (e.g. municipality and DMMO) to be transparent about and reflect on their resources, the decision environment and control of the methods adopted in the process.

This frame of evaluands was used in the fourth step of the framework for evaluation in design science research, when the 'individual evaluation episodes are designed', in which each of the episodes focusses on collecting information on some but not necessarily all evaluands. In this final step, the contextual constraints of evaluating were identified and

prioritised to develop a plan in which the number of evaluation episodes and their timing are considered, and for each episode the goal, the evaluators and related evaluands were determined. Given these constraints and the stakeholders involved, each evaluation episode adopted its own method. For this study, four different evaluation episodes (three formative, one summative, see Table 3) were designed to collect information on specific evaluands at specific stages of developing the process model (see Fig. 3).

For episode 1, the initiators of the living lab (municipal tourism policy officer, DMMO specialist, living lab manager) and an experienced design professional were interviewed to 'establish the purpose of the process model' based on a semi-structured interview guide developed using the 15 evaluands of characteristics 1, 2 and 3 in Table 2.

For episode 2, the 'setup of the co-crafting workshop' and the set of

Table 3
Evaluation episodes to co-craft the design process model.

| Timing	Episode goal	Evaluated characteristics	Evaluators	Method
Ex-ante	1. Design process purpose (formative)	c1, c2 & c3	Key stakeholders of the living lab and design professional (n = 4)	Interviews
Ex-ante	2. Workshop setup (summative)	c1, c2, c3 & c4	Researcher, living lab manager, facilitator, observer (n = 4)	Interviews
Interim	3. Process model reflection (formative)	c1, c2 & c3	Co-crafting workshop participants (n = 18)	Workshop
Ex-post	4. Debriefing (formative)	c1, c2, c3 & c4	Researcher, living lab manager, facilitator, observer (n = 4)	Focus Group
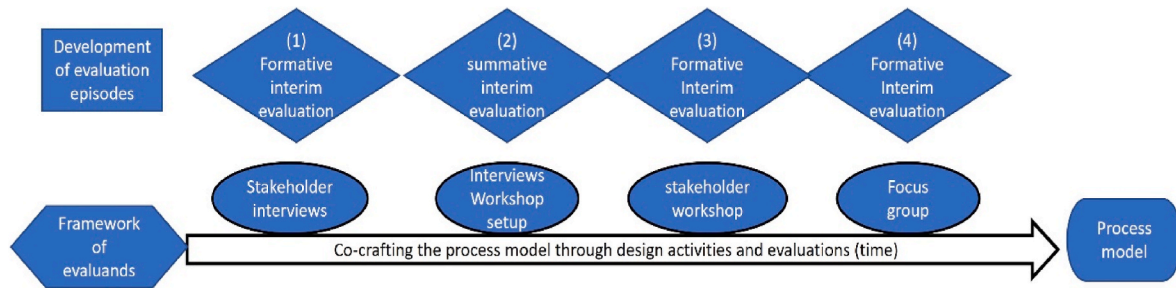
Fig. 3. Evaluation episodes on a time continuum (adapted from Venable et al., 2016).

potential activities that could be included in the design process model were subject of a summative evaluation focussing on the evaluands of all four characteristics, in three independent interviews with the living lab manager, the living lab facilitator, and an independent design expert (observer), ten to seven days before the co-crafting workshop. A summative evaluation was chosen as the setup of the workshop required verification of the responsibility taken by the researcher for the three reflexivity mechanisms. Moreover, as the workshop would only be held once, and the process model developed would be used for the future activities of the living lab, it was important to evaluate and adjust its setup beforehand. These adjustments were verified in a workshop briefing with the same people one day before execution. In addition, a separate semi-structured interview guide was developed based on evaluands in Table 2. Closed questions verified the presence of the design process characteristics, while open questions stimulated a reflection on the co-crafting workshop itself and the design process model under development, based on the 18 evaluands.

Evaluation episode 3 was integrated in a co-crafting workshop with 18 participants representing the culture, heritage, tourism, events and hospitality sectors, residents, the destination management organisation, a design professional, cultural heritage and tourism academics, and civil servants representing the departments of urban planning, tourism, culture & city branding. The independent design expert observed the workshop to make notes on its execution vs its setup. The purpose of this co-crafting workshop was to collaboratively develop (a prototype of) a process model based on the outcomes of evaluation episodes 1 and 2. The researcher asked the 17 other participants to 'reflect' on their co-developed process model prototype after different activities of the co-crafting workshop, using the evaluands of characteristics 1, 2 and 3.

