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Game-Based Learning Design for Post-Merger Integration Methods: Requirements and Metamodel

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Abstract. Post-merger integration (PMI) presents unique challenges for professionals responsible for information systems' (IS) integration when aligning and combining diverse system architectures of merging organizations. Although the theoretical and practical guidance exists for PMI on the business level, there is a significant gap in training for IS integration in this context. In prior research, specific methods AMILI (Support method for informed decision identification) and AMILP (Support method for informed decision-making) were introduced for the support of IS integration decisions in PMI. But during the practical application, a high learning curve and low learner motivation were reported. This study examines how game-based learning can transform the training of these methods into a more engaging and motivating experience, tailored to the context of the specific PMI case. Building on instructional design theory, game design theory, cognitive load principles, motivation models, and specifics of the IS integration in the scope of the PMI, the article derives a structured catalogue of requirements for a game-based learning design framework tailored to PMI-specific conditions. Additionally, a metamodel is defined to show how these requirements are systematically transformed into design activities and artefacts, resulting in a consistent learning design process and a corresponding data model aimed at designing a learning experience for IS integration within the scope of a specific PMI. The metamodel's applicability is demonstrated through instantiations of representative requirements.
Keywords: Post-Merger Integration, IS, Game-Based Learning, Instructional Design, Serious Games.

1 Introduction

Mergers and Acquisitions (M&A) are among the most frequently chosen strategies for organizational growth. If executed successfully, they enable the merging parties to create synergies and achieve outcomes that neither organization could accomplish individually [1]. However,

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establishing synergy requires the implementation of a newly created combined organization, integrating the structures, functions, and resources of M&A participants. This new organization should be carefully designed so that different parts can supplement and strengthen each other when combined, but all duplicate and redundant parts are decommissioned. The process of physical reconstruction of merging organizations is called post-merger integration (PMI) and is mentioned as one of the key enablers for M&A initiative outcomes [2].

As information systems (ISs) nowadays play a pivotal role in supporting all processes in an organization, it is essential to completely identify ISs to be combined, as well as select the best type and extent of combination. Integration of ISs should support the decisions made for business architecture, while seeking synergies and removing redundancies [3].

With M&A being widely used for a considerable amount of time, there is a comprehensive body of knowledge and best practices on how the process should be planned and executed. But it should be mentioned that the existing theory is mostly focused on the business perspective of PMI, leaving less attention to the technological level and specifically to the process of merging two or even more IS architectures [4]. In practice, the task of IS integration is often assigned to Information Technology (IT) professionals with no or very limited experience in PMI, with the assumption that the IS integration task in this context is similar to the one usually executed when several ISs are integrated to support flawless execution of the business process, which these systems support at different stages or in different phases [5]. However, the task of integrating ISs in the context of PMI is fundamentally different. First, in the standard system integration process, systems to be integrated are already defined, but in the context of PMI, systems are to be identified [6]. Secondly, in standard system integration, integration always means the process of establishing a way for two or more systems to exchange data between them, but in the context of PMI, such integration is only one of the options, where other options to consider are to leave systems as is without any kind of integration, to replace one system with another with or without replacing system adjustments, and even to replace all systems with a completely new system capable of supporting the newly created organization [7]. With limited competence of the involved responsible professionals, IS integration in the context of PMI is often executed as the replacement of all systems in the acquired organization by systems of the acquiring organization, making decisions on the fly when ISs are identified, while merging or replacing business units. This process is usually unstructured and does not follow a specific methodology [8].

In order to address this issue, the author of this article in the previous research has proposed a support method for IS integration in the scope of the PMI, focusing on two of the three process phases, covering decision identification and decision making, but leaving the execution of the made decision out of scope [9]. Two methods were created to (1) support the identification of groups of ISs to be merged (AMILI – Support method for informed decision identification) and (2) for each of the identified groups, evaluate possible integration options (AMILP – Support method for informed decision-making). Both methods were described from process and data perspectives, and for each of them, a proof of concept for the supporting tool was created to store and process information gathered throughout the process.

To provide a clearer context for the present work, the two previously developed methods [9] are briefly summarized. AMILI uses as input the business architectures and information system architectures of the merging organizations, together with business-level integration decisions already defined in the PMI initiative. Through the analysis of these inputs, AMILI identifies overlapping business units, their associated business functions, and the information systems supporting them. This enables the detection of architectural overlaps across the merging organizations and results in the creation of integration candidate groups – sets of ISs that support overlapping business functions. AMILP then evaluates these groups by analyzing alternative integration options through two complementary assessments. The first is an alignment evaluation, examining how each option aligns with earlier business-level integration decisions. The second is a weighted value evaluation, scoring options based on stakeholder support, contribution to PMI goals, user acceptance, and the balance against costs, implementation time, and associated risks.

As an output, AMILP produces, for each integration group, a prioritized list of recommended integration options accompanied by their evaluation values, which can be used directly by decision makers.

The methods, with the help of supporting tools, were validated with the help of IT professionals without prior experience in IS integration in the scope of PMI, and their results were compared with those of experienced professionals asked to work on the same case study [9]. Results showed that professionals without previous experience, with the help of the method and the tool, can achieve the same results as experienced professionals. But as one of the potential improvements mentioned by participants in the post-experiment survey was the ease of learning the method and tool usage, as provided instructions were difficult to follow and understand, and detailed, long descriptions required time and effort to comprehend. This comment becomes even more important in the context of real PMI, as usually integration activities have a very limited timeframe allowed and are performed under high pressure and stress level on one side, and with insufficient incentive and motivation on the other side [6].

This article considers the hypothesis that the challenge of learning complicated, serious material with a lack of motivation can be compensated by transforming the learning experience into an interactive game-based learning, tailored to the context of the specific PMI case[†]. The author explores existing approaches that could be utilized to transform the created methods training into game-based learning. Based on the research findings regarding the applicability of each existing approach, the author proposes the requirements for a game-based learning design framework for IS integration in the context of PMI. To guide the systematic transformation of these requirements into the framework, a metamodel is proposed and validated through instantiations of selected requirements to illustrate its applicability.

The structure of the article is as follows. In Section 2, the scope and content of the research are defined. In Section 3, existing research on educational frameworks, challenges, and gamified learning is explored. In Section 4, the initial requirements for the game-based learning design framework are stated. In Section 5, a metamodel is formulated to define how these requirements are transformed into the framework by linking them to design activities and artefacts. In Section 6, instantiations of selected requirements are presented to demonstrate the applicability of the metamodel. In Section 7, the main contributions are summarized, and directions for further development and evaluation are outlined.

2 Methodology

This study is guided by the following research question:

RQ. What kind of game-based learning design framework can be developed to support learning designers in specific post-merger integration (PMI) initiatives in creating learning experiences that are both grounded in established learning and motivation theories and adaptable to the unique characteristics of each PMI case?

To address this question, two supporting questions are examined:

RQ1. What requirements must such a framework satisfy to integrate learning theory, motivation theory, instructional design, game design, and PMI-specific domain needs?

RQ2. How can these requirements be formalized into a metamodel that enables learning designers to systematically derive a tailored learning design framework for a specific PMI initiative?

[†] This article extends the study presented in ManComp 2025, 24th International Conference on Perspectives in Business Informatics Research (BIR 2025).
K. Lace and M. Kirikova, "Requirements for game-based learning design framework for information system integration in the context of post-merger integration," in *Joint Proceedings of the BIR 2025 Workshops and Doctoral Consortium co-located with 24th International Conference on Perspectives in Business Informatics Research (BIR 2025)*, CEUR, vol. 4034, pp. 84-95, 2025. Available: https://ceur-ws.org/Vol-4034/paper89.pdf

The overall aim of the research is to develop an approach for defining a game-based learning design framework that will help practitioners design training tailored to a specific PMI case.

Before describing how this approach is developed, it is important to explain how it will be used in practice, as shown on the right side of the methodology diagram (Figure 1), which follows a UML activity diagram structure and includes both control-flow and object-flow representations. In practical application, a learning designer begins with the default requirements catalogue created in this research. The designer selects the requirements that match the situation of the specific merger and optionally adapts them to its characteristics, such as the complexity of the IS landscape, organizational structure, confidentiality constraints, time limits, and expected learner background. The tailored set of requirements is then processed through the metamodel, which generates the learning design framework for that case. This framework is expressed through a process model and a data model. When the designer executes this process, by producing content, defining activities, structuring tasks, and creating supporting artefacts, the outcome is the learning experience for that PMI initiative.

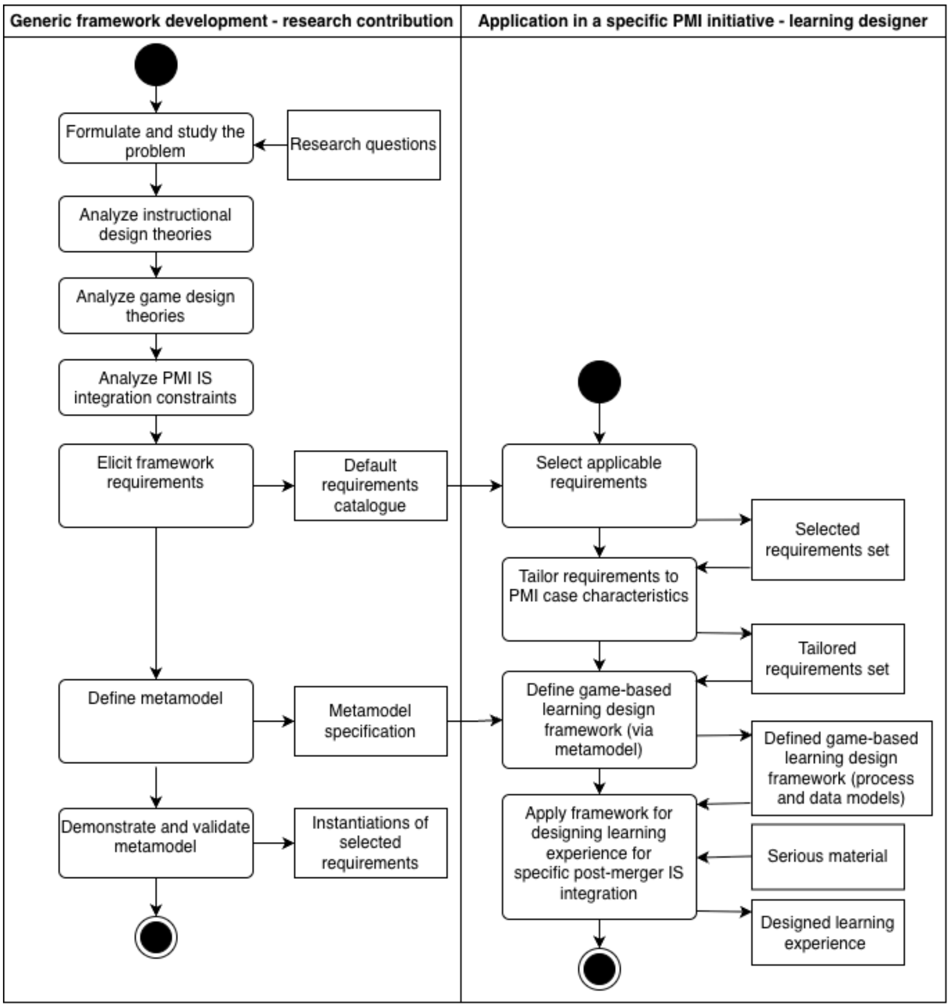

Figure 1. Research methodology (on the left) and practical application of the research results (on the right)

