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Player profile as tool for communities of practice animation

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ABSTRACT: This paper investigates the integration of player profiles and gamification elements into knowledge management practices within communities of practice engaged in engineering design. The study proposes a framework combining the MEREX method with gamification, tailored to Marczewski's player types. The research aims to personalize knowledge sharing, promote user engagement, and structure engineering design knowledge effectively. The framework leverages MEREX sheets with a narrative format structured around phases of the engineering design process. Additionally, it features personalized knowledge maps and contributor profiles to foster collaboration, facilitate knowledge formalization, and encourage knowledge reuse. This integrated approach seeks to improve both community animation and overall knowledge management within engineering design contexts.

KEYWORDS: knowledge management, gamification, teamwork, visualisation

1. Introduction

In today's knowledge economy, effective knowledge management has become a key success factor for organizations. Communities of practice, as informal groups of individuals sharing a common interest, play a crucial role in creating and sharing tacit knowledge. However, maintaining a high level of engagement and participation within these communities remains a persistent challenge.

Gamification, defined as the use of game elements in non-game contexts, has emerged as a promising approach to stimulate user motivation and engagement in various fields. Nevertheless, its application in the specific context of communities of practice and knowledge management remains little explored.

This study aims to fill this gap by examining how the use of player profiles, particularly Marczewski's (2015) model, can be integrated into knowledge management practices within communities of practice. We propose a conceptual framework that combines the MEREX method of knowledge capitalization with gamification elements adapted to different player types, which also considers key steps of the engineering design process.

Our research revolves around the following questions:

- How can player profiles be used to personalize the knowledge management experience in communities of practice?
- How can gamification elements be integrated into a knowledge management system to facilitate community animation and monitoring?

By answering these questions, this study aims to contribute to the literature on knowledge management and communities of practice, while offering practical insights for organizations seeking to improve the effectiveness of their knowledge management initiatives and communities of practice.

2. Knowledge management

2.1. Knowledge management through communities of practice

Knowledge management is a dynamic process that enables organizations to effectively identify, share, use, and store both explicit and tacit knowledge. Explicit knowledge is formalizable and easily documented in procedures or training materials, whereas tacit knowledge is derived from experience and expertise, often transmitted informally through mentoring or observation (Gardoni & Navarre, 2017). Communities of practice play a critical role in managing both explicit and tacit knowledge within organizations. These communities, formed voluntarily around a shared interest, focus on creating, sharing, and maintaining domain-specific knowledge. They foster collaboration and innovation, with members driven by a collective desire to advance their expertise (Tremblay, 2008).

To maximize the potential of these communities, structured methods like MEREX can be employed. MEREX focuses on formalizing knowledge into reusable "MEREX sheets," which organize and disseminate experience-based solutions. These sheets are thematically structured, ensuring quick access to context-specific knowledge while facilitating updates and reuse. By capitalizing on human expertise and making it widely accessible, MEREX enhances collective performance and operational efficiency (Corbel, 1995; Hamadache, 2006). The fact that MEREX sheets can be customized to suit specific contexts also enables them to be integrated seamlessly into the engineering design process. Communities engaged in this kind of activity can capitalize on their knowledge at each phase of the process: needs identification, problem analysis, conceptual design, detailed design, prototyping and testing, optimization, and finally documentation and communication (Sung, 2022). In this way, best practices and lessons learned at each stage are structured and easily shared.

2.2. Visual representation of knowledge

The visual representation of knowledge is integrated into the knowledge management process by providing tools that assist in both the capitalization and sharing of knowledge. These visual tools allow complex concepts to be represented by breaking them down into simpler, interconnected elements, which facilitates their understanding and retention. Typically, these elements are represented as nodes connected by links, with each link detailing the type of relationship between them, offering a more structured, clear, and accessible visualization of knowledge (O'Donnell et al., 2022). Visual representation integrates into knowledge management through various forms of knowledge maps like concept maps, mind maps, and cognitive maps. These tools effectively structure information, enhancing its accessibility and usability in decision-making processes (Eppler & Burkhard, 2002) (Cañas et al., 2004). Eppler and Burkhard (2007) highlight that these representations not only organize existing knowledge but also stimulate new knowledge generation by revealing hidden connections. This capability is vital in innovation-driven environments. The MEREX approach, using knowledge cards similar to concept maps, exemplifies how these tools can be applied in knowledge-intensive processes, supporting cognitive processes and decision-making (Hay et al., 2008).