For episode 4, the closed and open questions used in episode 1 and 2 served as the starting point for a 'debriefing' focus group on the co-crafted process model and the co-crafting workshop itself, using the evaluands of all four characteristics. A formative evaluation was adopted as the purpose of this evaluation was to verify the level to which the developed process model adhered to the evaluands. This focus group

was held with the living lab manager, the living lab facilitator, and the independent design expert (observer), two days after the co-crafting workshop.

Due to Covid-19 regulations, all evaluation episodes and the workshop itself were executed and recorded through Microsoft Teams (see Fig. 4). Some activities were supported by an interactive Miro board, where participants provided written input alongside the conversational input during the activities. These online tools allowed recording all interaction, including written, verbal and non-verbal communication between participants, as raw data for analysis in the form of video, audio, Miro boards, observation notes and Microsoft Teams chat conversations.

Given the diverse nature of this raw data and the diversity of methods and settings in which the evaluation episodes took place, an adapted version of the six steps of reflexive journaling (Halcomb & Davidson, 2006) was used to convert the raw qualitative data into journal notes per episode. Halcomb and Davidson (2006) recommend reflexive journaling over verbatim transcription for interpretative qualitative research, to generate meanings from the data. Reflexive journaling is an iterative process of collecting, managing, and analysing data. The dataset consists of researcher fieldnotes on the impressions of the interactions in the four evaluation episodes. Reflexive journalling is iterative in the sense that notetaking starts during the interaction but is continued as soon as possible after to expand on the impressions already noted down with more details, thoughts and perceptions. These fieldnotes are then completed and validated by rewatching/relistening the recorded interactions until each journal note provides a complete and thorough description of the specific interaction. The notes include reflections on the form of the interaction and possible unexpected topics discussed.

The journal notes were analysed using a codebook approach to thematic analysis (Braun & Clark, 2021), with codes based on the three reflexivity mechanisms and the four characteristics of process models to design tourism experience systems. Following convention, the analysed data in reflexive journalling was presented in narrative form, supported
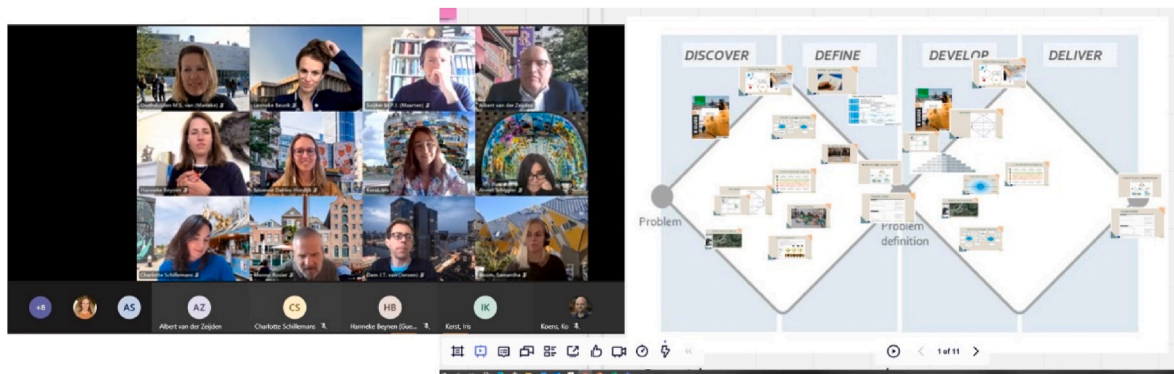

Fig. 4. Screen shot compilation from a co-crafting workshop.

by quotes from the field notes. This analysis was then verified by a co-author of this study, who reviewed the analysis using the raw data, field notes and journal notes. The combination of reflexive journaling and recordings allowed the researchers to revisit the recordings in case of ambiguity of meaning or interpretation, increasing both transparency and efficiency of the research process. By going through the six steps of reflexive journaling, the researchers could thus build evidence of deliberate circumspection and consciousness of the multi-logical context and relationships between a diverse group of stakeholders that are part of the same system (Wilson & Hollinshead, 2015).