The research contributes the elements that make this practical use possible and follows the design science activity sequence as presented on the left side of Figure 1. The author first formulates and examines the underlying problem, building on earlier work showing that existing AMILI/AMILP training is complicated and not engaging enough for practitioners involved in post-merger IS integration. To understand what the framework must support, the research analyzes learning theories, motivation theories, instructional design theories, game design theories, and constraints specific to post-merger IS integration. Based on these theoretical and domain insights, the study elicits the requirements for the framework. These requirements specify what the learning design process and the resulting learning experience must provide so that training fits different PMI initiatives. The outcome is a default requirements catalogue, which directly addresses RQ1.

The next stage addresses RQ1.2 by defining a metamodel. The metamodel describes how requirements can be systematically converted into learning design activities and artefacts. It provides the logic required to generate the learning design process from a chosen set of requirements. This article demonstrates and validates the metamodel through selected requirement examples. These instantiations demonstrate how the metamodel can support functional, quality, and constraint requirements originating from instructional design, game design, and PMI-specific content, and how it enables the production of consistent process steps and artefacts. This confirms that the metamodel can operationalize the requirements in a structured way, supporting both RQ2 and the overall RQ.

3 Literature Review

The literature review is performed from three complementary perspectives. First, it explores foundational learning theories and best practices to define characteristics of effective learning experiences. Second, the review examines two specific issues reported in the initial training evaluation – learning difficulty and lack of learner motivation – to identify the root causes of them and how they can be addressed. Lastly, serious games are explored as the potential baseline for the development of the game-based learning design framework.

To ground the design of the learning experience in a theory that depicts how people learn, the author selected the following foundational theories:

- Constructivist Learning Theory [10] proposes that learners actively construct their understanding through active engagement and not through passive perception of information.
- Experiential Learning Theory [11] states that learning is most effective when it follows the cyclical process of experience and reflection.
- Situated Learning Theory [12] emphasizes that effective learning happens in real-world contexts where knowledge can be practically applied.
- Transformative Learning Theory [13] highlights the importance of reflection and new insight integration in the existing mental models.

All these theories collectively propose the following characteristics for an effective learning experience:

- Proactive – learning should be driven by active learner involvement, highlighting the need for ownership, decision-making, and exploration activities.
- Applied – learning should be practical and goal-oriented, requiring problem-solving, experimenting, and practicing tasks.
- Contextual – learning should be mapped to real-world scenarios, requiring a clear link for learners between what they learned and where they apply it.
- Reflective – learning should incorporate processing and evaluation of the results, supported by periodic self-assessment checkpoints.
- Progressive – learning should evolve and build upon itself, meaning gradually increasing complexity.

One of the main aspects related to the increased difficulty of learning new material is named the limited human working memory, which is studied under the Cognitive Load Theory [14]. This theory further identifies three different types of cognitive load applied to the working memory while learning and defines how each of these types affects the learning experience and outcomes.

- Intrinsic load – natural load triggered by the complexity of the material itself. Usually, it is impossible to reduce it, since that would require reducing the extent and depth of the topic we want to learn.

- Extraneous load – additional load that is not required, and not useful, which is caused by poor instructional design and learning experience design itself.
- Germane load – useful load required for the practical application, interpretation, and creation of the new knowledge constructs.

Recent research in Cognitive Load Theory introduced the concept of element interactivity, which refers to the degree to which individual elements of learning activity interact and must be processed by the learner simultaneously [15]. In a domain as complex as post-merger IS integration with multiple interdependent procedural, organizational, and technical factors, high element interactivity leads to a significant intrinsic load. Designing learning in such a context requires strategies such as segmentation and pre-training, accompanied by worked examples, to reduce unnecessary cognitive effort in early learning stages [14]. This is especially important in digital learning, which has a higher risk of creating more unnecessary extraneous load through the user interface, narrative, and interaction complexity [16].

While the Cognitive Load Theory offers valuable ideas on how to structure learning to optimize cognitive processes, it does not provide a holistic, systematic process description that could help professionals transform static learning material into a learning experience. In the existing literature, several most-cited process frameworks are available defining how to design learning experiences systematically:

- ADDIE (Analysis-Design-Development-Implementation-Evaluation) Model [17] – a linear framework for the sequential process from needs analysis to post-implementation evaluation.
- SAM (Successive Approximation Model) [18] – an agile and iterative framework proposing rapid prototyping based on stakeholder feedback.
- Ten Steps for Complex Learning Model [19] – framework is focused on whole-task learning for complex skill development.
- Backward Design [20] – goal-focused framework starting with identification of desired learning outcomes and only then designing corresponding instructional components.

These frameworks provide structured processes for transforming content into a learning experience. But they mainly address the cognitive and instructional design dimensions and do not sufficiently cover the emotional and behavioral aspects of learner engagement. To analyze potential improvements from the perspective of learner motivation, this study utilizes BJ Fogg's Behavior Model [21], stating that high motivation can compensate for the great difficulty of the task.

There are several existing theories focusing on the motivational aspect, which could be applied to the motivation in learning environments.

Expectancy-Value Theory [22] states that learners evaluate the value of a task and their chances of success, and compare it to the expected difficulty of the task to decide if they want to contribute their effort. If the task is too complicated for the value gained and accompanied by high chances of no success, the engagement and commitment levels of learners will be lower.

Self-Determination Theory [23] proposes the three required components for the intrinsic motivation of the learner:

- Autonomy – sense of control and ownership over the experience. A lack of interactivity and personalization negatively impacts interest levels.
- Competence – a feeling of being capable of successfully completing the task and achieving the goal. Learning designed with inadequately large progressive new knowledge areas exposed to learners and complex concepts introduced without proper preparation reduces commitment.
- Relatedness – connection to the context of activity and relationship with other people (social context). As the post-merger context itself adds the challenge of social disorientation and lack of confidence in the new organizational context, training could benefit from collaborative activities to increase the motivation for cooperation between different professionals involved in the PMI activity.

Self-Determination Theory defines motivation as a continuum from amotivation, through extrinsic regulation, to intrinsic motivation [23]. Game-based learning supports intrinsic motivation by designing game mechanics that address psychological needs. Research shows that game features like clear goals, immediate feedback, and voluntary engagement increase learners' perception of autonomy and competence, shifting motivation from extrinsic to intrinsic [24]. In addition to this, Flow Theory further explains why games sustain engagement: learners enter a state of deep focus when challenge and skill are balanced, feedback is immediate, and goals are clear. Game-based learning environments are capable of creating these conditions by structuring tasks, pacing, and progression in a way that helps learners remain within the optimal "flow channel," avoiding both overload and boredom [25]. Together, these motivational and affective mechanisms make game-based learning and serious games the promising foundation for designing learning experiences [26], [27], as they integrate cognitive structuring with emotional engagement.

Serious games (games designed with a primary purpose other than pure entertainment) have been increasingly used in education and corporate training [28]. However, the design of such games requires a structured approach that can effectively combine instructional design, cognitive science, and game mechanics. Existing research on serious games has produced several frameworks and models for serious game design. Early approaches [29] integrated pedagogical considerations with game design, typically combining instructional objectives with general game elements such as challenge, feedback, and narrative. These early models were valuable in demonstrating that educational goals and gameplay could be aligned, but they offered only conceptual descriptions rather than a systematic method. Most of them provided lists of pedagogical principles and game features, leaving designers without practical guidance on how to decompose instructional material, create learning pathways, or transform domain-specific processes into game artefacts. As a result, their application depended heavily on the designer's experience and intuition, which limited their usefulness for complex training domains. The SCHEMA process [30] was introduced as a more structured model for the creation and evaluation of serious games, addressing the need for methodical development by defining stages such as conceptualization, design, implementation, and assessment. SCHEMA emphasizes alignment between educational goals, game logic, and sustainability considerations and encourages iterative improvement informed by evaluation results. However, it remains at a high level of abstraction and does not specify the types of artefacts that should be produced at each stage or the detailed decision steps required to operationalize complex instructional content. Its focus on phases and principles means that designers still lack concrete instructions on how to represent domain-specific knowledge, sequence learning tasks, or structure data and process models during serious game development. Other frameworks focus mainly on game development [31], [32], placing more emphasis on software engineering, content pipelines, and asset creation than on instructional design. These approaches tend to describe workflows for building digital games – such as prototyping, testing, and refining gameplay features – without attending to how learners acquire, interpret, and apply knowledge within the game. As a result, alignment with learning goals becomes secondary, and essential elements such as structured learning support, cognitive load management, and learner progression are insufficiently addressed. This makes such frameworks useful for game production but less suitable as standalone foundations for designing serious games intended to teach highly specialized, procedurally complex material. Accordingly, an approach is still missing that provides explicit artefact structures and process guidance while ensuring that the learning experience is systematically designed and tightly coupled with game mechanics.