Visual knowledge representation significantly enhances memory retention and understanding. Research shows that learners retain central ideas better with knowledge maps than with text (Tergan et al., 2006), (Becks et al., 2002). This is particularly important in educational and organizational settings. Moreover, visual tools facilitate knowledge transfer, especially in collaborative environments, by providing a common visual language understandable by all team members, regardless of expertise (Zhang, 2009), (Gavrilova et al., 2015). The use of visual tools in such settings enhances communication and fosters a deeper understanding. Visual representations serve as powerful tools for continuous process improvement. By visually mapping knowledge flows, they help identify gaps and inefficiencies in knowledge management (Olimpo, 2011), enabling organizations to optimize performance. This capability is essential in complex systems, revealing bottlenecks or underutilized knowledge, prompting corrective actions (Irani et al., 2014). Visual tools are also effective in external communication, helping organizations convey complex ideas to stakeholders, improving competitive advantage (Kraker et al., 2016).

3. Gamification

3.1. Gamification narrative dynamics in knowledge management

Gamification, the integration of game design elements into non-game contexts, enhances motivation and engagement by providing structured rules, clear goals, rewards, and immediate feedback (Swacha, 2015; Durinik, 2015). It encourages desired behaviors and fosters intrinsic motivation, particularly in contexts like knowledge management, where actions such as knowledge sharing can be made more enjoyable and engaging (Shapkova et al., 2017). As shown in Figure 1, Friedrich et al. (2020) classify gamification elements into dynamics (abstract motivators), mechanics (incentives), and components (concrete tools like points or badges). In our case, reversing this framework—starting with the desired dynamics and selecting supporting mechanics and components—ensures a meaningful gamified experience.

Among these dynamics, narrative dynamics stand out as particularly effective in facilitating knowledge transfer within communities. Soltani et al. (2021) demonstrate that integrating narrative elements into knowledge collection and dissemination processes enhances engagement and retention of critical information. Narratives contextualize knowledge, making it more accessible and relatable, while enriching the understanding of successes, challenges, and decisions (Brown & Duguid, 1991; Bruner, 1991). The narrative dynamic aligns seamlessly with the MEREX method and the engineering design process. Project narratives, shared through expert interviews, can be transformed into MEREX records by detailing the context of the knowledge and at which design phase it occurred. This approach identifies key skills, reduces barriers to knowledge sharing, and fosters a culture of collaboration and communication (Gabriel, 2000; Tsourma et al., 2019). By combining gamification and narrative dynamics, knowledge management processes can motivate participation, contextualize expertise, and enhance the overall effectiveness of knowledge transmission, ultimately strengthening a community's capacity to learn and innovate.

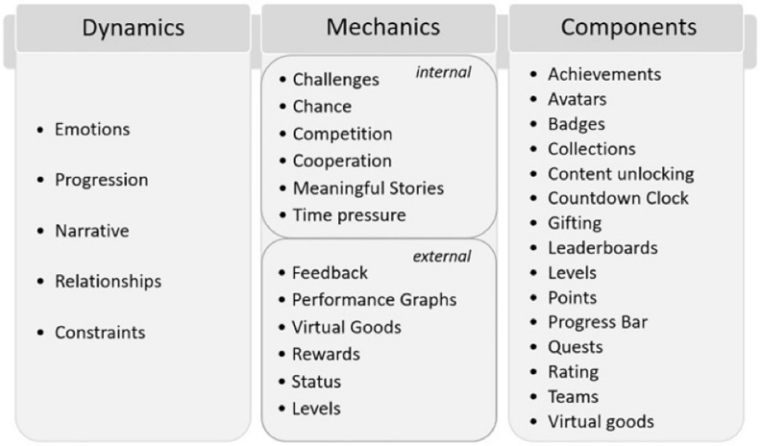

Figure 1. Dynamics, mechanics and components of gamification (Friedrich et al. 2020)