5. Results

The four evaluation episodes were created to support the development of a process model to design tourism experience systems. The narrative below provides insights from the reflexive journals, highlighting how the evaluands created awareness of the three reflexivity mechanisms (problem, stakeholder, method definition) in relation to the four characteristics of the process model. The narrative is presented in four sections, one for each of the process model characteristics, to illustrate the choices made for the process model co-crafted in the living lab experiment, and how the ultimate process model supports the co-evolution of problem and solution to design a tourism experience system that contributes to quality of life in the city. The fifth section presents the co-crafted process model itself.

5.1. Characteristic 1: purpose, starting point and subsequent activities

"Don't go talking to residents, so many people so many opinions" (policy officer during stakeholder interview).

The first activities should clarify the objectives of the design effort (problem definition) by determining its purpose and measures of improvement for different beneficiaries (Q.1, Q.2, Q.3) (stakeholder definition). Moreover, these activities should stimulate participants to share more than just their (professional) view on destination development, they should also stimulate connecting participants on a personal level to empathise with each other, create trust and commitment, and stimulate them to stop thinking in terms of us and them (method definition). Therefore, it was decided that the first activities incorporated in the process model should aim to invite stakeholders to specific neighbourhoods of Rotterdam, to observe and discuss local best practices, and to identify obstacles and opportunities for the tourism experience system.

"Clarifying the decision environment (e.g., permit system, investment funds) of different (types of) stakeholders and aligning these with the measures of improvement, supports the identification of solution avenues through private, public and public/private initiatives" (researcher journal note on stakeholder interview with design professional).

However, only focussing on purpose and measures of improvement (Q.1, Q.3) poses the threat of creating a design beyond the scope of stakeholders in control of resources (problem definition without stakeholder definition). To avoid the risk of creating a design without the informed consent of decision makers, leading to a beautiful design without an owner or sponsor, the design process also needs to include activities that lead to the identification of decision makers (Q.4) and the boundaries of their decision environment (Q.5, Q.6) (stakeholder definition). Ideally, this is done concurrently or iteratively with the clarification of objectives mentioned above, so that it is clear within which parameters solutions can be developed. For Rotterdam, this led to re-evaluating which policy officers to involve, ultimately inviting a wider group of policy officers and neighbourhood culture managers to these first activities.

5.2. Characteristic 2: design team composition and capabilities

"We are developing a trade-off framework to start a constructive conversation with initiators of all kinds of plans to talk about their contribution to the Rotterdam society" (tourism policy officer in stakeholder interview).

The activities mentioned above iteratively lead to the participative identification of objectives. In Rotterdam, they should support the identification of neighbourhood stakeholders that should be the beneficiaries (stakeholder definition) of the tourism experience system, while simultaneously narrowing down the resources and decision-making stakeholders at neighbourhood and municipal level. However, this also means that solutions that work for one neighbourhood can have the opposite effect elsewhere (problem definition). Therefore, the identified decision-makers (Q.4/Q.6) need a way to prioritise the importance of stakes and stakeholders for the city and the neighbourhood. These priorities are needed (problem definition) to inform those focussing on generating solutions and to evaluate these solutions while developing them. Therefore, the design process also needs to incorporate activities and/or tools to facilitate this prioritisation and decision making, so that at the start of the idea generation stage it is clear what the ideas will be evaluated on, and how this evaluation will take place (problem definition and method definition).

"Establishing a decision-making team and neighbourhood teams allows for a combination of a top-down and bottom-up approach where the neighbourhood teams can come up with ideas and suggestions within the requirements and resources established by the decision-making team. If the success criteria are established together then this could work. The design team would be responsible for creating the tools and methods for both groups" (researcher journal note on debriefing).

For the Rotterdam living lab (i.e., the design team), this resulted in forming three types of teams. The neighbourhood teams focused on defining how the tourism experience system can contribute to quality of life in the neighbourhood. The decision-making team was responsible for establishing priorities and allocation of resources to solutions generated by neighbourhood teams. The design expertise team was responsible for developing the activities and tools for both other teams to do their jobs.