Building on these limitations, more recent frameworks have been proposed to provide stronger theoretical grounding and clearer guidance on how learning objectives, gameplay mechanics, and player experience should be aligned:

- Mechanics, Dynamics, Aesthetics (MDA) [33] – one of the foundational frameworks in game design. It decomposes the game experience into three interconnected layers: mechanics (the formal structures and rules of the game), dynamics (run-time behavior that emerges when players interact with game mechanics), and aesthetics (emotional responses in players evoked by dynamics). Research on MDA highlights its usefulness in predicting how changes in mechanics influence player experience, but it offers limited guidance on sequencing learning tasks or embedding domain-specific processes such as decision identification. As a framework for game design in general (rather than for serious games for learning) MDA is intentionally descriptive rather than procedural, and therefore cannot be directly extended to support domain-specific tasks such as translating AMILI/AMILP methods into game-based modules.

- Design, Play, Experience (DPE) [34] – is grounded in the principles of MDA, where design corresponds to mechanics, play corresponds to dynamics, and experience corresponds to aesthetics. DPE extends this by defining design considerations across four layers: learning (objectives and competencies), storytelling (narrative structure and scenario development), gameplay (rules, challenges, and player actions), and user technology (platform, interface, and interaction constraints). This layered structure supports alignment between pedagogy and gameplay, but it does not prescribe how instructional content should be decomposed into the artefacts and process steps required for designing complex professional training.
- Design, Development, Evaluation (DDE) [35] – references both MDA and DPE, and proposes an iterative design process where each cycle sequentially goes through design, development, and evaluation. DDE emphasizes rapid prototyping and testing with real users, highlighting how serious games evolve through multiple refinements. However, while the model is strong on iterative improvement, it provides little detail on how each iteration should be derived from specific learning objectives or how theoretical or domain-specific methods, such as AMILI and AMILP, should be transformed into concrete training activities.
- Learning Mechanics – Game Mechanics (LM-GM) [36] – is not a comprehensive design process framework, but rather a model for mapping learning mechanics with game mechanics. It supports systematic alignment: for instance, reflection corresponds to feedback loops, exploration corresponds to branching structures, and hypothesis testing maps to simulation-based mechanics. LM-GM is valuable for ensuring that gameplay actions reinforce pedagogy, but it does not guide how these mechanics should be organized, sequenced, or contextualized in a full learning experience design process.

In summary, the existing instructional design theories, game-design models, and serious-game frameworks offer valuable conceptual foundations but fall short of providing an integrated, context-sensitive approach suitable for complex domains such as post-merger IS integration. Instructional design theories do not incorporate principles of game design, while game-design frameworks are not sufficiently aligned with instructional requirements. Serious-game frameworks, although helpful in articulating high-level principles, provide limited process guidance and lack structured data models that would enable designers to decompose domain-specific content, construct learning pathways, or translate theoretical methods into concrete training activities. Furthermore, current approaches do not address how to embed the operational characteristics of the target context into the final learning experience, relying instead on references to general learning needs rather than domain-specific constraints. These gaps indicate the need for a more systematic, structured framework that can integrate instructional, game-design, and domain-specific requirements within a coherent design process. The next section, therefore, defines the requirements such a framework must satisfy to support the development of context-appropriate game-based learning experiences for post-merger IS integration.

4 Requirements for the Learning Design Framework

To support the construction of a learning design framework that can be tailored to different PMI initiatives, the approach requires a structured and traceable set (a catalogue) of requirements. These requirements define what the framework must provide to generate an appropriate learning design process and, through it, the corresponding learning experience. Because practitioners will later select and adapt these requirements for a specific PMI case, the requirements catalogue must be systematic, transparent, and grounded in established requirements engineering practice, e.g., supported by such standard as for Certified Professional for Requirements Engineering (CPRE) mainained by International Requirements Engineering Board (IREB) [37], or corresponding ISO/IEC/IEEE standards [38], while remaining high-level enough to allow further detailing and adjustments through defined tailoring mechanisms. The proposed requirements derivation process is presented in Figure 2. It is designed using a UML activity diagram structure with both control-flow and object-flow representations.

Following the process shown in Figure 2, the first step was defining the requirement subjects. Two subjects are used in this research: (1) the learning design process, describing how training should be created, and (2) the learning experience, describing the resulting form of the training that learners interact with. Separating the two subjects ensures clarity between the activities involved in designing training and the characteristics of the output.

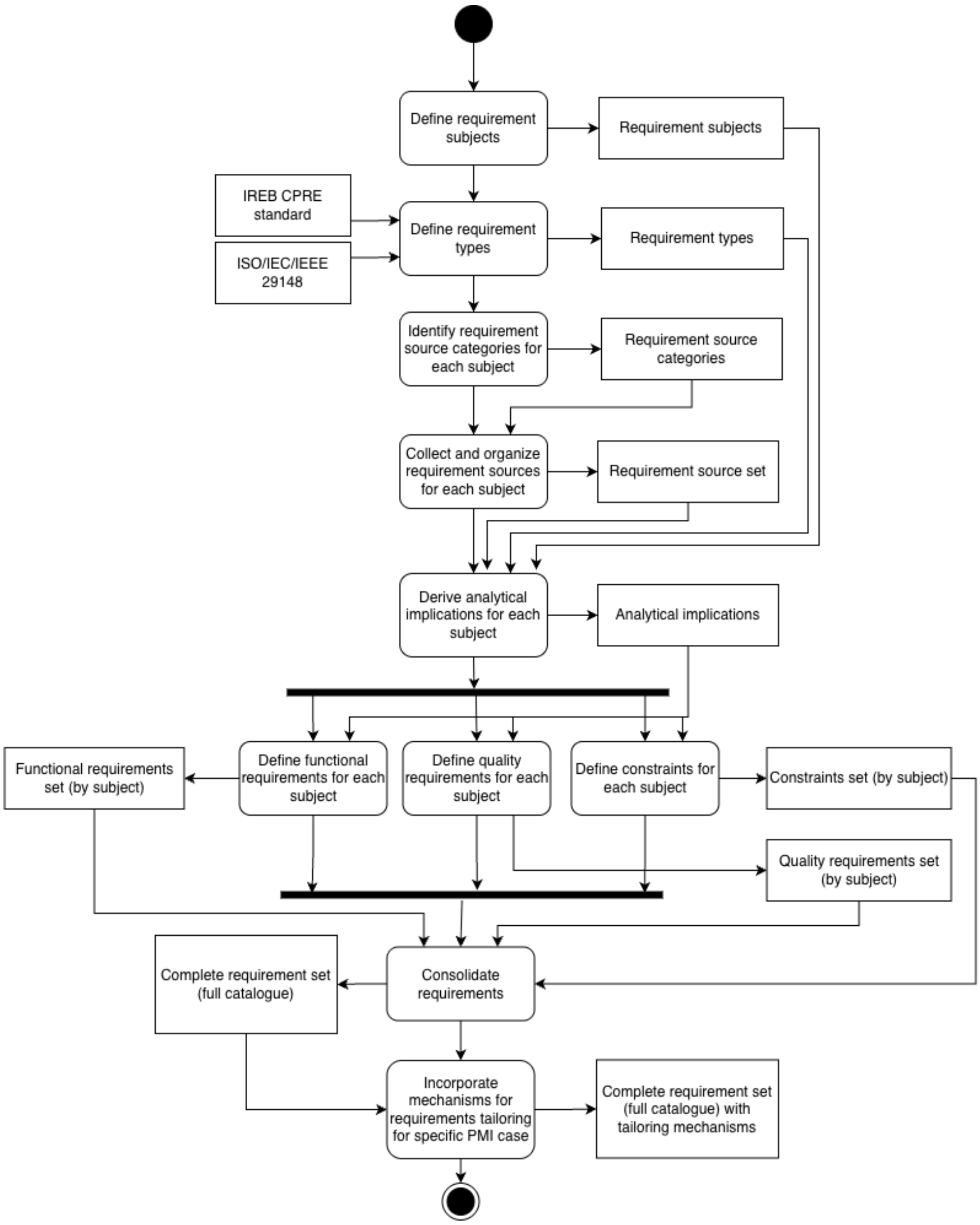

Figure 2. Requirements derivation process for the learning design framework

After subjects were defined, the requirement types were specified. The research adopts the classification recommended in internationally recognized standards [37], [38]. In line with these standards and practices, requirements are grouped into (1) functional requirements, (2) quality requirements, and (3) constraints. Functional requirements describe what the framework must enable or support. In this research, they specify what the learning design process must be capable of generating and what the learning experience must allow learners to do. Quality requirements describe how well the process or experience must perform. They cover aspects such as usability, reliability, and adaptability. Their purpose is to ensure that different designers applying the framework can achieve comparable levels of quality. Constraints specify the contextual limitations that restrict the design space. Their status as a separate type is justified by requirements engineering literature, which shows that many elements traditionally labelled as "non-functional requirements" are better interpreted as constraints because they limit what solutions are permissible rather than describing a quality of the solution itself. In the PMI context, constraints include limited time and budget, organizational rules, and technological restrictions. These constraints influence both how training can be designed and how it can be delivered, and therefore must be stated explicitly.

After establishing the requirement subjects and types, the suitable requirement source categories for each subject were identified. For the learning design process, these sources include (1) instructional design and (2) game design frameworks. For the learning experience, sources include (1) theories of learning, (2) theories of learning complex material, as well as (3) learner motivation and engagement theories. In addition, (1) the theory of IS integration in PMI, and (2) PMI-specific constraints, apply to both subjects, as they influence both how training is designed and how it can be experienced in practice.

The next step was to collect and organize the requirement sources for each subject. After the sources were identified, they were systematically reviewed, and the analytical implications of each source for the framework were derived. Using these analytical implications, functional requirements, quality requirements, and constraints were defined for each subject. During the formulation of quality requirements and constraints, any uncovered requirements were typified according to classifications found in established standards [37], [38]. At this stage, the requirements were kept at a high level because their practical implementation will differ across PMI cases and will be operationalized through the metamodel during application. The result is a structured set of functional requirements, a structured set of quality requirements, and a structured set of constraints, each linked to its corresponding requirement subject and analytical implication.

