

FINAL VERSION OF CHASE

CHASE - Checklist for evaluation of User Experience in IoT Environments

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This checklist aims to assist evaluators, researchers, and practitioners who want to observe user behavior in a user experience (UX) assessment in the Internet of Things (IoT) domain. CHASE unifies aspects of IoT, such as context awareness and programmability, and UX, such as user satisfaction, emotional aspects, feelings of control, and dominance in their verification items.

CHASE Organization

The checklist organizes its 26 items into two categories and three subcategories.

Explanation of CHASE categories		
Here, we describe the explanation of the checklist categories. Each category groups a set of verification items to assist the evaluator in user observation.		
Categories	<i>Human-Thing Interaction</i>	The interaction that occurs between smart objects and the user. (For example, user turns on ambient light through an application).
	<i>Thing-Thing Interaction</i>	The interaction relates to the intercommunication between smart objects in order to exchange information and provide services to users. (For example, when you open the door, mood lighting is enabled).
Subcategories	General aspects of UX	Subcategory linked to user satisfaction, identification of user control over the IoT environment and identification of its usefulness. <u>Only present in the Human-Thing category.</u>
	Context awareness	A system is context awareness if it uses context to provide relevant information and / or services to the user, relevance depends on the user's task.
	Programmability	"Things" can take on a variety of behaviors. At the simplest level, a programmable device is one that can assume a variety of behaviors on a user command without requiring physical changes.

Use recommendations of CHASE

The following are recommendations related to the organization of the assessment:

- To apply this checklist, at least two reviewers must conduct the UX assessment. One responsible for conducting the evaluation with the user and another focused on observing and completing the checklist.
- We strongly recommend using the Thinking Aloud protocol to assist in observing and understanding user behavior while interacting with the IoT environment. Without the use of the protocol, the effort of the evaluator who will observe the user can be greater.
- Perform one or two pilot evaluations to familiarize yourself with the verification items.
- The check items may recur on more than one task during the evaluation.
- Try to simulate key contextual situations of the IoT solution being evaluated so you can verify the context sensitivity and programmability subcategories. In addition, you will ensure the proper functioning of the evaluated IoT environment.
- Interpret the checklist through the most violated checkpoints. Remember to relate items to tasks performed and impacts on UX while interacting with the IoT environment.

The following recommendations focus on handling the checklist.

- Ensure that all subcategories presented in the Human-Thing and Thing-Thing categories are present in the scope of your evaluation and present in the IoT system to be evaluated.
- Check the “not applicable” items (N / A) prior to the assessment with the user to help the evaluator focus on the verification items within the scope of the assessment.
- For each check item the evaluator should indicate whether the description has occurred or partially occurred or has not occurred. Be aware that in some items this state can only be attributed at the end of the evaluation.
- Each item must be given a severity level determined by the evaluator, which helps interpret which items have negatively impact on the UX. The severity scale followed in CHASE is:
 1. No negative impact on UX or not a problem
 2. Low impact on UX
 3. Big impact on UX
 4. Deep impact on UX
- The observation field is reserved if the observer wishes to take notes during the evaluation.
- CHASE accompanies a set of examples related to check items to assist researchers in understanding check items.

Recommendations for CHASE printing

- We recommend that the instrument print in color as the colors were designed to aid observation.
- We recommend that the checklist be printed on one double-sided sheet to avoid disturbing the evaluator with a large number of sheets during the evaluation. However, it is important to point out that the evaluator should arrange the sheets in the way that is most comfortable for user observation.

Description of available formats

Full Version - This is the version that CHASE was originally intended for, containing all the fields of use to be completed. Check items are separated into modules.

Full Version with Examples - This is the version of CHASE that check items have examples for, especially for reviewers who have little experience observing user behavior, assisting during the assessment.

Compact Version - Privileges viewing of all scan items quickly and succinctly. Some notes and remarks that the appraiser wants to make can be made at the edges or on separate paper.