5.3. Characteristic 3: alternatives for activities for collecting tacit and explicit knowledge

"If the vision is that the city should be a lively and attractive place to live, which also attracts tourists, this vision needs to be translated down into the real world. [...] [Then] it is also about hospitality businesses, such as pubs which some residents like in their neighbourhood, but some rather not have. So, it is a political decision to pursue this or not." (destination marketing specialist in stakeholder interview).

In Rotterdam, municipal policy officers have access to explicit and quantitative knowledge and data on the tourism system (visitor numbers, expenditure) at destination level but lack more qualitative information, for example on the impact of tourism on quality of life in the city and specific neighbourhoods. Simultaneously, stakeholders active in neighbourhoods can provide tacit knowledge on the state of cultural tourism for their neighbourhood or business, but they cannot quantify that information or compare it to other parts of the city (stakeholder definition). Therefore, the process model needs to specify activities leading to exchange and capture knowledge in shared documents, visuals or artefacts (method definition), before specific measures of improvement (Q.3) can be determined for different neighbourhoods (problem definition).

A key insight from evaluation episode 3 (workshop) was to also look for tacit knowledge on local culture and local cultural tourism beyond the regular network (stakeholder definition). For instance, ethnic entrepreneurs and retailers were mentioned as a valuable sources of tacit knowledge on their neighbourhood and local ethnic cultures that formal

visitor-oriented cultural institutions (e.g. museums, theatres) and the destination management organisation are unaware of.

"… it is important to point out here that small ethnic retailers often play an important role in maintaining immaterial heritage" (cultural heritage academic during workshop reflection).

Such entrepreneurs are often also involved in keeping immaterial heritage alive through organising community gatherings and public events. Similarly, neighbourhood artists and cultural entrepreneurs (e. g., dance schools) who are resident-oriented were mentioned as experts on their neighbourhood that could help identify activities, pop-up events, restaurants and places that could be interesting for tourists. The process would benefit from activities that collect this knowledge and make it available for others in the early stages of exploring solutions. Simultaneously, these activities should provide opportunities for these stakeholders to express their view on tourism development in their neighbourhood (stakeholder and method definition). Collecting this knowledge could lead to refinement of beneficiaries, purpose and measures of improvement (problem definition). Therefore, the design team included a person in a witness role that actively pursued reconciliation of differing worldviews (Q.13, Q.14 and Q.15).

5.4. Characteristic 4: procedural knowledge and competence needed to manage and validate design process

"Some participants expressed their discomfort with the workshop (after the workshop) due to lack of procedural knowledge. They are happy to bring in their professional and personal tacit and explicit knowledge and contacts but do not feel qualified to determine when and where these are needed." (journal note on debriefing).

Although many participants in evaluation episodes 1 and 3 identified specific stakeholders of the neighbourhood tourism experience system, and the tacit knowledge these stakeholders could bring to the table (stakeholder definition), the participants were unable to determine when this knowledge would be needed in the design process, or which activities could be useful to collect this knowledge (method definition). They specifically wanted and needed designers or researchers to determine this, using their procedural knowledge.

"If stakeholder/participant selection per activity will be based on (our perception) of how and when their knowledge is relevant. This puts us [living lab manager, facilitator and researcher] in a role of guarantor and witness in establishing the process model to make sure all relevant worldviews are represented and heard directly or indirectly" (researcher's journal note on debriefing).

In previous projects, the municipality and destination management organisation outsourced this task to external design specialists. Both organisations felt they do not need this competence in their organisation. However, this decision leads to situations where designers with limited (tacit) knowledge on the local tourism experience system and limited knowledge on relevant local stakeholders are asked to guide the design process. Moreover, these design specialists are eager to please the stakeholder that pays them, while making the process efficient for themselves (problem definition). Consequently, this makes the process vulnerable. For the Rotterdam living lab, the design expertise team therefore included both design experts (method definition) but also experts on the local tourism experience system (problem definition) and neighbourhood stakeholders (stakeholder definition). Through this role, the latter experts also served as witnesses (Q.13) and guarantors (Q.9), making sure the activities and participant selection was fit for purpose (method and stakeholder definition).