After that, these sets were consolidated into a complete requirements catalogue, which serves as the default input for practitioners. As the final step of the requirements derivation process, the complete requirement catalogue is extended with tailoring mechanisms that enable practitioners to adapt the requirements to a specific PMI initiative. These mechanisms formally define how individual requirements can be selected, modified, contextualized, or constrained based on case-specific factors such as the merger type, organizational structure, confidentiality considerations, and the maturity of the IS integration team. Incorporating these mechanisms ensures that the catalogue is directly usable in practice, supporting systematic tailoring during the application phase, while creating the learning design process for the specific PMI initiative.

4.1 Requirements for Learning Design Process

In this section, the requirements applicable to the learning design process are listed as a structured sequence of activities through which instructional content is converted into an interactive learning format. These requirements reflect insights gathered from instructional design models, game-based design models, the theory of IS integration in PMI, and constraints specific to post-merger IS environments. Each requirement is accompanied by a reference to its corresponding source and analytical implication, as well as a tailoring mechanism indicating how the requirement can be adapted for a specific PMI context. In practice, the learning designer reviews the catalogue, selects the requirements relevant to the given PMI initiative, and tailors them according to the defined tailoring mechanisms. Collectively, the requirements specify the functionality (Table 1), quality characteristics (Table 2), and constraints (Table 3) that guide designers throughout the learning design process.

Table 1. Learning design process – functional requirements

No	Requirement Source	Analytical Implication	Requirement	Tailoring Mechanism
1	Instructional design – ADDIE	Effective learning design follows a structured, ordered progression from analysis to evaluation	The framework should support a structured, sequential process that guides designers from the analysis to the evaluation phase	Identify the ADDIE phases required for this PMI and check which artefacts already exist in the merging organizations
2	Instructional design – SAM	Rapid iterations and continuous stakeholder feedback improve the quality of learning solutions	The framework should allow for iterative prototyping and continuous feedback loops with stakeholders	Identify iteration frequency based on stakeholder availability
3	Instructional design – Ten Steps	Complex skills are best learned through integrated whole tasks supported by gradual scaffolding	The framework should enable whole-task learning strategies to build complex skills	Select which IS-integration tasks should be taught as whole tasks
4	Instructional design – Backward design	Defining learning outcomes leads to clearer and more purposeful instructional decisions	The framework should require the definition of learning outcomes prior to instructional content development	Define PMI-specific learning outcomes aligned with the initiative's integration strategy
5	Game design – MDA	Desirable player experiences arise from intentional alignment between mechanics, dynamics, and aesthetics	The framework should require the definition of game mechanics, prediction of learning dynamics, and intentional design for aesthetics	Identify PMI-specific integration specialist actions and force them into the scope of gameplay
6	Game design – DPE	Learning goals, narrative, gameplay, and technology must be considered together to create coherent experiences	The framework should support design across four layers: learning goals, narrative, gameplay mechanics, and enabling technology	Specify narrative and gameplay elements that match the PMI integration scenario
7	Game design – DDE	Iterative cycles where design, development, and evaluation continuously refine one another provide higher-quality training outcomes	The framework should support iterative refinement based on evaluation of learning effectiveness and learner engagement	Plan training, testing, and refinement based on expected learner challenges in the PMI
8	Game design – LM-GM	Aligning learning mechanics with game mechanics strengthens pedagogical effectiveness	The framework should ensure that learning mechanics are effectively mapped to corresponding game mechanics	Define specific learning and gaming mechanics mapping in the PMI
9	Theory of IS integration in PMI – AMILI/AMILP theory and practice	Learning experience must reflect the specific analytical and evaluative logic of AMILI and AMILP	The framework should support the accurate transformation of AMILI and AMILP methods descriptions into interactive modules for learner training	Specify required adaptations through examples from AMILI/AMILP
10	PMI-specific constraints – PMI Stakeholder management	PMI learning must account for different stakeholder roles, interests, and decision rights	The framework should allow adaptation of training on role-specific responsibilities and knowledge levels of future learners	List the exact stakeholder roles in the PMI
11	PMI-specific constraints – Specific PMI challenge management	PMI environments expose learners to conditions such as incomplete data, ambiguity, and conflicting priorities	The framework should support the secure transformation of real-world cases, managing confidentiality, and adjusting complexity	Determine which elements of the PMI's data require anonymization or abstraction

Table 2. Learning design process – quality requirements

No	Requirement Source	Analytical Implication	Requirement	Tailoring Mechanism
1	PMI-specific constraints – Relevance and adaptability	PMI initiatives vary in integration strategies, organizational cultures, and IS landscapes	The framework should enable tailoring of training experience to different merger types, industries, and legacy systems	Analyze merger type, industry, organizational maturity, and IS landscape complexity
2	PMI-specific constraints – Scalability and reusability	During PMI, activities often repeat across multiple business units and integration waves	The framework should structure content into modular units to allow replication and extension for multiple merger cases	Determine how many integration waves, business units, or system clusters the PMI will include
3	PMI-specific constraints – Reliability and stability	PMI operates under high pressure and strict deadlines	The framework should consistently support the creation of training that guarantees comparable learning results for different designers	Define reliability thresholds based on how time-critical the PMI's integration decisions are
4	PMI-specific constraints – Performance	PMI timelines are compressed, so solutions must function efficiently without causing delays	The framework should support the rapid design process without delays and breakdowns	Assess response time thresholds imposed by the PMI
5	PMI-specific constraints – Usability and learnability	PMI involves multidisciplinary teams with varied backgrounds	The framework should be intuitive and easily learnable by instructional designers	Identify the designers' skill levels and required support
6	PMI-specific constraints – Accessibility	PMI environments involve diverse stakeholders, often from different cultures	The framework should comply with inclusive design standards	Consider geographic distribution, languages, and organizational diversity across merging entities

Table 3. Learning design process – constraints

No	Requirement Source	Analytical Implication	Requirement	Tailoring Mechanism
1	PMI-specific constraints – Target audience	PMI brings together stakeholders with different expertise levels, priorities, and responsibilities	The framework should be usable by designers creating training for professionals with no prior experience in educational design and game design	Assess the designer's knowledge and experience in PMI, IS architectures, and decision-making processes in PMI
2	PMI-specific constraints – Available time	PMI work is time-critical due to synergy targets, Day-1 requirements, and compressed integration windows	The framework should allow training design to be planned and executed under constrained timelines	Identify PMI timeframe, available time slots, and timeboxes
3	PMI-specific constraints – Technical constraints	PMI environments often combine incompatible legacy systems and restrictive IT policies	The framework should function within common technical infrastructures and be compatible with existing learning management systems	Identify technology restrictions and security policies across both organizations
4	PMI-specific constraints – Organizational constraints	Decision-making in PMI is governed by established corporate structures, approval layers, and compliance rules	The framework should align with corporate structures and decision hierarchies	Map the governance structure, approval layers, and reporting lines specific to the PMI

Table 3. Continued

No	Requirement Source	Analytical Implication	Requirement	Tailoring Mechanism
5	PMI-specific constraints – Financial constraints	PMI budgets are tightly monitored, and cost efficiency is prioritized	The framework should support cost-effective training design using minimal or low-cost resources	Determine the budget allocations for training within the PMI program
6	PMI-specific constraints – Legal and ethical constraints	PMI involves sensitive operational, financial, and personal data from merging organizations	The framework should ensure the ethical use of data and compliance with organizational privacy, copyright, and confidentiality	Examine confidentiality classifications and data-sharing restrictions between the merging entities
7	PMI-specific constraints – Pedagogical constraints	Certain domain-specific knowledge and terminology in PMI must remain accurate and complete	The framework should ensure learning of core IS integration in the context of PMI concepts and training goals	Identify which AMILI/AMILP knowledge components cannot be simplified due to the risk of misinterpretation
8	PMI-specific constraints – Content constraints	PMI processes depend on complete and accurate representations of organizational, architectural, and stakeholder information	The framework should enable the transformation of all relevant AMILI/AMILP materials, ensuring completeness	Determine which data artefacts must remain complete and accurate

4.2 Requirements for Learning Experience

While the previous section addresses the mechanics of constructing game-based training, this section focuses on the characteristics of the learning experience that emerges from that process. The identified requirements define the functionality (Table 4), quality attributes (Table 5), and constraints (Table 6) that the final learning experience must fulfil.

Table 4. Learning experience – functional requirements

No	Requirement Source	Analytical Implication	Requirement	Tailoring Mechanism
1	Theories of learning – Constructivist Learning Theory	Learners construct meaning actively rather than absorbing information passively	The learning experience should actively engage learners in constructing understanding through interaction and exploration	Identify which parts of the PMI can be explored interactively
2	Theories of learning – Experiential Learning Theory	Learning deepens when learners cycle through action, reflection, and conceptualization	The learning experience should cycle learners through concrete experiences, reflection, and conceptualization	Select realistic PMI situations where learners can act, review results, and iterate
3	Theories of learning – Situated Learning Theory	Knowledge becomes more meaningful when tied to real-world contexts	The learning experience should embed content in realistic PMI integration scenarios to improve relevance	Select integration scenarios that reflect this merger's real processes and IS architecture
4	Theories of learning – Transformative Learning Theory	Reflection can reshape assumptions and deepen understanding	The learning experience should encourage learners to critically reflect on prior assumptions and adapt mental models	Determine which PMI assumptions or biases learners hold in the PMI