3.2. Player profiles and gamification elements

Based on Bartle (1996) player profiles categorization, Marczewski (2015) proposed the Hexad Scale (Figure 2) which offers a more diversified categorization spectrum into 8 different profiles. It is based on the intrinsic and extrinsic motivations of users, and the intrinsic motivations of relatedness, competence, and autonomy, with the addition of purpose. Thus, we obtain a motivation associated with each profile, allowing a more advanced personalization of a gamified system:

- Philanthropists: motivated by intrinsic purpose, willing to give without expectation in return.
- Socializers: motivated by relatedness and mainly want to interact with other users.
- Free Spirits: seek autonomy and freedom to express without any external control.
- Achievers: motivated by self-improvement or progress
- Players: motivated by extrinsic rewards which lead to complete anything within a system,
- Disruptors: want to trigger change, or even chaos, by disturbing the system negatively or not. (Marczewski, 2015)

Figure 2. Gamification user types Hexad (Marczewski, 2015)

Knowing what motivates each users allows a "system administrator", or any organization in charge of creating a gamified system, to know how to address to the proper users, or to select via the gamification's mechanics which users they aim to impact. This way of thinking is synched with Kapp's sayings (2012) concerning the fact a system has to be adapted to the users it is addressed to.

To go further, Andrzej Marczewski focused on the relationship between different gamification mechanics and elements with the player profiles he identified. The result is a table that consists of 52 game mechanics divided into 8 distinct categories. One is dedicated to rewards, one is more general, and 6 others correspond to a predefined player profile. This rigorous organization allows a holistic visualization of the intrinsic relationships between the mechanics and to apprehend their impact on user engagement and satisfaction.

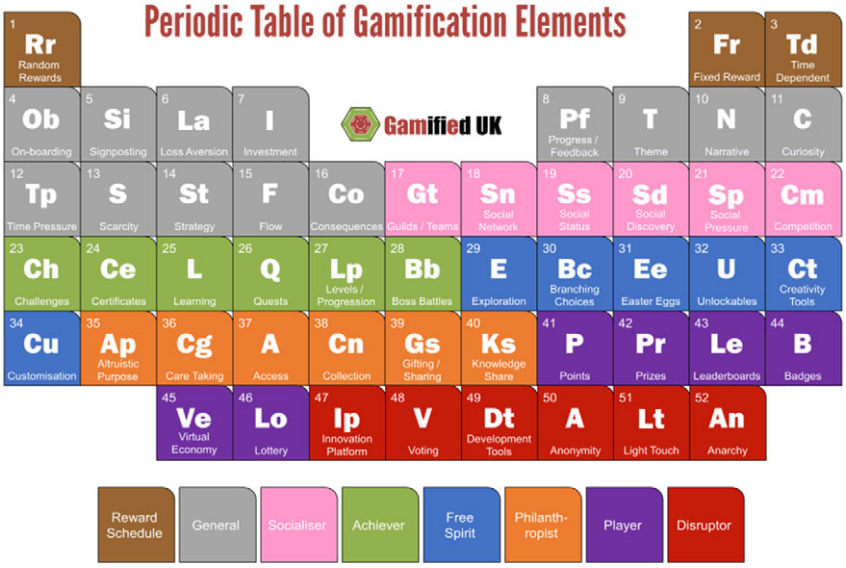

Figure 3. Periodic table of gamification elements (Marczewski, 2015)

This table is an important source of inspiration for the integration of gamification mechanics into a knowledge management system. Though it is important to consider that it consists as guidelines. It is not mandatory to use it in its entirety, or to use every element related to a profile to address it, as it is also not mandatory to address a system to every profile. This table could be easily combined with Friedrich's previously introduced, as its dynamics could be chosen, before selecting its mechanics and associating them with pertinent elements. This choice could be driven by the player profile(s) we would want to address.

4. Proposition of a gamified knowledge management artefact

In knowledge management and gamification, gaps and needs are identified as follows:

- Knowledge creation by individuals engaged in the gamified process.
- Knowledge acquisition by the same individuals (Sampaio, 2019).
- Knowledge reuse within a group or organization.

The proposed approach, rooted in the DSR method, aims to create an artifact addressing these needs. Following Peffers et al. (2007), the artifact will be developed iteratively and includes:
A knowledge map to represent community knowledge through project stories and design phase using the MEREX method.
1. A contributor profile per user, offering an overview of individual and community interactions.
Community animators will adapt activities based on members' engagement with knowledge activities (creation, enhancement, usage). The DSR method involves six phases: problem identification, defining objectives, creating the artifact, applying it, evaluating it, and communicating results. Key objectives include:
Facilitating knowledge formalization using MEREX and narration dynamics.