5.5. The co-crafted process model

A specific process model was crafted for use in the living lab, what was only possible 1) by clarifying its characteristics as described in the previous four paragraphs and 2) by systematically embedding reflexivity in the process model through the evaluation episodes. The most important activities, team tasks and stakeholders are summarised for the four phases of the double diamond process model (see Table 4). First, the 'discover phase' focuses on scoping the goals of the design effort by the decision-making team concurrently with identifying the needs and opportunities in each neighbourhood, while establishing trust and commitment between all involved. Second, the 'define phase' uses the information from the discover phase to collaboratively prioritise which stakeholders should benefit from cultural tourism development and what these benefits should be (e.g. job creation, increased sense of belonging). Moreover, the decision environment is clarified in this phase so that the develop phase starts with a clear design brief on the resources available and requirements for idea development. Third, the 'development phase' further needs to stimulate an iterative interplay between neighbourhood teams and the decision-making team in creating ideas and receiving feedback and input for improving them. Finally, the 'delivery phase' develops implementation plans for the set of approved ideas in roadmaps that show the time, order and interdependencies in realising these ideas in each neighbourhood.

6. Discussion and conclusions

This study presents a living lab experiment in developing a process model for participative design of a tourism experience system. Its aim was to collaboratively and consciously develop this process model, before actually starting the design effort. As Smit et al. (2021) point out, deliberately reflecting on the aim, starting point and envisioned solution types on forehand should inform the choice of a particular process model. This study shows the importance of reflexivity in determining problem, method and stakeholders in such processes also during and after choosing a process model. Adopting the framework for evaluation in design science (Venable, 2016) and applying critical system heuristics in different evaluation episodes has demonstrated how to systematically embed reflexivity in a process model for participatory design of tourism experience systems, in practice. By doing so, this study contributes to societal challenges by aligning theory and practice in reflexive co-design of tourism experience systems.

6.1. Theoretical contributions

The objective of adopting the framework for evaluation in design science was to systematically incorporate evaluation in the development of an artefact. In this study, we experimented with and evaluated how to incorporate reflexivity in the development of a process model to design a tourism experience system (our artefact). Unlike other evaluation efforts, this study stimulated iteration during the development of the process model using four evaluation episodes, rather than evaluating it only after its development or adoption to only then find out that the operation was successful, but the patient died. Critical systems heuristics provided the evaluands through which the four characteristics of design process models (Smit et al., 2021) could be evaluated to create awareness and stimulate the application of design reflexivity through the three identified reflexivity mechanisms (problem definition, method definition, stakeholder definition), while crafting a process model to design tourism experience systems.

Firstly, problem definition was addressed by framing the tourism experience system as part of its wider socio-technical system (i.e. a city or neighbourhood) to consider the perspective of stakeholders. Proactively and collaboratively defining the combination of beneficiaries, purpose, and measures of improvement using critical system heuristics from a neighbourhood and city perspective next to an industry perspective changes the focus of the design process, from serving tourists and the tourism industry towards how tourism can contribute to quality of life in the destination. Not setting this problem definition in stone in advance, but refining and detailing this problem definition with stakeholders in different activities as part of the early stages of the design process, supports the co-evolution of problem and solution (Dorst &

Table 4
Summary of the co-crafted process model.

Team stakeholders and tasks per team per Double Diamond process phase	Problem space		Solution space	
	Discover	Define	Develop	Deliver
Neighbourhood team - Residents - Culture, Tourism & hospitality entrepreneurs - Municipal culture manager - Municipal policy officer tourism - Council member - DMMO representative	Provide tacit and explicit knowledge on neighbourhood qualities & resources Identify stakeholders, stakes and interdependencies	Define beneficiaries and measures of improvement	Idea generation & selection based on priorities and beneficiaries with neighbourhood resources	Develop roadmaps with other teams
Design team - Design experts - Local tourism expert - Neighbourhood representative	Select methods that allow for collecting tacit knowledge, stakeholder identification and team building	Select methods for setting priorities for beneficiaries in relation to measures of improvement	Develop design brief and select ideation methods for neighbourhood teams Select method for assessing ideas & giving feedback for decision making team	Select integrative methods for roadmap development
Decision making team - head of tourism, hosp. & retail - head of branding & culture - urban planning officer CEO of DMMO COO of events foundations	Present tourism vision & strategy for the city based on available explicit knowledge	Define beneficiaries and measures of improvement Define decision environment (funding, legal aspects) for neighbourhoods	Assess ideas against decision environment	Develop roadmaps with other teams Validate roadmaps with decision environment and design goals

Cross, 2001).