Table 4. Continued

No	Requirement Source	Analytical Implication	Requirement	Tailoring Mechanism
5	Learning complex material – Cognitive load theory, Intrinsic load	Task complexity must match the learner's cognitive capacity	The learning experience should match task complexity to the learner's cognitive readiness	Assess the complexity of the PMI's actual IS landscape and team maturity
6	Learning complex material – Cognitive load theory, Extraneous load	Unnecessary complexity distracts from learning and should be minimized	The learning experience should avoid unnecessary cognitive load through clear design, intuitive UI, and minimal distractions	Identify potential UI, terminology, or documentation complexity specific to the merger
7	Learning complex material – Cognitive load theory, Germane load	Useful mental effort supports deeper knowledge formation	The learning experience should reinforce practical knowledge construction through varied practice, feedback, and reflection	Analyze which hands-on tasks support deep learning in the PMI
8	Learner motivation and engagement – Self-determination theory, Autonomy	Learners are more engaged when they have meaningful control over choices and actions	The learning experience should allow learners meaningful control over decisions and paths	Identify which decisions learners can authentically make in the PMI
9	Learner motivation and engagement – Self-determination theory, Competence	Sense of mastery grows when challenge and skill remain in balance	The learning experience should scaffold difficulty to build confidence and mastery	Determine difficulty progression based on baseline skills of PMI participants
10	Learner motivation and engagement – Self-determination theory, Relatedness	Social connection enhances learner motivation	The experience should integrate social elements to foster collaborative learning and peer motivation	Identify cross-team interactions expected in the PMI
11	Learner motivation and engagement – Expectancy-Value	Learners commit more effort when they perceive the task as meaningful	The learning experience should clearly communicate the importance and practical value of training activities	Identify the real business impact of accurate integration decisions in the PMI
12	Learner motivation and engagement – Expectancy-Value	Learners engage more when they believe success is achievable	The learning experience should provide tasks that are perceived as achievable with visible reward and progression structures	Map training steps to difficulty levels realistic for learners in the PMI
13	Learner motivation and engagement – Flow theory	Optimal engagement occurs when challenge and ability are well-matched in a clear goal-feedback loop	The learning experience should maintain an optimal balance between challenge and learner skill by providing clear goals, immediate feedback, and structured progression to sustain deep engagement	Balance challenge and skill based on the complexity of the PMI's decision-making tasks
14	Theory of IS integration in PMI – AMILI/AMILP theory and practice	Learning experience must reflect the specific analytical and evaluative logic of AMILI and AMILP	The learning experience should accurately simulate the two-step AMILI/AMILP process through applied challenges	Select integration groups, evaluation criteria, and system clusters relevant to the PMI
15	PMI-specific constraints – Stakeholder management	PMI learning must account for differing stakeholder roles, interests, and decision rights	The learning experience should include role-based tasks that simulate cross-functional collaboration and stakeholder management activities	Identify the stakeholder conflicts, priorities, and interactions present in the merger

Table 4. Continued

No	Requirement Source	Analytical Implication	Requirement	Tailoring Mechanism
16	PMI-specific constraints – Specific challenge management	PMI environments expose learners to conditions such as incomplete data, ambiguity, and conflicting priorities	The learning experience shall prepare learners to navigate time pressure, ambiguity, data gaps, and conflicting priorities in real PMI contexts	Capture PMI constraints: missing data, inconsistent architectures, time pressure, etc.

These requirements specify how the game-based training should operate once implemented and are derived from foundational learning theories, motivation models, the theory of IS integration in PMI, and the practical challenges associated with post-merger IS integration. Similar to the game-design process requirements, each requirement includes a reference to its underlying source and the analytical implications from which it was derived, along with a tailoring mechanism that indicates how it can be adapted for the conditions of a specific PMI case. During application, the learning designer evaluates these requirements, selects those relevant to the situation, and adjusts them using the associated tailoring guidance.

Table 5. Learning experience – quality requirements

No	Requirement Source	Analytical Implication	Requirement	Tailoring Mechanism
1	PMI-specific constraints – Relevance and adaptability	PMI initiatives vary in integration strategies, organizational cultures, and IS landscapes	The learning experience should support adaptation to diverse industry, organizational, and IS contexts	Select merger-specific terminology, systems, roles, and constraints
2	PMI-specific constraints – Scalability and reusability	During PMI, activities often repeat across multiple business units and integration waves	The learning experience should support a range of group sizes and allow for reuse across different training cycles	Determine group size and interaction patterns for the PMI
3	PMI-specific constraints – Reliability and stability	PMI operates under high pressure and strict deadlines	The learning experience should ensure consistent delivery and learner performance outcomes	Analyze where instability in the PMI might affect learning
4	PMI-specific constraints – Performance	PMI timelines are compressed, so solutions must function efficiently without causing delays	The learning experience should function smoothly without delay and support session completion within the available time	Identify the maximum allowed learning session length within integration timelines
5	PMI-specific constraints – Usability and learnability	PMI involves multidisciplinary teams with varied backgrounds	The learning experience should have clear guidance, user-friendly interfaces, and minimal onboarding time	Consider varying IS literacy and PMI familiarity across teams
6	PMI-specific constraints – Accessibility	PMI environments involve diverse stakeholders, often from different cultures	The learning experience should support diverse learner needs, including language, technical literacy, and other special characteristics	Assess language, cross-country teams, legacy vs modern system exposure

Table 6. Learning experience – constraints

No	Requirement Source	Analytical Implication	Requirement	Tailoring Mechanism
1	PMI-specific constraints – Target audience	PMI brings together stakeholders with different expertise levels, priorities, and responsibilities	The learning experience should adapt to IT professionals with varying IS integration and PMI knowledge and experience levels	Define the exact PMI roles and their expertise
2	PMI-specific constraints – Available time	PMI work is time-critical due to synergy targets, Day-1 requirements, and compressed integration windows	The learning experience should adapt to different timeframes available for learning	Map how many hours the PMI leadership will allocate to training
3	PMI-specific constraints – Technical constraints	PMI environments often combine incompatible legacy systems and restrictive IT policies	The learning experience should be deployable on common enterprise systems without specialized hardware or software	Determine devices, browsers, and VPN restrictions used in involved organizations
4	PMI-specific constraints – Organizational constraints	Decision-making in PMI is governed by established corporate structures, approval layers, and compliance rules	The learning experience should align with existing training formats and protocols used in the organization	Align with official PMI playbooks, training protocols, and communication standards
5	PMI-specific constraints – Financial constraints	PMI budgets are tightly monitored, and cost efficiency is prioritized	The learning experience should be acquirable and maintainable within limited training budgets	Determine cost ceilings set by the integration management office
6	PMI-specific constraints – Legal and ethical constraints	PMI involves sensitive operational, financial, and personal data from merging organizations	The learning experience should ensure confidentiality, data security, and compliance with organizational and legal norms	Identify which real system names, architectures, and datasets cannot be shown
7	PMI-specific constraints – Pedagogical constraints	Certain domain-specific knowledge and terminology in PMI must remain accurate and complete	The learning experience should achieve learning objectives without oversimplifying or gamifying serious content	Identify which AMILI/AMILP logic steps must remain uncompromised
8	PMI-specific constraints – Content constraints	PMI processes depend on complete and accurate representations of organizational, architectural, and stakeholder information	The learning experience should cover all necessary topics, tasks, and materials aligned with AMILI and AMILP methods	Determine which integration artefacts must stay complete

5 Metamodel of a Learning Design Framework

The metamodel formalizes how the requirements defined in the previous section are operationalized into concrete design activities and artefacts, and provides the structural basis for creating both the learning design process and the resulting learning experience. The metamodel supports the systematic construction of a case-specific learning design process and ensures that both design decisions and resulting outputs can be traced back to their originating requirements. The metamodel is depicted using a UML class diagram and is built around four core concepts – requirements, solutions, activities, and artefacts – together with the relationships between them (Figure 3). A requirement specifies what the framework must support; a solution shows how a requirement is addressed; and solutions are expressed through activities and artefacts that together form the learning design process (process model) and the underlying data model.

Each requirement belongs to one of two subjects: the learning design process or the learning experience. These subjects reflect the two components of the overall framework. Requirements describe either what the design process must be capable of or what characteristics the resulting learning experience must have. This subject separation also ensures that the metamodel can represent both the creation of training and the properties of the final training output. Each requirement has an associated source, describing the origin of the requirement. Sources include instructional design research, game design frameworks, learning theories, complex material learning, learner motivation and engagement, as well as IS integration theory, and case-specific PMI context. This allows requirements to reflect general pedagogical principles, game-based learning principles, and constraints inherent in post-merger integration. Requirements are classified into functional requirements, quality requirements, and constraints. Functional requirements describe what the process or experience must enable; quality requirements describe performance expectations; and constraints specify contextual limitations that the learning design framework must respect.

The framework supports relationships in which an initial requirement is refined into one or multiple tailored requirements, based on the defined tailoring mechanism, enabling adaptation to the conditions, constraints, and objectives of a specific PMI scenario. For each requirement, the metamodel identifies a solution, which specifies whether the requirement is satisfied by an activity, an artefact, or a combination of both. The connection between a requirement and its solution is represented through an impact, which shows how the requirement influences the design. Impact types include stating (introducing a solution), detailing (elaborating or specifying an existing solution), expanding (broadening the scope of a solution), changing (modifying an existing solution), and framing (constraining or defining the boundaries of a solution).

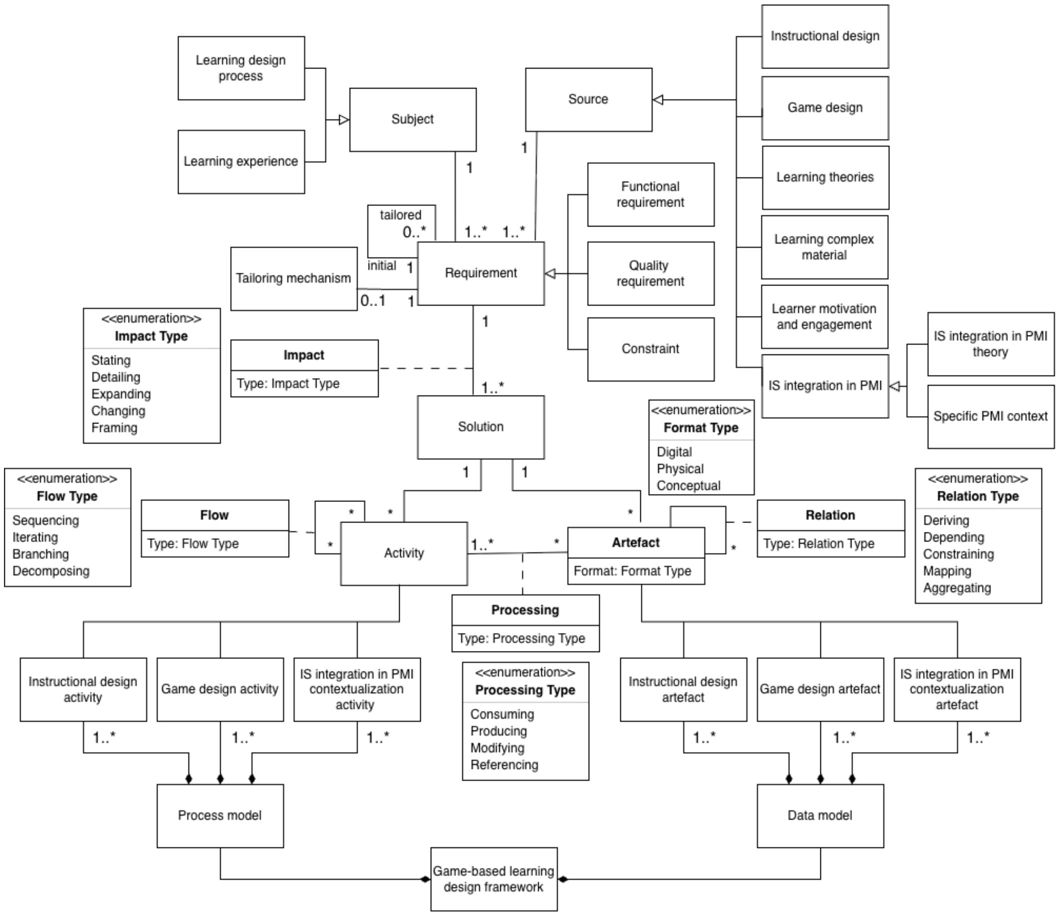

Figure 3. Metamodel for deriving the process model and data model of the learning design process