- Providing personalized, collaborative visualizations to motivate users in knowledge acquisition and sharing.
- Encouraging collaboration and transforming individual knowledge into collective knowledge, supported by community profiles.

The next sections will be dedicated to the artefact explanation, and how gamification dynamics and mechanics are integrated in its creation.

4.1. Narration dynamic and MEREX sheets for engineering design

To encourage knowledge sharing and contextualize technical expertise within the engineering design process, a narrative format could be adopted for constructing MEREX sheets.
In our context, research is conducted within the company Moment Factory, a company that faces challenging and innovative both engineering and design projects filled with learning opportunities.
Considering this context, it is proposed that each individual wishing to share knowledge with their community will do so through a project narrative, carefully structured within the MEREX framework. This structured narrative approach, built upon the dynamics of storytelling, aligns seamlessly with the MEREX method, enhancing its ability to facilitate knowledge transfer. It's important to include classification elements relevant to the community. Following suggestions are given to establish a MEREX sheets template structured around phases of an engineering design process, but they remain optional and adaptable to the unique context of each organization: a context section helps identify the location of the knowledge within the organizational ecosystem; a "problematic" section, allows users to identify challenges encountered; sections detailing the final situation and lessons learned are also crucial, with additional elements such as graphics, documents, or other resources that enhance understanding; lessons learned and their impact for future projects, including consequences of non-application of the written knowledge.
Moreover, the MEREX structure facilitates linking related sheets for visual representation within the system. To further guide users in knowledge capitalization, MEREX templates could incorporate questions driven by knowledge elicitation techniques (Shadbolt & Smart, 2015), ensuring that implicit knowledge is captured as precisely as possible. These sheets are designed to encourage exchange and discussion, whether through user comments or, potentially, future AI assistance in refining knowledge capture. Crucially, these knowledge sheets serve as resources, not directives; they share knowledge and advice, fostering a culture of open learning within the system.

4.2. Collaborative personalized knowledge map

As Kapp (2014) highlights, a gamified system requires a structured framework. Here, a well-organized knowledge base serves as the foundation for the knowledge map. Each user has a personalized view showing accessed and pending knowledge, with dynamic feedback. Users can add or update knowledge sheets and interact with the community map (e.g., proposing knowledge, initiating discussions). The artifact's functional structure can thus be visualized as follows:

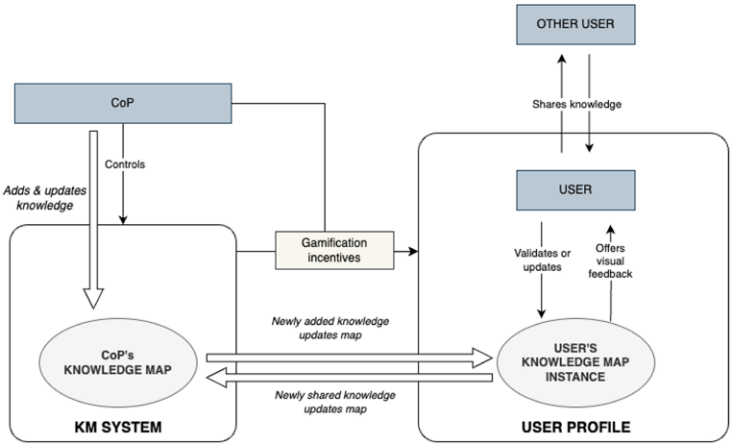

Figure 4. Functional diagram of the knowledge map

This approach balances open access to shared knowledge while preserving authorship, fostering collaboration. Each user has its own instance personalized instances that support features like tracking progress, recommending knowledge, or comparing achievements.

Testing was conducted with Capacities software to model the map. Its structure facilitates object and tag creation, with automatic visual links. MEREX sheets are categorized by levels (e.g., informational). Future enhancements may include community-defined expertise levels or methods quantifying difficulty (Zhang & Thomson, 2018).

