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Graduation Project

Conceptualising and designing a systematic performance framework for esports teams

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Abstract

Esports has undergone rapid professionalisation, yet structured approaches for sustained team-level performance development remain limited, with competitive improvement still largely dominated by a "grind culture" of high-volume, unstructured practice. While existing research identifies various performance determinants, current practices often focus on fragmented player-level optimisation rather than coordinated organizational learning. This study addresses this gap by exploring how a structured framework can support collaborative performance analysis in esports teams.

A Systematic Performance Improvement (SPI) framework was developed, synthesising principles from High-Performance Organisation (HPO) theory and the Data Team Method (DTM), specifically adapted for the high-velocity, short-cycle environment of esports. The framework was examined through a three-stage design-based research process involving a *Rocket League* team. In Part A, an eight-phase conceptual walkthrough revealed that while participants reported and demonstrated instances of more anticipatory communication during later sessions, they encountered recurring difficulties with tasks requiring abstraction and formal categorisation.

In Part B, these insights informed the design of a dashboard prototype focused on reducing operational friction through automated data preprocessing and replay-centered review. The prototype was evaluated in Part C via a guided walkthrough and the User Experience Questionnaire (UEQ). Findings suggest that the framework may facilitate structured reflection grounded in shared evidence, though interpretive conclusions depend heavily on facilitated dialogue rather than automated system guidance.

The study contributes a novel SPI framework and a prototype tool that functions as a "mediating artefact" to structure team-based learning. However, as the evaluation was limited to a single participant and a short implementation period, conclusions regarding long-term performance effects and causal attribution remain preliminary. Future research is required to assess the framework's applicability across diverse game titles and more stable competitive environments.

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1 Introduction

Esports performance analysis is heavily metric-driven, fragmented across disciplines, and often reliant on informal and unsustainable development practices. Esports has rapidly evolved into a global competitive industry with substantial growth in viewership, revenue, and prize pools (Kegelaers et al., 2024). Professional players and teams increasingly operate under highly competitive and professionalized conditions (Navarro-Lucena et al., 2025), while franchised leagues, recurring international tournaments, and streaming platforms have transformed gaming into a viable long-term career path (Jenny et al., 2017; Taylor, 2012; Zhao et al., 2024). At the same time, the longevity of major esports titles such as *League of Legends* and *Rainbow Six Siege* has contributed to a continuous rise in average player capability over time (Adams & Walker, 2017). This growing baseline skill level intensifies competitiveness throughout the player population and continuously raises expectations for elite performance.

The competitive environment is further complicated by updates that characterize esports ecosystems. Developers frequently alter game mechanics, rebalance systems, or introduce new content in intervals as short as two weeks (Jenny et al., 2017; Pedraza-Ramirez et al., 2020). These changes require players and teams to adapt continuously in order to remain competitive. In practice, even small delays in adaptation may lead to performance declines that threaten competitive standing and professional careers (Gisbert-Pérez et al., 2024). Consequently, esports organizations increasingly rely on extensive performance monitoring, statistics, and rapid analytical feedback loops to optimize performance outcomes.

Despite this growing use of data and analytics, current esports performance practices remain fragmented and largely informal. Esports has undergone rapid professionalization, yet competitive improvement continues to be dominated by a prevailing grind culture in which long, repetitive, and high-volume practice is perceived as the primary pathway toward elite performance (Sun, 2024). Training routines frequently lack structured guidance, evidence-based development strategies, or sustainable organizational processes. Instead, players often engage in extended practice hours with limited recovery or systematic performance planning, increasing the risk of physical injuries, psychological strain, and long-term burnout (Bubna et al., 2023; Nagorsky & Wiemeyer, 2020; Nyström et al., 2022).

These issues extend across the wider esports ecosystem. Emerging players face unstable and insecure career pathways (Kegelaers et al., 2024; Pedraza-Ramirez et al., 2025), while elite competitors experience continuous pressure to sustain performance under demanding and uncertain working conditions (Peng et al., 2020). Simultaneously, organizations and coaching staff struggle to balance competitive success with player well-being within existing performance norms (Gisbert-Pérez et al., 2024; Peng et al., 2020). Research has increasingly documented negative outcomes associated with these practices, including exploitation, gender inequality, mental exhaustion, and physical burnout (Kegelaers et al., 2024; Pedraza-Ramirez et al., 2025; Peng et al., 2020). For many professional players, sustainable long-term career prospects remain uncertain or entirely absent (Pedraza-Ramirez et al., 2025).

The persistence of these practices can partly be explained by the rapid and digitally driven development of esports as a field. Esports expanded quickly while maintaining characteristics of a relatively young domain that evolved alongside broader processes of digitalization (Pedraza-Ramirez et al., 2025). As a result, scholarly engagement with sustainable training practices and organizational development emerged relatively late, after many dominant performance norms had already become institutionalized (Tang et al., 2023). Consequently, grind culture and short-term optimization practices continue to shape expectations despite increasing evidence of their harmful effects.