Activities represent the design steps that will appear in the learning design process. They belong to one of three activity types: instructional design activities, game design activities, and IS integration contextualization activities. This reflects the integration of pedagogical, game-based, and domain-specific perspectives within the same process model. Together, these activities form the process model that represents the game-based learning design for the specific PMI initiative.

Artefacts represent the information used or produced by activities. An artefact may take one of three formats: physical (a tangible non-digital object), digital (an electronically created or stored item), or conceptual (an element that exists only as a mental construct without a concrete representation). Like activities, artefacts are classified into instructional design artefacts, game design artefacts, and IS integration contextualization artefacts. Together, these artefacts form the data model that supports the execution of the learning design process. Depending on how they are used, artefacts may be processed by activities through consuming (using an artefact as an input), producing (creating an artefact as an output), modifying (changing an existing artefact), or referencing (using an artefact to guide execution without serving as a direct input).

The metamodel defines two types of structural connections within the process: relations and flows. Relations describe how artefacts depend on or influence each other. Relation types include deriving (using one artefact to transform it into another), depending (influencing how another artefact is created), constraining (limiting or restricting another artefact), mapping (creating a new artefact by analogy or correspondence), and aggregating (incorporating one artefact into another). These relations allow the metamodel to show, for instance, that a game design artefact may depend on an instructional design artefact. Flows describe the sequencing logic of activities. Flow types include sequencing (one activity occurring after another), iterating (an activity repeating another activity at the next level of granularity), branching (activities representing alternative paths), and decomposing (one activity serving as a sub-activity of another). These flows allow the metamodel to represent both linear and iterative structures within the learning design process.

By combining requirements, solutions, activities, artefacts, as well as relationships between them, the metamodel generates two complementary outputs: (1) a process model, composed of activities linked through flows, describing how the learning design process should proceed, and (2) a data model, composed of artefacts and their relations, describing the information used and produced throughout the process. Together, these models represent the learning design framework that practitioners will execute in a specific PMI initiative. Because all elements are derived from explicit requirements, the resulting process and learning experience remain grounded in instructional design, game-based learning principles, and PMI-specific conditions. The metamodel is designed to be generic in structure but adaptable in content. Its core mechanisms – requirements, solutions, activities, artefacts – can be reused across domains. In this research, the metamodel is instantiated for the post-merger IS integration context, but its structure may accommodate other complex learning design problems with minimal adaptation.

6 Validation

The objective of validation is to verify that the metamodel can represent different types of requirements originating from different sources in a consistent and structurally traceable way. The validation demonstrates how the metamodel operationalizes requirements by instantiating them into concrete solutions, activities, artefacts, and relationships within the process and data models.

For validation, a simple merger case was defined: two small companies decide to merge. Both have fewer than 50 employees and simple IS landscapes (≈ 8–10 systems in total). PMI timeline is tight: integration decisions must be ready within 12 weeks, and the training for specialists must be delivered no later than 01.01.2026. Instructional designers have no programming background, and the organization mandates the use of familiar, low-complexity digital tools (PowerPoint, MS Forms, etc.). The main PMI challenge is to collect stakeholder input and evaluate integration options for each system group, so the game-based design will be applied with the additional focus on the AMILP method.

To illustrate the metamodel in use, five representative requirements were selected. Each requirement is instantiated through an object diagram constructed based on the metamodel's class diagram. These object diagrams represent the selected requirements together with their sources and the subjects to which they apply, followed by the corresponding solutions, activities, and artefacts that operationalize them. Taken together, these instantiated objects form the foundations of a process model and a data model, which in combination constitute an overall framework instance. The selected requirements represent the full spectrum of requirement types: an instructional-design functional requirement, a game-design functional requirement, a functional requirement derived from PMI theory, as well as a PMI-specific quality requirement and a constraint. The resulting object diagrams, therefore, demonstrate a potential application case in which applicable requirements are selected and instantiated. Each requirement is presented as a separate diagram, although in practice, all instantiated requirements would be combined into a single process model and a single data model containing the complete set of activities and artefacts. Below is a description of each diagram created.

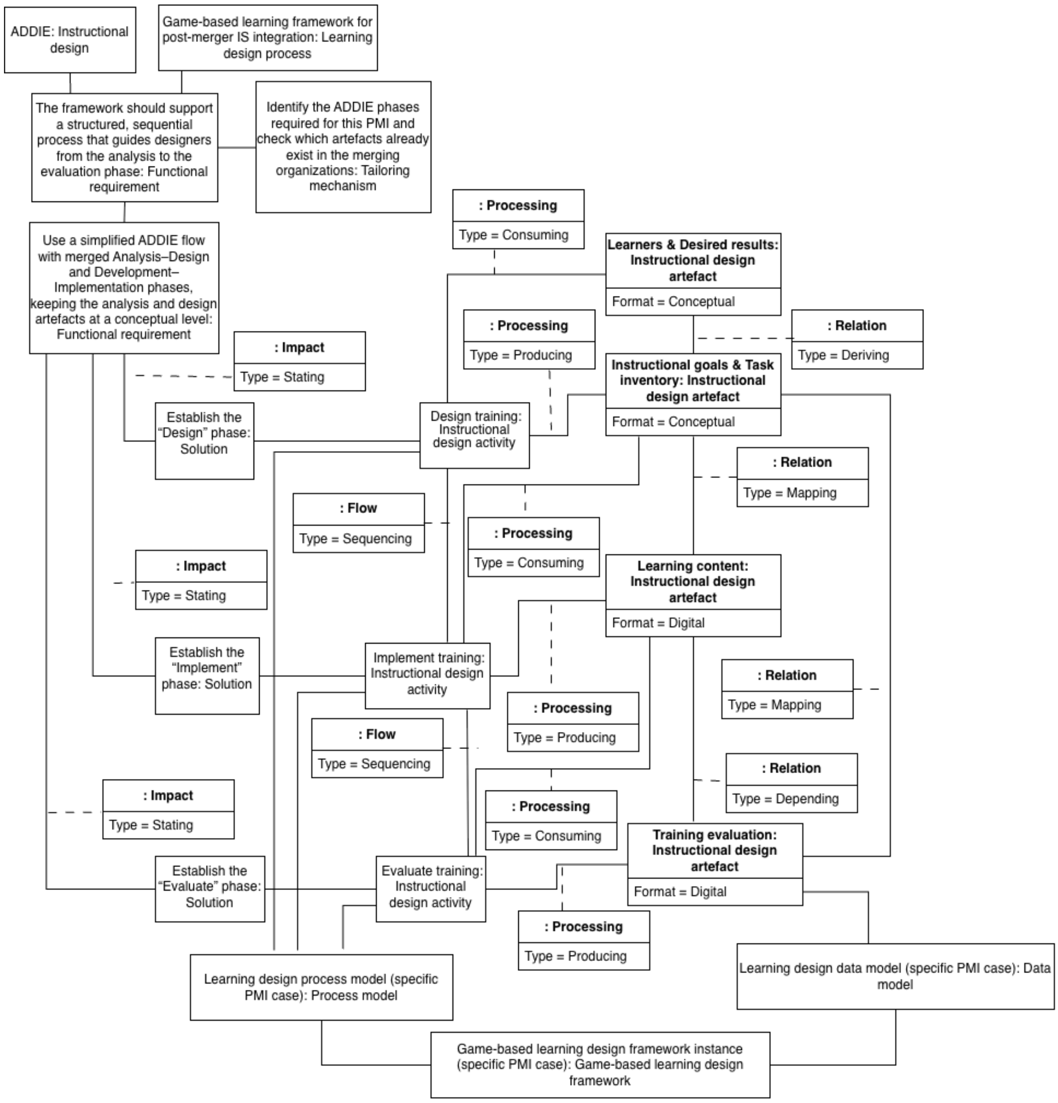

Figure 4. Metamodel validation – functional requirement from instructional design

Figure 4 demonstrates how the functional requirement "The framework should support a structured, sequential process that guides designers from the analysis to the evaluation phase" is instantiated. Tailoring mechanism applied: "Identify the ADDIE phases required for this PMI and check which artefacts already exist in the merging organizations." Tailored requirement: "Use a simplified ADDIE flow with merged Analysis–Design and Development–Implementation phases, keeping the analysis and design artefacts at a conceptual level." To simplify the process, several ADDIE phases were combined, and the following phases were selected as solutions: (1) the Design phase, whose main purpose is to define instructional goals and corresponding tasks; (2) the Implement phase, which focuses on producing learning content and executing the training; and (3) the Evaluate phase, which assesses the training after delivery based on the previously defined instructional goals. Each phase in the diagram is represented as a solution, with its associated activities and artefacts. The diagram also shows which artefacts are consumed and produced by each activity, as well as the relationships between artefacts, highlighting how some artefacts are derived from others, mapped to each other, or depend on artefacts created earlier. This example illustrates how a single functional requirement can result in multiple instructional design solutions and generate both the process and data structures of the framework.