CHASE - Checklist for User Experience Evaluation of Internet of Things Environments (Full Version)

Evaluator:

User ID:

1.Human-Thing Interaction General aspects of UX	Did this situation occur during the evaluation?	In which tasks?	Severity	Observations
1.1 The user demonstrates <i>signs of contentment</i> with the IoT system.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.2 The user shows <i>signs of discontent</i> or annoyance with the IoT system.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.3 The user can <i>execute properly, at the right time</i> , the sequence of actions necessary to accomplish the <i>task</i> .	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.4 The <i>user correctly identifies</i> all the <i>"things"</i> that can provide services in the IoT environment.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.5 The user has their <i>needs met</i> by the IoT system.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.6. The user is <i>pleased to correctly identify</i> the actions that the IoT system has performed according to <i>their personal preferences</i> .	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.7 The user seems to be satisfied with the <i>appearance of the IoT system</i> (the visual aspect of "things" and the interface, if any, pleases the user)	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.8 The user is <i>encouraged to explore</i> the actions and services that the IoT system can perform.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.9 The IoT system gives the user a <i>sense of control</i> over the <i>actions</i> taken.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.10 The user demonstrates <i>signs of positive emotions</i> during interaction with the IoT system.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.11 The user shows <i>signs of negative emotions</i> during interaction with the IoT system.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.12 The action of the IoT system <i>meets the user's expectation</i> while performing the task in the assessment.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	

2.Human-Thing Interaction Context awareness	Did this situation occur during the evaluation?	In which tasks?	Severity	Observations
2.1 The context simulations provided in the evaluation worked correctly.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
2.2 Context changes occur according to user expectations .	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
2.3 The user maintains a sense of control when a context change occurs in the evaluation and the IoT system proactively adapts to it by changing its state.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
2.4 The user is comfortable with proactive adaptations of the IoT system triggered by context changes.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
2.5 Context changes occur fluidly and keep the flow of the task performed by the user.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	

3.Human-Thing Interaction Programmability	Did this situation occur during the evaluation?	In which tasks?	Severity	Observations
3.1 The user correctly identifies the services that can be scheduled .	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
3.2 The user tries to schedule actions according to their personal preferences , but the IoT system does not provide corresponding operating rules .	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
3.3 The user is informed if the rules configured in one service impact the operation of other services in the IoT system.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	

4.Thing-Thing Interaction Context awareness	Did this situation occur during the evaluation?	In which tasks?	Severity	Observations
4.1 The IoT system correctly fits the user's expectations when performing the task.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
4.2 The IoT system increases user satisfaction by adapting correctly .	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
4.3 The IoT system provides services and features according to user needs and the context changes.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
4.4 The IoT system failed to identify the context contributing to the negative perception of the experience.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	

5.Thing-Thing Interaction Programmability	Did this situation occur during the evaluation?	In which tasks?	Severity	Observations
5.1 <i>Conflict between the rules</i> of operation of the IoT system, cause <i>poor services performed</i> and a <i>negative user experience</i> .	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
5.2 The user set <i>operating rules</i> that were <i>NOT executed properly</i> by the "things" of the IoT system.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	

CHASE - Checklist for User Experience Evaluation of Internet of Things Environments (Compact version)

Evaluator:

User ID:

Human-Thing Interaction		Did this situation occur during the evaluation?	In which tasks?	Severity
1. GENERAL ASPECTS OF UX	1.1 The user demonstrates signs of contentment with the IoT system.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
	1.2 The user shows signs of discontent or annoyance with the IoT system.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
	1.3 The user can execute properly, at the right time , the sequence of actions necessary to accomplish the task .	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
	1.4 The user correctly identifies all the "things" that can provide services in the IoT environment.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
	1.5 The user has their needs met by the IoT system.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
	1.6. The user is pleased to correctly identify the actions that the IoT system has performed according to their personal preferences .	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
	1.7 The user seems to be satisfied with the appearance of the IoT system (the visual aspect of "things" and the interface, if any, pleases the user)	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
	1.8 The user is encouraged to explore the actions and services that the IoT system can perform.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
	1.9 The IoT system gives the user a sense of control over the actions taken.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
	1.10 The user demonstrates signs of positive emotions during interaction with the IoT system.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
	1.11 The user shows signs of negative emotions during interaction with the IoT system.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
	1.12 The action of the IoT system meets the user's expectation while performing the task in the assessment.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
2. CONTEXT AWARENESS	2.1 The context simulations provided in the evaluation worked correctly.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
	2.2 Context changes occur according to user expectations .	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4