Recent efforts toward professionalization have attempted to address some of these concerns. Emerging approaches include data-driven performance development models (Pedraza-Ramirez et al., 2025), personalized training regimes (Neri et al., 2021), and the integration of mental health support structures into esports organizations (Berga et al., 2023; Pedraza-Ramirez et al., 2025). Nevertheless, these initiatives remain fragmented across different research domains and professional practices. Current esports research is distributed across fields such as cognitive science, sports psychology, organizational behaviour, and human-computer interaction, with limited interdisciplinary integration (Brock, 2023; Cranmer et al., 2021; Reitman et al., 2020). While individual studies contribute valuable insights into aspects of performance, few comprehensive frameworks exist that systematically guide long-term improvement at both individual and organizational levels (Bubna et al., 2023; Nyström et al., 2022; Pedraza-Ramirez et al., 2020; Reitman et al., 2020).

As a result, structured performance improvement processes remain largely absent within esports organizations (Raetze et al., 2025). Existing analytical systems primarily focus on short-cycle optimization and player-level adjustments rather than broader organizational learning. Performance analytics in esports are highly effective at generating rapid feedback regarding mechanical execution, cognitive performance, and psychophysiological adaptation (Reitman et al., 2020). However, these systems rarely translate observations into structured learning mechanisms, cross-role coordination, or sustainable capability development across teams and organizations. Consequently, esports teams frequently struggle to transform large quantities of performance data into coherent improvement strategies that support long-term development.

This gap becomes particularly relevant when compared to principles found in high-performance organizations (HPOs). HPOs are understood as organizational systems that create sustained value through continuous improvement, structured learning cycles, and coherent behavioural routines (Waal, 2021). Rather than focusing exclusively on short-term outcomes, HPO frameworks emphasize how leadership, communication, collaboration, and systematic information use contribute to consistent long-term performance. Within such systems, performance data is embedded into broader organizational learning processes that support collective adaptation and sustainable improvement.

This perspective is highly relevant to esports because the field increasingly seeks professional legitimacy while continuing to depend on fragmented and reactive performance practices. Current esports environments emphasize rapid adaptation and individual optimization but often lack mechanisms that systematically convert analytical insights into collective learning structures. As a result, organizations may successfully optimize short-

term competitive outcomes while failing to establish sustainable developmental systems that support long-term organizational resilience, player well-being, and consistent performance growth.

Therefore, esports organizations continue to face difficulties translating observations, metrics, and coaching insights into structured improvement processes. This limitation motivates the exploration of Systematic Performance Improvement (SPI) approaches within esports environments. Drawing from principles used in high-performance organizations, SPI frameworks may offer a way to integrate analytical feedback, organizational learning, and coordinated development into a more sustainable performance model for esports teams.

The current study investigates the conceptualization of a systematic performance improvement framework for esports. More specifically, this research explores how established practices that implement SPI can inform the co-design of a practical and configurable tool to guide performance improvement within esports teams. The study follows a three-part research design. Part A evaluates the initial framework concept. Part B translates findings into prototype requirements and design principles. Part C evaluates the framework within an esports team environment.

The main research question guiding this thesis is as follows:

How can a structured framework support systematic performance improvement in esports teams?

This question is supported by the following sub-questions:

RQ2: What insights can be observed from an initial walkthrough of the framework?
RQ3: What requirements are critical to inform prototype design?
RQ4: To what extent does the practical tool meet the identified requirements?

The following section describes the theoretical and practical foundations required to design a systematic performance improvement framework for esports organizations.

2 Background

Research on performance improvement in esports has expanded considerably in recent years. Existing studies have examined isolated dimensions of gameplay, including mechanical execution, cognition, physiological performance, team coordination, and psychological resilience. However, despite this growing body of work, esports research remains fragmented across disciplines such as sport science, human performance, organizational behaviour, and data-driven analytics. As a result, esports organizations possess increasing amounts of performance-related data while lacking coherent structures that systematically translate these observations into long-term improvement practices.

This chapter examines how this gap emerges and how structured improvement approaches from adjacent domains may inform esports performance development. First, esports performance analysis literature is reviewed to demonstrate the current reliance on fragmented and largely individual-focused analytical practices. Second, reflective and systematic performance improvement (SPI) processes are examined through literature on traditional sport and high-performance organizations. Third, the data team method (DTM) is introduced as a structured and collaborative approach to iterative organizational learning. Finally, the limitations of directly applying the DTM to esports are discussed, motivating the adaptation and development of a dedicated SPI framework for esports teams.

2.1 Esports performance analysis

Current esports research demonstrates that large quantities of performance data and analytical insights exist, yet structured improvement processes remain underdeveloped. Literature reviewed through the PRISMA methodology (Page et al., 2021), detailed in Appendix A, collectively indicates that esports performance cannot be explained through a single skill domain or isolated metric. Across 15 review papers and 25 experimental studies, performance is examined through cognitive, mental, physiological, mechanical, environmental, and organizational perspectives. This breadth of focus highlights that esports performance is multidimensional and context-dependent.