Secondly, reflexivity in method definition was addressed by identifying activities and methods that allow 1) collecting relevant explicit and tacit knowledge on the problem and solution, and 2) sharing and documenting this knowledge and the resulting differences in stakeholder worldviews. Applying critical system heuristics in the evaluation demonstrated the importance of activities and methods that allow for transparent decision-making through weighing these worldviews and stakes in the light of the purpose and measures of improvement, as defined during the problem definition. In doing so, the design process forces decision-makers to be transparent about their decision environment, and the design team forces decision-makers to bear witness of the impact of these decisions on different stakeholders as intended in critical systems heuristics (Ulrich & Reynolds, 2010). Simultaneously, such methods also provide the argumentation for these decisions, contributing to selecting the best solution alternative. Obviously, developing or selecting and contextualising these activities and methods to the local situation requires procedural design knowledge and tacit knowledge on the local tourism experience system.

Thirdly, reflexivity in stakeholder definition in crafting the process model that shapes the actual design process. Reflexivity with respect to stakeholder definition is required both in problem definition and method definition. Therefore, the design team composition and its capabilities should guarantee that (the stakes of) relevant stakeholders are represented in different activities of the process to avoid reinforcing unsustainable local social structures (Vink & Koskela-Huotari, 2021). Simultaneously, the design team must be aware of the efficacy of the process in choices to promote stakeholder plurality and heterogeneity. In the living lab experiment this led to forming a decision-making team, neighbourhood teams and a design expertise team, each with their own tasks and roles, with the design expertise team responsible for linking these activities, exchanging information and setting up integrative activities. Potentially, this results in a user friendly, effective and efficient process model but at the expense of requiring a design expertise team with the knowledge, capabilities and responsibility to practice reflexivity and being transparent about the consequences of their choices.

6.2. Managerial and societal contributions

This study shows that reflexivity needs to be practiced to become part of the procedural knowledge of those leading the process of designing tourism experience systems. For DMMOs and local governments, this means that developing procedural knowledge in-house is important to serve both the tourism industry and society at the same time. Even if they outsource facilitating the design process to designers, they need reflexivity to understand the impact this has in problem, method and stakeholder definition, making the formulation of the assignment, budget and decision environment a conscious choice to reinforce or disrupt potentially unsustainable local networks. The process model presented in the results section, that was co-crafted in the Rotterdam living lab based on the Double Diamond process model introduced in the literature review, can serve as template for other use cases. However, to avoid the same mistakes seen in other studies, users should reflect on forehand whether it serves their purpose, but also how it can be and should be adapted to the local context during the process. Doing so, potentially increases its relevance and efficacy in achieving societal goals through tourism.

6.3. Conclusions

This study contributes to tourism literature in three ways. First, it is the first in tourism literature to adopt the framework for evaluation in design science research. Second, it identifies three interlinked reflexivity mechanisms that play a pivotal role in developing process models for soft systems such as tourism experience systems. Third, by applying critical systems heuristics, it demonstrates how to systematically incorporate these reflexivity mechanisms in developing a process model, by asking the right people the right questions at the right time. Ultimately, this study contributes to the maturity and flexibility of process models for designing tourism experience systems, and confirms that there is not one universal process model to design tourism experience systems and that reflecting on the process model before, during and after its development is crucial for creating successful designs (see Smit et al., 2021).

6.4. Limitations and further research

Although applying reflexive journaling in this study has supported collecting tacit and procedural knowledge, the process model developed in the Rotterdam living lab itself does not necessarily provide many insights for other destinations. Repeating this study elsewhere might allow integration and generalisation of results, furthering the maturity

and flexibility of process models to design tourism experience systems. Moreover, further research is needed to establish whether the way in which reflexivity was incorporated in the Rotterdam living lab experiment has resulted in a better quality of life in the city.

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CRediT authorship contribution statement

Bert Smit: Writing - review & editing, Writing - original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Frans Melissen:** Writing - review & editing, Writing - original draft, Validation, Supervision, Methodology. **Xavier Font:** Writing - review & editing, Writing - original draft, Supervision.

Data availability

Data will be made available on request.

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