	2.3 The user maintains a sense of control when a context change occurs in the evaluation and the IoT system proactively adapts to it by changing its state.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
	2.4 The user is comfortable with proactive adaptations of the IoT system triggered by context changes.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
	2.5 Context changes occur fluidly and keep the flow of the task performed by the user.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
3. PROGRAMMABILITY	3.1 The user correctly identifies the services that can be scheduled .	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
	3.2 The user tries to schedule actions according to their personal preferences , but the IoT system does not provide corresponding operating rules .	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
	3.3 The user is informed if the rules configured in one service impact the operation of other services in the IoT system.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4

Thing-Thing Interaction		Did this situation occur during the evaluation?	In which tasks?	Severity
4. CONTEXT AWARENESS	4.1 The IoT system correctly fits the user's expectations when performing the task.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
	4.2 The IoT system increases user satisfaction by adapting correctly .	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
	4.3 The IoT system provides services and features according to user needs and the context changes.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
	4.4 The IoT system failed to identify the context contributing to the negative perception of the experience.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
5. PROGRAMMABILITY	5.1 Conflict between the rules of operation of the IoT system, cause poor services performed and a negative user experience .	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
	5.2 The user set operating rules that were NOT executed properly by the "things" of the IoT system.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4

CHASE - Checklist for User Experience Evaluation of Internet of Things Environments (Full Version with examples)

Evaluator:

User ID:

1.Human-Thing Interaction Aspectos gerais da UX	Did this situation occur during the evaluation?	In which tasks?	Severity	Observations
1.1 The user demonstrates signs of contentment with the IoT system. Ex: Expressions of satisfaction and well-being, such as smiles and positive comments.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.2 The user shows signs of discontent or annoyance with the IoT system. Ex: Expressions of dissatisfaction such as frowning, sagging lips, long pauses and negative comments	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.3 The user can execute properly, at the right time , the sequence of actions necessary to accomplish the task . Ex: Use a service or grant permission to application sensors before performing an action.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.4 The user correctly identifies all the "things" that can provide services in the IoT environment. Ex: Lamps, air conditioners and door locks.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.5 The user has their needs met by the IoT system. Ex: If the IoT system really assists in the tasks the user needs your assistance. Not performing actions and services that add nothing to the user.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.6. The user is pleased to correctly identify the actions that the IoT system has performed according to their personal preferences . Ex: Temperature and ambient brightness adjustment.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.7 The user seems to be satisfied with the appearance of the IoT system (the visual aspect of "things" and the interface, if any, pleases the user) Ex: Comments and compliments about the colors, shapes and texture of things and the interface.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.8 The user is encouraged to explore the actions and services that the IoT system can perform. Ex: The user is comfortable exploring the functionality and services offered by the IoT environment.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.9 The IoT system gives the user a sense of control over the actions taken. Ex: Service automation occurs in ways that do not hurt the freedom of the user.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.10 The user demonstrates signs of positive emotions during interaction with the IoT system. Ex: Joy and enthusiasm	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	

1.Human-Thing Interaction General aspects of UX	Did this situation occur during the evaluation?	In which tasks?	Severity	Observations
1.11 The user shows signs of negative emotions during interaction with the IoT system. Ex: Sadness, insecurity and fear.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
1.12 The action of the IoT system meets the user's expectation while performing the task in the assessment. Ex: Turn on and turn off one thing, a service work as the user expects.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	