Variation in the conceptualization of expertise illustrates this complexity. Some studies define expertise exclusively through elite or professional status, while others rely on rankings, competitive experience, or self-reported proficiency without consistent operationalization across studies. Although this heterogeneity limits direct comparability, it also reflects the reality that expertise in esports manifests differently across competitive titles and environments (Nagorsky & Wiemeyer, 2020). Skills that distinguish elite performance in one title may not transfer directly to another, suggesting that general performance capacities must be interpreted through game-specific contexts.

Cognitive performance research particularly reflects this interaction between general and context-specific capacities. Eleven studies report that expert players outperform lower-skilled players on dimensions such as attentional control, response time, spatial cognition, self-regulated learning, and appraisal processes (Kleinman et al., 2021; Miao et al., 2024; Park

et al., 2021; Trotter et al., 2023). However, findings regarding cognitive fatigue and fluctuating cognitive load demonstrate that these abilities remain highly dependent on situational conditions and competitive demands (Matsui et al., 2024; Poulus et al., 2022; Zhang & Owen, 2023). Thus, cognitive resources alone do not guarantee performance unless effectively integrated into dynamic gameplay environments.

Psychological and mental performance studies reinforce this perspective. Sixteen studies indicate that elite players demonstrate stronger stress regulation, emotional control, and mental resilience compared to less experienced competitors (Bikas et al., 2022; Poulus et al., 2022; Sharpe et al., 2024; Wang et al., 2022). Research on choking under pressure and clutch performance further demonstrates how psychological regulation directly influences critical competitive moments (Beres et al., 2021). While these constructs resemble those studied in traditional sport, esports uniquely intensifies them through persistent digital monitoring, continuous competition exposure, and minimal separation between practice and performance environments.

Environmental and organizational studies further extend performance analysis beyond the individual player. Research on game updates and balance changes demonstrates that rapidly shifting metas continuously alter optimal strategies and mechanical requirements (He et al., 2021; Thompson et al., 2023). Other studies show that many professional players operate with limited institutional guidance and rely heavily on self-directed learning practices (Dominteanu et al., 2023; Hong, 2023). Additionally, research on stigma and sexism demonstrates that performance evaluation itself is socially mediated, with player behaviour interpreted differently depending on gender and social context (Trepanowski et al., 2024). These findings position esports performance within broader socio-technical systems rather than isolated individual skill expression.

Physical and physiological studies add another layer to this complexity. Research demonstrates that poor sleep quality, musculoskeletal strain, and unhealthy recovery practices negatively affect consistency and long-term performance sustainability (Bonnar et al., 2019; Lee et al., 2021; Moen et al., 2022). Physiological studies further indicate that physical warm-up routines improve motor execution more effectively than purely cognitive preparation strategies (Dos Santos et al., 2024). Mechanical performance studies similarly show that elite players develop highly game-specific interaction patterns shaped by response timing, mouse sensitivity, and fatigue management (Kleinman et al., 2021; Park et al., 2021; Bikas et al., 2022).

Taken together, esports literature demonstrates that performance emerges through the interaction of multiple domains whose relevance changes across contexts, games, and organizational conditions. Yet while this research provides extensive analytical insight into performance determinants, it simultaneously reveals the absence of structured mechanisms that integrate these observations into coherent team-level improvement processes. Existing esports environments therefore possess substantial quantities of data but limited organizational structures for systematically translating analysis into collective improvement.

2.2 Reflective and systematic performance improvement processes

The limitations identified in esports performance analysis suggest that effective improvement requires more than isolated metrics or reactive adjustments. Structured performance improvement depends on reflective processes that enable organizations to interpret information collectively, coordinate decision-making, and iteratively refine practice over time.

Traditional sport science provides a useful comparison because it has historically confronted similar challenges of multidimensional performance complexity. Research across endurance, strength, precision, and team-based sports demonstrates that sustained performance improvement depends on continuous cycles of observation, interpretation, intervention, and evaluation (Chidambaram et al., 2022; Corrado et al., 2024; Seçkin et al., 2023). Athletes are monitored through physiological, biomechanical, and psychological measurements that inform adjustments in training load, technical execution, recovery, and nutrition (Mirifar et al., 2017; Rosenblat et al., 2021; Russell & Kingsley, 2014; Tee et al., 2020).

Importantly, these practices rely not only on measurement technologies but also on organizational structures that support reflective interpretation and coordinated action. Elite sport environments integrate data through specialized staff, shared routines, and iterative planning cycles that collectively guide decision-making (Chidambaram et al., 2022). Consequently, improvement emerges not from isolated observations but from structured processes that connect evidence, reflection, and intervention over time.