Figure 5 illustrates how the functional requirement "The framework should require the definition of game mechanics, prediction of learning dynamics, and intentional design for aesthetics" is realized. Tailoring mechanism applied: "Identify PMI-specific integration specialist actions and force them into the scope of gameplay." Tailored requirement: "Focus the game mechanic on gathering stakeholder inputs for weighted option evaluation, with simple collaboration dynamics and an exploration-themed aesthetic." The requirement is implemented through a solution that expands the Implement phase by adding an explicit game-design activity to define game mechanics aimed at training stakeholder input gathering. This game-design activity is a decomposition of the training implementation activity and produces a game-design artefact describing the corresponding mechanics. This artefact forms part of the overall learning content artefact. This example demonstrates how certain functional requirements lead to additional activities and artefacts that extend the framework by incorporating a game-design perspective alongside instructional design.

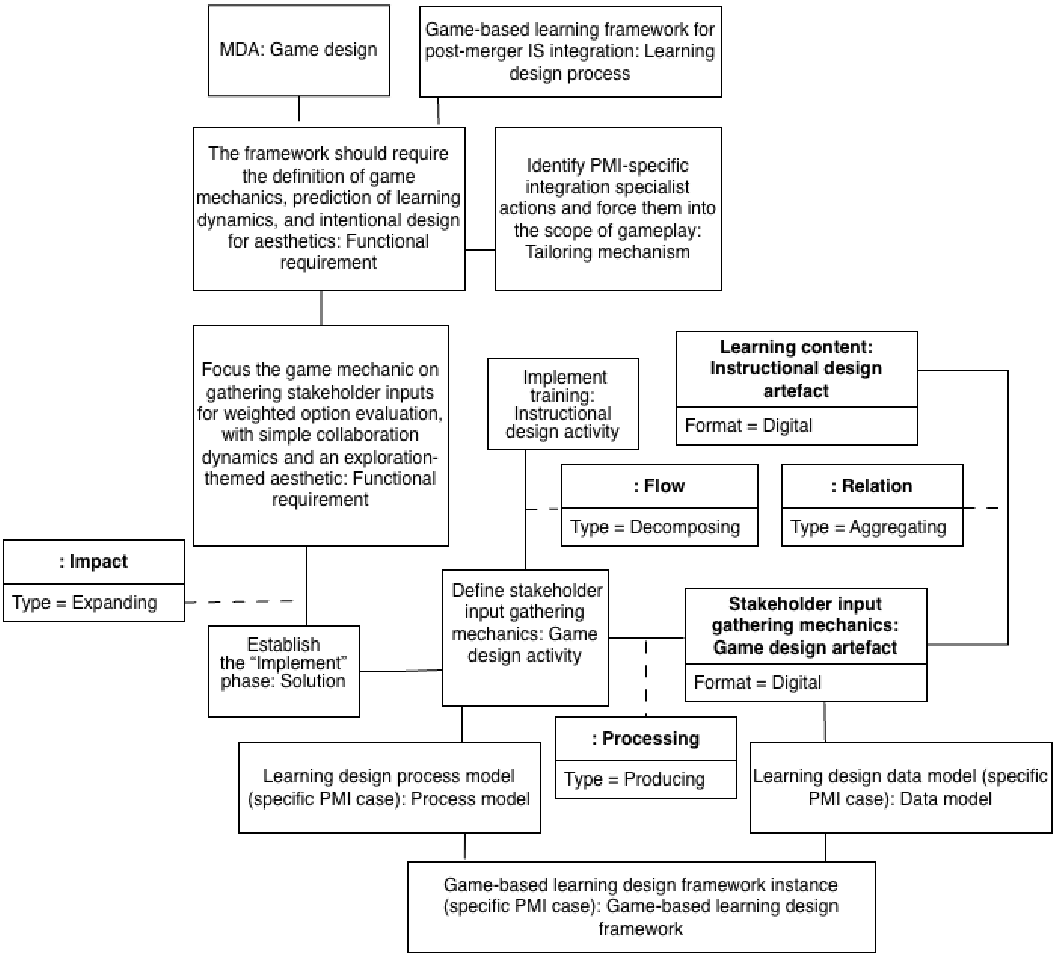

Figure 5. Metamodel validation – functional requirement from game design

Figure 6 illustrates how the functional requirement "The framework should support the accurate transformation of AMILI and AMILP methods descriptions into interactive modules for learner training" is realized. Tailoring mechanism applied: "Specify required adaptations through examples from AMILI/AMILP." Tailored requirement: "Provide only a brief AMILI introduction, make AMILP the core interactive module with essential evaluation steps." This requirement is addressed by detailing the Design and Implementation phase solutions and providing a PMI-specific contextual perspective for the instructional goals and corresponding learning content. As a result, dedicated instructional goals and tasks were created for both AMILI and AMILP as part of the overall instructional goals and tasks artefact. Based on these specific goals, corresponding learning content was developed to train the required competencies for each method. This method-specific learning content forms part of the overall training materials. Furthermore, since specific game mechanics were defined for gathering stakeholder input in AMILP, these mechanics were mapped to the AMILP learning content, resulting in gamified learning content. This example demonstrates how certain functional requirements lead to activities and artefacts that expand the framework by integrating instructional design, game design, and PMI-specific IS integration perspectives.

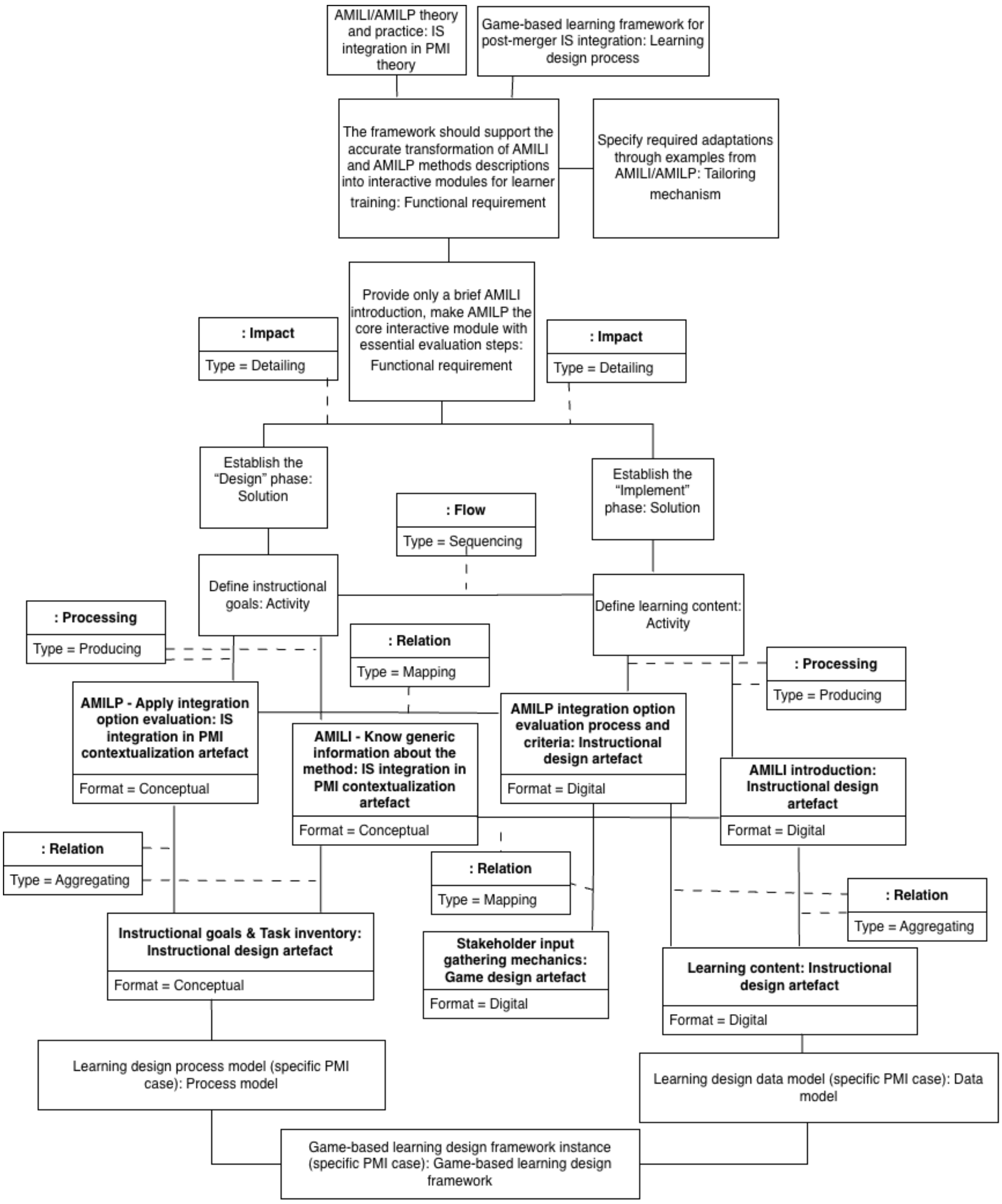

Figure 6. Metamodel validation – functional requirement from post-merger IS integration

Figure 7 shows how the quality requirement "The framework should be intuitive and easily learnable by instructional designers" is fulfilled. Tailoring mechanism applied: "Identify the designers' skill levels and required support." Tailored requirement: "Require only familiar no-code tools and provide ready templates to avoid any programming." This requirement frames the existing solution associated with the Implement phase. The framing is achieved by defining the new learning content artefact as an interactive narrative, derived from the AMILP learning content and the stakeholder input-gathering mechanics created earlier. This artefact represents the final game-based learning outcome for the AMILP method. This example demonstrates how quality requirements shape activities and artefacts by specifying how particular artefacts must be designed.