2.Human-Thing Interaction Context awareness	Did this situation occur during the evaluation?	In which tasks?	Severity	Observations
2.1 The context simulations provided in the evaluation worked correctly. Ex: The contexts were able to create the situations predicted to evaluate the intended portion of the IoT system in the assessment.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
2.2 Context changes occur according to user expectations . Ex: Whether the IoT system can perceive the change of user goals during use and offer services according to what the user is expecting.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
2.3 The user maintains a sense of control when a context change occurs in the evaluation and the IoT system proactively adapts to it by changing its state. Ex: Whether the IoT system automates services and functionality in such a way that the user feels that things are happening without their permission or at odds with their preferences.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
2.4 The user is comfortable with proactive adaptations of the IoT system triggered by context changes. Ex: The user does not mind the IoT system turning on the house lamps on a cloudy day, where the house is low in natural light.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
2.5 Context changes occur fluidly and keep the flow of the task performed by the user. Ex: The user can navigate the services and functionalities of the IoT environment in a fluid way, not appearing that with each service or task performed, he is interacting with a different system or needs to be very aware of the actions he needs to perform.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	

3.Human-Thing Interaction Programmability	Did this situation occur during the evaluation?	In which tasks?	Severity	Observations
3.1 The user correctly identifies the services that can be scheduled . Ex: Turn on one "thing" at a certain time every day	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
3.2 The user tries to schedule actions according to their personal preferences , but the IoT system does not provide corresponding operating rules . Ex: At nightfall, the user would like to schedule a suitable illumination for reading, but the IoT system has no such setting option.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
3.3 The user is informed if the rules configured in one service impact the operation of other services in the IoT system. Ex: User asks the IoT system to turn off the house lights every day at 22:00. However the user has configured the night the lights should stay on until all members of the house come home. At 22:00, what will be the behavior of the IoT system?	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	

4.Thing-Thing Interaction Context awareness	Did this situation occur during the evaluation?	In which tasks?	Severity	Observations
4.1 The IoT system correctly fits the user's expectations when performing the task. Ex: The user asked the lights to turn on within one minute and they work as expected. The IoT system identifies that a minute has passed and turns on the lights.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
4.2 The IoT system increases user satisfaction by adapting correctly . Ex: The system offers a service at the moment the user needs.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
4.3 The IoT system provides services and features according to user needs and the context changes. Ex: The user will prepare a recipe never made before at an important dinner that is planned in the user's schedule. The IoT system using sensors and actuators assists the user in preparing the meal.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
4.4 The IoT system failed to identify the context contributing to the negative perception of the experience. Ex: The user has set to turn off the lights at 22:00. However, at 10 pm the lights remained on.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	

5.Thing-Thing Interaction Programmability	Did this situation occur during the evaluation?	In which tasks?	Severity	Observations
5.1 Conflict between the rules of operation of the IoT system, cause poor services performed and a negative user experience . Ex: Two "things" can influence the ambient light. However, the rules of operation of one "thing" do not allow the correct functioning of another.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
5.2 The user set operating rules that were NOT executed properly by the "things" of the IoT system. Ex: The user has set to turn on the lights at 18:00. However, the lights only turn on at 18:10.	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> PARTIALLY <input type="checkbox"/> N/A		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	

CHASE - Checklist for User Experience Evaluation of Internet of Things Environments