Research on high-performance organizations (HPOs) similarly emphasizes reflection as a central mechanism for sustained improvement. Literature reviewed through the methodology presented in Appendix B demonstrates that HPO-aligned frameworks such as Six Sigma, Lean, Lean Six Sigma, Total Quality Management, and Operational Excellence all depend on recurring learning cycles and collaborative problem-solving structures (Al Zaabi et al., 2023; Chay et al., 2015; Mahanti & Antony, 2006; Sharma & Singh, 2023). Frameworks such as DMAIC, the EFQM Excellence Model, and the Malcolm Baldrige National Quality Award institutionalize these principles through formalized routines for diagnosis, evaluation, and organizational learning (Bou-Llusar et al., 2009; Gamal Aboelmaged, 2010; Taraza et al., 2023).

Across the reviewed HPO literature, recurring success factors include leadership alignment, cross-functional collaboration, cultural adaptation, and data-driven decision-making. These patterns suggest that sustained improvement depends less on isolated analytical tools and more on stable reflective processes that coordinate learning across organizational levels (Waal, 2021). Reflection therefore functions not merely as evaluation after performance, but as an ongoing mechanism that structures how organizations collectively interpret evidence and adapt behaviour.

Together, sport science and HPO research demonstrate that structured performance improvement requires recurring reflective cycles in which organizations collectively diagnose problems, interpret evidence, implement interventions, and evaluate outcomes over time.

These insights establish the conceptual foundation for examining operational approaches that translate reflective improvement into practical organizational routines.

2.3 Data Team Method

The data team method (DTM) provides a potential operational solution for embedding structured reflective improvement into organizational practice. Whereas HPO theory primarily conceptualizes the organizational conditions required for sustained improvement, the DTM operationalizes these principles through iterative, collaborative analytical processes.

The DTM can be understood as a practice-embedded empirical methodology aligned with action research and design-based research traditions. Rather than functioning as a top-down management instrument, the method structures improvement through recurring cycles of problem identification, hypothesis formulation, evidence collection, interpretation, intervention, and evaluation (Schildkamp et al., 2014). Importantly, these activities occur within everyday organizational practice rather than external assessment contexts.

A defining feature of the DTM is its collaborative and cross-level structure. Teachers, managers, and organizational leaders collectively participate as investigators who contribute different forms of contextual and professional expertise. Research on distributed leadership and organizational learning demonstrates that such collaborative interpretation broadens analytical perspectives and reduces the risk of narrow problem framing (Schildkamp & Poortman, 2015). As a result, data interpretation becomes more context-sensitive and more likely to generate sustainable organizational change.

The method's iterative and non-linear character further strengthens its suitability for complex environments. Teams continuously revisit hypotheses, analytical assumptions, and interventions as new information becomes available. Within design-based research traditions, this iterative refinement increases validity by allowing organizations to test and adapt findings in situ. Consequently, non-linearity within the DTM functions not as methodological inconsistency but as reflective validation embedded within organizational learning processes.

Although empirical evidence for the DTM primarily originates from educational settings, its underlying logic is not sector-specific. The method demonstrates how organizations can systematically combine evidence collection, collaborative interpretation, and iterative evaluation without requiring highly formalized institutional infrastructures. This makes the DTM conceptually relevant for esports environments, where teams similarly operate in fast-changing and information-rich contexts that require coordinated interpretation and rapid adaptation.

2.4 Why the Data Team Method is insufficient directly

Despite these similarities, the direct application of the DTM to esports remains insufficient because esports environments differ fundamentally from the educational settings in which the method was originally developed.

Educational contexts typically emphasize long-term organizational stability, formalized decision structures, and gradual intervention cycles spanning months. In contrast, esports environments operate under conditions of rapid adaptation, unstable competitive metas, short performance cycles, and highly dynamic team structures. Competitive success often depends on immediate contextual interpretation rather than extensive procedural analysis. Consequently, esports teams require more flexible and situated improvement processes than those traditionally emphasized within educational data literacy frameworks.

Furthermore, the original DTM places substantial emphasis on systematic data quality procedures and formal analytical inquiry. While these elements remain valuable, esports performance environments frequently prioritize speed, contextual judgement, and collaborative interpretation over extensive methodological formalization. Performance discussions often occur during scrimmages, tournament preparation, or post-match review sessions where actionable interpretation must emerge rapidly from incomplete information.

Another limitation concerns intervention development. Within the original DTM, intervention design receives relatively limited procedural emphasis, as participants are generally expected to independently translate analytical findings into practical action. However, esports teams often lack established reflective infrastructures and may therefore require greater procedural support in connecting analysis to intervention design and implementation.

Thus, while the DTM provides a valuable conceptual foundation for collaborative and iterative improvement, esports environments require adaptation of its structure, pacing, and emphasis to align with the realities of competitive performance ecosystems.