Figure 5. Visual representation of interactions between knowledge cards on capacities.io (with additional information). Inaccessible yet knowledge could be associated to work in progress or not published knowledge

4.3. Gamification mechanics for users profile creation

Knowledge-sharing activities dynamically shape user profiles, helping community animators identify which activities are popular, underutilized, or missing entirely. Profiles evolve based on user actions, reflecting adaptability and responding to various user needs. Unlike rigid categorizations, this approach enables a flexible system aligned with gamification mechanisms defined by Marczewski (2015) as shown in Figure 3, associating actions with multiple player profiles depending on context and motivation.

The key actions and their linked knowledge phases, along with potential player profiles that could be associated, include:

- **Creating and sharing knowledge sheets.** *Potential profiles: Philanthropist and Socializer* This action corresponds to knowledge sharing mechanics and is tied to altruism (Philanthropist profile) and team collaboration (Socializer profile). Users may also compete to become top contributors, adding a competitive dynamic (Socializer still).

- **Reading and confirming reading of knowledge sheets.** *Potential profiles: Explorer and Achiever* Reading is linked to exploration (Explorer profile) and learning-oriented challenges (Achiever profile). It encourages curiosity and allows members to progress through knowledge areas.
- **Reusing and applying knowledge.** *Potential profiles: Achiever and Disruptor, Philanthropist* Users indicate how knowledge has been used in projects, haring application insights ties into innovation (Disruptor profile) and altruistic contributions (Philanthropist profile). But most importantly challenge (Achiever profile), as the primary challenge to accomplish within this system being knowledge reutilization.
- **Reviewing and validating knowledge.** *Potential profiles: Explorer and Socializer* Ensuring that knowledge remains relevant supports exploration (Explorer profile) and community collaboration (Socializer profile). Updating knowledge benefits both the community and the organization by maintaining accuracy.
- **Commenting on or suggesting updates for knowledge sheets.** *Potential profiles: Disruptor and Socializer* Adding suggestions or engaging in discussions promotes team dynamics (Socializer profile) and innovation (Disruptor profile), challenging and improving existing knowledge.

Each action earns points for relevant player profiles, which are aggregated into an overall user profile. This profile is visually represented as a spider diagram (Figure 6), highlighting trends rather than rigid classifications. Animators can access these profiles to monitor activity distribution within the community and adapt interventions accordingly. So users that could find interest in activities they don't take part, even if it doesn't correspond to their profile. For instance:

- If knowledge creation is lacking, animators may organize knowledge elicitation sessions, integrating narrative immersion or quest, thus allowing other profiles like Achiever to find interest and to contribute in another way. AI tools could assist with session transcription and sheets drafting but it still requires human validation.
- If knowledge validation is insufficient, group activities or individual objectives can encourage knowledge updates. Rewards could be given to efficient contributors, but as recognition by others is a reward for some, it might engage Philanthropists to take part to these knowledge validation activities.
- If knowledge reuse is low, animators could host sessions to identify applicable knowledge for projects, minimizing risks and fostering practical applications. Members presenting their successful reuse stories could motivate others.

Community profile, average of user profiles, provide further insights. While it doesn't fully represent individual actions, they reveal broader tendencies, helping animators prioritize efforts to sustain engagement and knowledge exchange. For example, if the majority of users engage in exploration but neglect sharing, tailored interventions can promote balance and growth.
In this dynamic system, the goal remains clear: foster a collaborative and evolving environment where knowledge creation, validation, and reuse are consistently supported through targeted activities and gamified interactions.