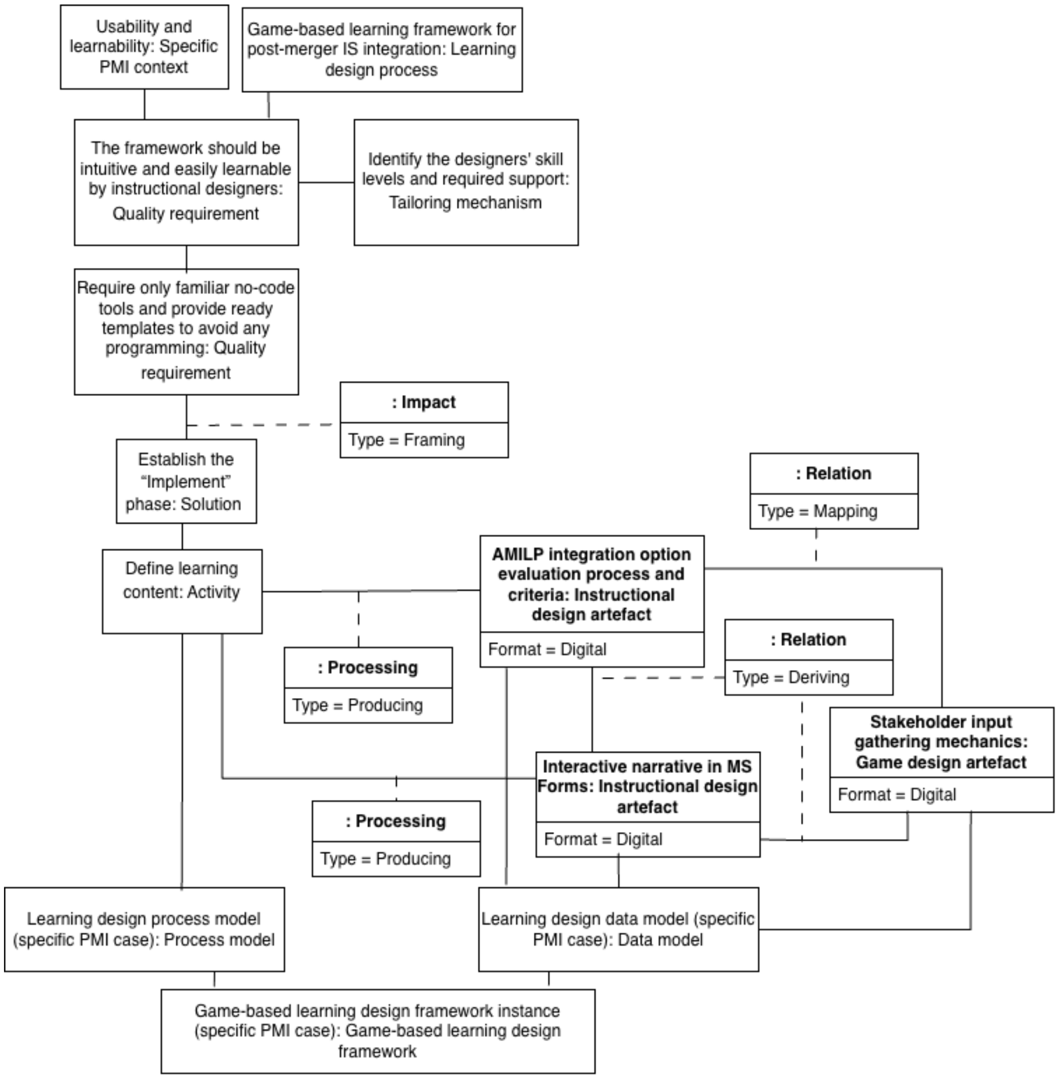

Figure 7. Metamodel validation – quality requirement from post-merger IS integration

Figure 8 illustrates how the constraint "The framework should allow training design to be planned and executed under constrained timelines" is addressed. Tailoring mechanism: "Identify PMI timeframe, available time slots, and timeboxes" Tailored requirement: "The full training must be finished within one week and ready by 01.01.2026, using short, fixed-length modules." This requirement, similar to the previous example, does not introduce a new solution but instead frames the existing solution associated with the Implement phase. The framing adds additional instructional design activities to create a learning plan and to segment the learning content into time-boxed modules. These activities produce two corresponding artefacts: (1) the learning plan, which constrains the learning content, and (2) the time-boxed modules, which are incorporated into the learning content. Both activities are sequentially connected to the existing instructional design activity responsible for implementing the training. This example demonstrates how constraint requirements frame activities and artefacts by adding additional activities and constraining existing artefacts.

Taken together, the five instantiations confirm that the metamodel can represent diverse requirement types through a unified structure of activities, artefacts, relations, and flows. This confirms that the metamodel provides sufficient expressive capability to support the construction of consistent learning design processes and data models across different requirement sources.

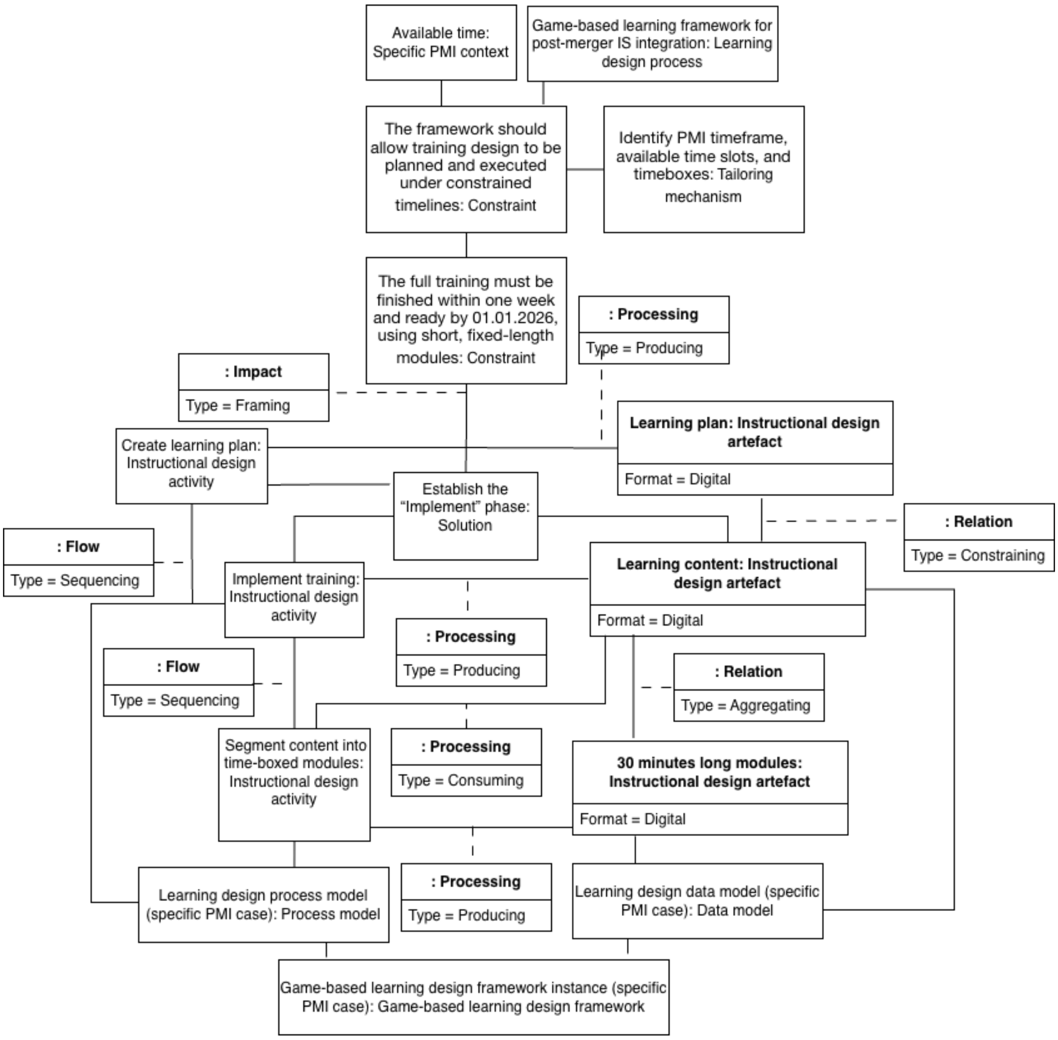

Figure 8. Metamodel validation – constraint from post-merger IS integration

7 Conclusions and Future Research

This study advances earlier work on the methods for handling information system problems in M&A cases (post-merger information systems – PMI). It proposes a structured approach for transforming complex post-merger IS integration training into a game-based learning experience, and delivers three interconnected contributions. First, the study consolidates insights from instructional design models, learning theories, motivation frameworks, serious-game design models, IS integration in PMI theory, and PMI-specific constraints into a comprehensive catalogue of functional requirements, quality requirements, and constraints applicable to both the learning design process and the resulting learning experience. This catalogue provides a theoretically grounded and domain-sensitive specification that future learning solutions must satisfy, and addresses the unique challenges of PMI environments. Second, the research introduces a metamodel that formalizes how these requirements can be systematically transformed into a learning design process and corresponding data model. By defining how requirements map to solutions, activities, artefacts, and relations between them, the metamodel ensures traceability from theoretical foundations to design decisions. The validation through representative instantiations demonstrates that the metamodel can express instructional, game-design, and PMI-specific requirements in a consistent structure, enabling designers to generate a tailored process model for a specific merger scenario. Third, this study clarifies how the metamodel supports practical application. By guiding designers from requirement selection through to the construction of tailored process and data models, the metamodel bridges generic instructional and game design theory with the specialized domain of IS integration in PMI. This positions the framework as a reusable, tailorable starting point for practitioners who must design learning experiences under real organizational constraints. These three contributions map directly to the research questions: the requirements catalogue addresses RQ1, the metamodel addresses RQ2, and the practical application demonstrates how the overall RQ is fulfilled.

Future research will build upon this foundation by operationalizing the metamodel into a fully elaborated design framework. This includes developing transformation guidelines, predefined templates, reusable artefacts, and examples of instantiated learning experiences. The main direction for future work is an empirical evaluation, i.e., applying the framework in real post-merger training programs with IT professionals and assessing learning outcomes, user experience, and motivational effects. Additional research will examine how the framework adapts to different merger types, organizational cultures, and technological environments, and explore opportunities for extending its use to other complex decision-making scenarios beyond PMI. Ultimately, the goal is to create a validated, practitioner-oriented game-based learning design framework that enhances both the effectiveness and engagement of IS integration training in high-stakes organizational contexts.

Declaration on Generative AI

The author has not employed any Generative AI tools.

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