2.5 Framework adaptation

The proposed framework is structured as a recurring sequence of eight interdependent phases, depicted in Figure 1, that guide performance development within esports teams. The framework begins with the collective identification of a performance-related problem that is defined at the team or organisational level rather than attributed to individual failure. This problem definition phase is followed by cause definition, aimed at determining the most likely source of performance fallacies. Subsequently is targeted data collection, in which relevant performance, training, or contextual data are gathered in a purposeful manner. The analysis phase translates these data into interpretable insights that inform decision-making, after which concrete interventions are designed and implemented within training, competition, or organisational routines. The final phase consists of structured evaluation, where outcomes are assessed against the initial problem definition and used to refine subsequent cycles.

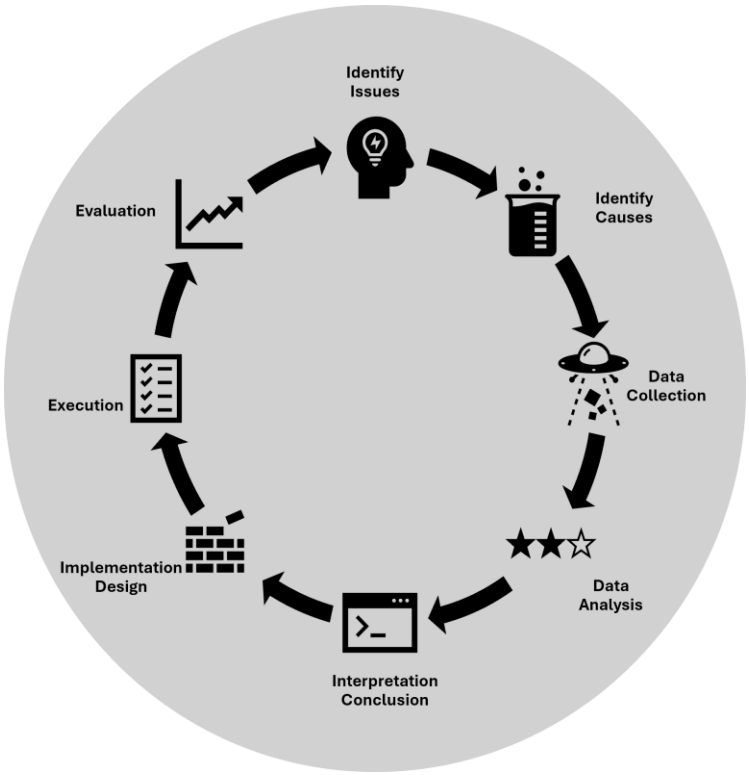


Figure 1 visual representation of framework

The eight phases of the SPI framework directly operationalize the principles identified across esports performance research, traditional sport science, high-performance organization studies, and the data-team methodology. Esports and sport science literature highlight the need for structured diagnosis, targeted data collection, and iterative evaluation, reflecting the core logic that performance improvement requires cycles of measurement, interpretation, and adjustment rather than isolated interventions. High-performance organization research emphasises coordinated learning, distributed expertise, and stable routines, which are translated in the framework into collective problem identification, shared hypothesis formulation, and alignment of intervention decisions with team-level objectives. The data-team methodology contributes the structure of cycles, wherein teams iteratively refine their understanding through evidence collection, collaborative analysis, and evaluative reflection. Taken together, these theoretical traditions justify the framework's progression from problem

definition (Phases 1–2), through evidence gathering and interpretation (Phases 3–5), to intervention and evaluative learning (Phases 6–8), thereby embedding systematic, team-level improvement into the everyday performance practices of esports teams.

The structure of the proposed framework has been altered from the Data Team Method(DTM). Although originally developed within educational contexts, the DTM shares several theoretical characteristics with esports performance environments, including collaborative decision-making, iterative improvement processes, distributed expertise, and the need for reflective evaluation of complex performance situations. These similarities make the DTM conceptually relevant as a foundation for structured SPI within esports

However, several adaptations were introduced to better align the process with the theoretical characteristics of esports performance environments discussed in the literature. The original DTM was developed within educational contexts and primarily emphasizes systematic data literacy, evidence-based inquiry, and formalized analytical procedures conducted within long-term organizational settings. In contrast, esports performance analysis literature highlights the importance of situated decision-making, rapid contextual interpretation, and collaborative reflection within highly dynamic team environments. Given that esports titles generate standardized data, the aspect of data quality can be minimized and integrated with data analysis.