STUDY MATERIAL WITH EXAMPLES FOR ITEMS

	Human-Thing Interaction	Examples
1. GENERAL ASPECTS OF UX	1.1 The user demonstrates signs of contentment with the IoT system.	Expressions of satisfaction and well-being, such as smiles and positive comments.
	1.2 The user shows signs of discontent or annoyance with the IoT system.	Expressions of dissatisfaction such as frowning, sagging lips, long pauses and negative comments
	1.3 The user can execute properly, at the right time , the sequence of actions necessary to accomplish the task .	Use a service or grant permission to application sensors before performing an action.
	1.4 The user correctly identifies all the "things" that can provide services in the IoT environment.	Lamps, air conditioners and door locks.
	1.5 The user has their needs met by the IoT system.	If the IoT system really assists in the tasks that the user needs your assistance. Not performing actions and services that add nothing to the user.
	1.6. The user is pleased to correctly identify the actions that the IoT system has performed according to their personal preferences .	Temperature and ambient brightness adjustment.
	1.7 The user seems to be satisfied with the appearance of the IoT system (the visual aspect of "things" and the interface, if any, pleases the user)	Comments and compliments about the colors, shapes and texture of things and the interface.
	1.8 The user is encouraged to explore the actions and services that the IoT system can perform.	The user is comfortable exploring the functionality and services offered by the IoT environment.
	1.9 The IoT system gives the user a sense of control over the actions taken.	Service automation occurs in ways that do not hurt the freedom of the user.
	1.10 The user demonstrates signs of positive emotions during interaction with the IoT system.	Joy and enthusiasm
	1.11 The user shows signs of negative emotions during interaction with the IoT system.	Sadness, insecurity and fear.
	1.12 The action of the IoT system meets the user's expectation while performing the task in the assessment.	Turn on and turn off one thing, a service work as the user expects.
2. CONTEXT AWARENESS	2.1 The context simulations provided in the evaluation worked correctly.	The contexts were able to create the situations predicted to evaluate the intended portion of the IoT system in the assessment.
	2.2 Context changes occur according to user expectations .	Whether the IoT system can perceive the change of user goals during use and offer services according to what the user is expecting.
	2.3 The user maintains a sense of control when a context change occurs in the evaluation and the IoT system proactively adapts to it by changing its state.	Whether the IoT system automates services and functionality in such a way that the user feels that things are happening without their permission or at odds with their preferences.
	2.4 The user is comfortable with proactive adaptations of the IoT system triggered by context changes.	The user does not mind the IoT system turning on the house lamps on a cloudy day, where the house is low in natural light.
	2.5 Context changes occur fluidly and keep the flow of the task performed by the user.	The user can navigate the services and functionalities of the IoT environment in a fluid way, not appearing that with each service or task performed, he is interacting with a different system or needs to be very aware of the actions he needs to perform.
3. PROGRAMMABILITY	3.1 The user correctly identifies the services that can be scheduled .	Turn on one "thing" at a certain time every day
	3.2 The user tries to schedule actions according to their personal preferences , but the IoT system does not provide corresponding operating rules .	At nightfall, the user would like to schedule a suitable illumination for reading, but the IoT system has no such setting option.
	3.3 The user is informed if the rules configured in one service impact the operation of other services in the IoT system.	User asks the IoT system to turn off the house lights every day at 22:00. However the user has configured the night the lights should stay on until all members of the house come home. At 22:00, what will be the behavior of the IoT system?

Thing-Thing Interaction		Examples
4. CONTEXT AWARENESS	4.1 The IoT system correctly fits the user's expectations when performing the task.	The user asked the lights to turn on within one minute and they work as expected. The IoT system identifies that a minute has passed and turns on the lights.
	4.2 The IoT system increases user satisfaction by adapting correctly .	The system offers a service when the user needs.
	4.3 The IoT system provides services and features according to user needs and the context changes.	The user will prepare a recipe never made before at an important dinner that is planned in the user's schedule. The IoT system using sensors and actuators assists the user in preparing the meal.
	4.4 The IoT system failed to identify the context contributing to the negative perception of the experience.	The user has set to turn off the lights at 22:00. However, at 10 pm the lights remained on.
5. PROGRAMMABILITY	5.1 Conflict between the rules of operation of the IoT system, cause poor services performed and a negative user experience .	Two "things" can influence the ambient light. However, the rules of operation of one "thing" do not allow the correct functioning of another.
	5.2 The user set operating rules that were NOT executed properly by the "things" of the IoT system.	The user has set to turn on the lights at 18:00. However, the lights only turn on at 18:10.