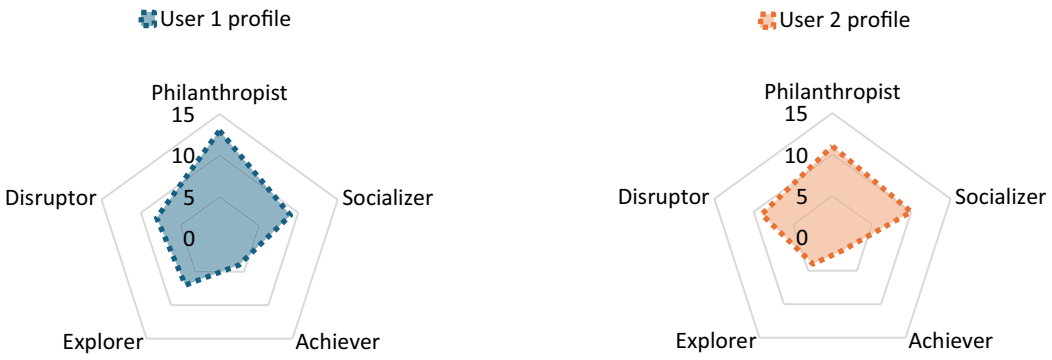

Figure 6. Example of two distinct users' profile in the same community

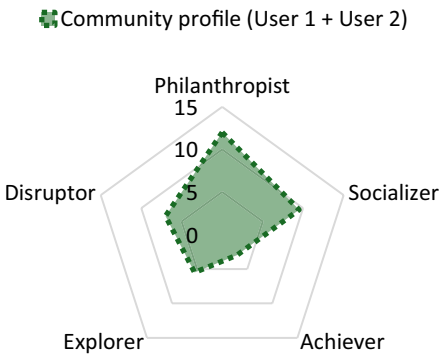

Figure 7. Example of a community profile, based on the two previous users' profiles in Figure 6

5. Future tests and expected limits

To evaluate the proposition, an iterative 3 phase protocol is considered. The first phase involves a pilot study with a small community (5-10 members) to introduce MEREX sheets and the knowledge map. We aim to gather initial feedback on usability, relevance, and motivation to contribute. Data will be collected through tracking sheet activity and weekly surveys, offering a preliminary assessment of the artifact's potential. The second phase incorporates community profiles and gamification elements, building upon the initial insights from the pilot. This phase seeks to measure the artifact's impact on knowledge sharing, community cohesion, and user perceptions through pre- and post-implementation surveys and individual interviews. The third phase involves extending the implementation to additional communities, adapting the artifact based on the unique needs and player profiles of each group. This phase will track key metrics across all communities to identify best practices and improvement areas, as well as assess the overall impact of the artifact on knowledge management through cross-community surveys. It anticipates challenges like low participation and gamification fatigue, with suggested mitigation strategies.
Additionally, it is anticipated that the allocation of profile points may need to be adjusted to avoid imbalances in player profile creation. Each action does not necessarily require the same level of effort and varies in difficulty. For instance, while creating a MEREX sheet may seem time-consuming, it might be considered less significant than reusing one, as knowledge reuse could hold greater importance depending on the organization. Another aspect to consider is the lifespan of the profiles. Although they are intended to be created dynamically, allowing near real-time tracking of their development, there could be the possibility of updating them and keeping a history over a sliding period of 6 months for example. This way, profiles would not be fixed, and the system would be more dynamic, increasing community engagement over time and potentially preventing it from settling into a routine. No zeroing, but rather a rolling retrospective to better track and analyse what has happened in the community over the past months. Finally, with the rise of AI usage and internal LLM, it is planned to combine the MEREX sheets with RAG (Retrieval Augmented Generation) in order to access knowledge even faster through an LLM. Context once properly captured needs to be transcribed, as it is a necessity for proper knowledge understanding.

6. Conclusion

This study explored the integration of player profiles in knowledge management of communities of practice. It suggests that using Marczewski's model, combined with the MEREX method, offers a framework for personalizing the knowledge management experience that could increase member engagement. Addressing different player types allows addressing the varied intrinsic and extrinsic motivations of community of practice members. This personalized approach not only could increase participation but also enable more effective monitoring of knowledge capitalization and sharing activities. Our work contributes to existing literature by proposing an integrative model that combines knowledge management, community of practice management, and gamification that is supposed to stimulate engagement and optimize knowledge sharing in an engineering design context. However, this study has certain limitations. Further try-outs are needed to validate the effectiveness of the proposed model in various organizational contexts. Moreover, the evolution of player profiles over time and its impact on long-term engagement deserve more in-depth investigation. Future research could focus on developing diagnostic tools to precisely identify player profiles within communities of practice, as well

as on developing implementation strategies adapted to different types of organizations. Additionally, exploring the impact of this approach on organizational performance and innovation could provide valuable insights for practitioners and researchers. In conclusion, integrating player profiles in the gamification of communities of practice opens new perspectives for knowledge management. This approach could not only to improve member engagement and participation but also foster an organizational culture focused on continuous learning and knowledge sharing.

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