Furthermore, the original DTM places relatively limited emphasis on the intervention phase, with participants being expected to formulate interventions largely independently following the analytical stages. Given the exploratory and as yet unvalidated nature of the proposed SPI framework, the ordering of several steps was adapted to provide greater emphasis on intervention development and evaluation. This restructuring was intended to more explicitly support translating analytical insights into actionable improvement strategies and evidence-informed performance practices. To address this, principles derived from Intervention Mapping (Kok et al., 2016) and the Behaviour Change Wheel (Michie et al., 2011) are ingested in these intervention stages. Intervention Mapping(IM) was chosen as the method provides effective and evidence-based interventions for fast paced settings (Jones et al., 2023; Mattie et al., 2020; Pattyn et al., 2022). The Behaviour Change Wheel(BCW) was chosen to provide grounded logic for deciding training aspects and has shown promise in gaming (de Salas et al., 2022). All adaptations are aggregated and shown in Table 1:

Table 1 Overview of framework differences

Dimension	Data Team Method (DTM) / HPO Foundation	SPI Framework Innovation	Rationale for Esports Adaptation
Primary Goal	Focused on formalised data literacy and evidence-based inquiry within stable educational settings.	Focused on situated, collective adaptation and rapid strategic improvement.	Esports requires immediate, team-level responses to shifting competitive "metas" rather than long-term institutional shifts.
Pacing & Cycle	Emphasises long-term organisational	Designed for rapid, short-cycle routines	The high-velocity nature of digital

	cycles and gradual intervention.	that align with bi-weekly game update cycles.	competition necessitates faster feedback and reflection loops than traditional domains.
Data Handling	Requires high procedural rigour regarding data quality and formal analytical inquiry.	Minimises formal data quality procedures in favour of collaborative, dialogue-based reflection.	To reduce cognitive load and overcome "grind culture" norms, players need accessible insights over complex statistical preparation.
Intervention Strategy	Offers limited procedural support for the intervention phase; participants work independently.	Substantially expanded Phases 6–8 providing structured guidance for intervention design and evaluation.	Esports demographic is not expected to have similar capabilities to those in education.
Organisational Focus	Focuses on cross-level management and instructional change.	Integrates Sport Science and HPO principles to shift from individual mechanical "grind" to team-level capability.	Moves performance development from fragmented player-level optimisation to a coordinated organisational learning architecture.

3 Methodology

To answer the research questions, the results are structured in three separate sections. initial walkthrough, design, and evaluation. This was chosen as the proposed framework is untested, therefore prototype design and eval depend on the validity of the underlying framework. By first gathering results on the framework, practical feedback will guide more considerate prototype design. Each respective section will describe the methodology and Results as these depend on each subsequent part. In short the study is structured as follows: after the initial eval, a prototype is designed based on the results of that part. Finally, the prototype is tested to see if it fulfills the requirements deduced in design.

This methodology section specifically explains the general study design.

Participants

Participant selection was guided by two criteria: competitive level and proximity. Competitive level was used to ensure that participating teams operated within a professional or semi-professional structure, allowing for meaningful engagement with systematic performance improvement practices. Proximity was considered to reduce logistical constraints related to scheduling and availability.

Participants were recruited through the Rocket League Championship Series-related tournament Rocket Soccar Confederation(RSC). The tournament structure divides players into tiers based on a predefined Matchmaking Rating (MMR) range. Players are initially assigned to teams within their respective tiers. Following a two-week selection period, teams finalize their roster composition. After this stabilization phase, teams were invited to participate in the study on a voluntary basis. After deliberation, one team chose to continue with the study.

Rocket League was selected as the research context due to the researcher's prior familiarity with the game and its competitive environment. Esports titles are characterized by domain-specific terminology, mechanics, and strategic conventions that require contextual understanding for accurate interpretation. Selecting a title in which the researcher possessed prior knowledge reduced the risk of misinterpretation and facilitated meaningful communication with participants. For readers unfamiliar with Rocket League, the game can be described as follows:

Rocket League is a vehicular sports video game developed by Psyonix in which players control rocket-powered cars to interact with a large ball in a closed arena. The primary objective is to score goals by striking the ball into the opposing team's net within a fixed match time. Players move using standard driving controls while also utilizing a boost system that allows rapid acceleration and aerial movement. Jumping and mid-air control enable cars to perform aerial maneuvers, flips, and directional adjustments, which are central to advanced gameplay. The physics-based interaction between the vehicles and the ball determines ball trajectory, speed, and rebounds from arena surfaces. As a result, gameplay revolves around precise car control, timing of jumps and boosts, and positioning within the arena to influence ball movement and create scoring opportunities

Ethical Consideration

Gameplay recordings and performance data were treated as confidential team material and were not shared outside the research context. Data were anonymized in reporting.

Ethical approval for the study was obtained from the University of Twente CIS Ethics Committee (reference nr 241191). All participants provided informed consent and were informed of their right to withdraw from the study at any point without consequence. The consent form can be found in Appendix C.

4 Part A: Conceptual Walkthrough

This part will first explain methodological considerations specific to this section. Afterwards the results are shown in section 4.1.

Procedure

The co-design process consisted of multiple structured meetings, each dedicated to a specific stage of the SPI framework. The timeline can be found in Table 2 below. During these sessions, participants engaged in guided discussions aimed at evaluating the clarity, feasibility, and perceived usefulness of each framework component.

	week 1	week 2	week 3	week 4	week 5	week 6	week 7	week 8
meeting								
text coding								
design reqs								
material								

Table 2 Timeline Meetings

Between sessions, data and recordings from the discussions were analyzed using a grounded theory approach. Emerging themes were translated into design requirements that informed iterative refinements of the framework.

Materials

As described in section 2.5, the framework structure is derived from the data team method. Additionally, the material used in the data team also serves as the basis for activities in this part. However, the data team and its activities were designed with physical meetings in mind, such as filling in individual tables. Given that meetings will be held online, activities were executed on an online collaborative whiteboard. This tool enabled shared visualization, clustering of ideas, and real-time interaction. Each framework stage was presented on the whiteboard, with interactive elements tailored to the purpose of specific subcomponents. A list of all activities is shown in Table 3:

Section	Activities
Identify issues	Issue table
	Issue aggregation
	Issue prioritization
	Formalizing issue
Identify causes	Cause table
	Cause aggregation
	Cause prioritization
	Formalizing cause
Data Collection	Requirements
	Preparing
Data Analysis	Analysis
Interpretation & Conclusion	Interpretation
	Conclusion
Design Implementation	Bad situations
	Good situations
	Why good
	Where to improve
	Training
	Implementation plan
	Measurements
Execute Implementation	Execute
Evaluate Implementation	Evaluate

Table 3 Overview of activities per framework step

Prior to each session, participants received a preparatory booklet outlining planned activities. This booklet functioned as a simplified and visually adapted version of the framework manual, designed to manage expectations and reduce cognitive load during sessions. An example page can be found in Appendix E.

4.1 Diagnostic Phase

This phase initiates the cycle by establishing a shared understanding of team performance through the collective identification of issues and their underlying causes. In Step 1, players categorise observations into domains to prioritise a central objective. Step 2 focuses on brainstorming potential causes to ensure that the team addresses root problems rather than symptoms

4.1.1 Step 1 – Issue Identification

The first step of the framework focused on identifying and structuring performance issues within the team. This step consisted of four activities: identifying issues, aggregating them into themes, prioritizing a central problem, and concluding with a shared objective.

Important to note that the table from the first activity has been altered from the original in the data team method. Initial testing revealed that the original problem definition activity was too ambiguous to interpret by participants. Hence, the format was altered to separate examples in categories. 4 were chosen that span esports titles: Skills, Game Sense, Mental Game and Behaviour. An example is shown below in Table 4:

Theme	Observation	Example	Impact	Improvement
Skills	Whiff the ball	Miss the ball during counterattack	Out of rotation	Don’t go for the ball at full speed
Game Sense				
Mental Game				
Behaviour				

Table 4 Example issue table

Findings

Analysis of the reflection tables and group discussion revealed three primary findings: variation in how players perceived performance issues, the central role of psychological resilience during matches, and ambiguity in the categorization framework used during the activity.

4.1.1.1 Variation in perceived improvement areas

The reflection tables showed that players focused on different aspects of performance improvement. Across all participants, fourteen issues were recorded: five related to skills, three to game sense, three to mental factors, and three to behaviour.

These responses indicated that players approached the reflection exercise from different perspectives. Some participants emphasized mechanical skill development, while others focused on tactical understanding or positional play. For example, one player highlighted mechanical execution as a primary concern, while another identified rotational decision-making[1] as a more pressing issue.

This variation is likely to players within the same team perceiving performance limitations differently depending on their role, playstyle, or recent match experiences.

4.1.1.2 Psychological resilience as the shared priority

Despite the diversity of individual reflections, the group discussion converged on psychological resilience as the most significant shared issue. Players repeatedly described how mistakes affected their mental state during matches and influenced later decision-making. An example aggregate is depicted in Table 5:

Issues	Issues	Issues	Theme
Limited communication	Hesitation	Quiet during pressure	**Communication**
Overthinking	Not capitalizing	Emotional response	**Decision-making**
Out of play	Inefficient movement	Difficulty interpreting	**Positioning**
Timing	Technique	Skill competency	**Consistency**

Table 5 Example issue aggregate

One participant explained that “that play will just stay in my head… it just leads to a goal.” Another noted that mistakes could affect later decisions because “that would just play throughout the game… it’ll mess up my overthinking.” Players also described internal pressure related to expectations of perfect performance. One participant summarized this by

[1] Rocket League often requires players to take on multiple positions, e.g. attacker, defender, midfielder. Switching between these roles is context dependent, and can change quickly.

stating that players were “thinking too much of yourself… expecting yourself to be perfect every time.”

Participants also emphasized the difficulty of recovering mentally after mistakes. One player described the experience as “you just go down and you don’t know how to get out of the down.” These reflections suggest that the team perceived psychological recovery during matches as a major factor influencing overall performance

4.1.1.3 Ambiguity in the categorization framework

A third finding concerned the structure of the reflection framework itself. Several participants experienced difficulty categorizing specific issues within the predefined domains of skills, game sense, mental game, and behaviour.

For example, one participant asked how communication behaviour should be categorized, stating: “Where would I put comming, like doing comms, is that skills or game sense?” After clarification, the issue was placed in the skill category.

This moment highlighted that some categories were not sufficiently self-explanatory for participants. When categories overlap conceptually, players may hesitate or interpret them differently, which can slow down the reflection process.

4.1.2 Step 2 – Cause Identification

The second session focused on identifying potential causes for the inconsistent performance identified in the previous step. Similar to the first session, the framework consisted of four activities: identifying possible causes, aggregating them into broader categories, prioritizing the most relevant issue, and drawing a shared conclusion.

Findings

Analysis of the brainstorming session revealed three primary findings: a wide range of perceived causes for inconsistent performance, the emergence of scrim-to-match adaptation as a central issue, and ambiguity in categorizing certain causes within the proposed framework.

4.1.2.1 Diversity of perceived causes

Participants proposed several potential causes for performance “crash outs[2]” during scrims and official matches. These causes ranged from individual factors such as fatigue and frustration to environmental influences including room temperature and controller quality. Players also mentioned broader competitive dynamics, such as adapting too strongly to scrim[3] opponents before official matches

Some of the suggested causes reflected physical conditions affecting performance, including sleep quality, fatigue, and cold hands. Others related to mental factors such as frustration, loss of focus, or entering “autopilot” during gameplay. Environmental influences were also mentioned, including mismatches between scrim environments and official matches, as well as equipment concerns.

These responses indicate that players interpreted inconsistent performance as the result of multiple interacting factors rather than a single isolated cause.

4.1.2.2 Scrim-to-match adaptation as the central issue

Although a variety of causes were discussed, the conversation gradually converged on one dominant explanation: excessive adaptation to scrim opponents. Participants described how practice matches often required adjusting to the playstyle of specific opponents. When transitioning to official matches, these adjustments sometimes persisted and negatively affected the team’s early performance in a series.

One participant summarized this issue by explaining that adapting too strongly to scrim opponents left the team “fucked up a lot in the first games of the series.” Players reported that this situation often resulted in poor starts, frustration, and a need to spend several games re-adjusting to the actual match environment.

[2] a moment when a player loses emotional control due to frustration, resulting in impulsive or unproductive behavior during gameplay.
[3] a practice match between players or teams used to train strategies and coordination without affecting official rankings.

Within the discussion, other factors such as fatigue, communication breakdowns, or frustration were frequently reframed as consequences of this underlying issue rather than independent causes.

4.1.2.3 Ambiguity in categorizing causes

A third observation concerned the classification of causes within the proposed domains of mental, physical, and environmental factors. Several issues overlapped multiple categories, which led to brief discussions about how they should be categorized.

For example, burnout was discussed as both a mental and physical issue. Similarly, controller problems were raised as environmental factors but were also associated with mechanical execution and skill performance. These overlaps occasionally slowed the discussion and required clarification from the facilitator.

This finding suggests that some performance issues cannot be easily separated into distinct domains and may involve interactions between psychological, physical, and environmental conditions.

4.2 Analytical Phase

This phase focuses on gathering and interpreting empirical evidence to move the team from subjective impressions toward data-informed insights. Step 3 involves determining necessary data sources, such as gameplay replays or statistical metrics, and initiating collection processes. In Step 4, the team applies qualitative analysis to match recordings and session transcripts to identify recurring tactical patterns like rotational coordination or spacing errors. The phase concludes with Step 5, where participants synthesise these findings into analytical conclusions and assess their team's current level of adaptability.

4.2.1 Step 3 – Data Collection

The third session aimed to initiate data collection to support evidence-based analysis of team performance. Unlike the previous steps, this session consisted of two activities: determining what data should be collected and how it should be gathered, and creating an overview of the collected data for later analysis.

Findings

Analysis of the session revealed three primary findings: limited engagement with structured data collection, reliance on qualitative replay discussion, and the identification of recurring playstyle patterns affecting team performance.

4.2.1.1 Limited engagement with structured data collection

Participants showed limited engagement with the initial task of defining structured datasets for analysis. Contributions during this phase were sparse, and several players expressed uncertainty about the purpose of the activity. One participant summarized this hesitation by stating that “this activity is more suited for doing between meetings… because you’re just depending on other people to collect their stuff.”

The planned step of pre-sharing replay files[4] before the meeting was also not completed. As a result, only fragments of gameplay material were available at the start of the session. This limitation forced the group to shift away from structured planning toward reviewing available recordings during the meeting. An example of such a fragmented dataset is shown in Table 6:

[4] a saved file that records all in-game events of a Rocket League match, allowing players to replay and analyze gameplay from different perspectives.

Group	Outcome	Approach Style	Pressure Level (%)	Control Level (%)	Key Observations
Group A	Negative	High-intensity, pressure-focused	40%	60%	Overcommitment leading to mistakes; occasional breakdowns in structured execution
Group B	Neutral	Mixed approach			
Group C		Controlled, structured approach			More consistent control and better decision-making under pressure
Group D					Inconsistent pressure application; periods of strong control not sustained

Table 6 Example data collection with missing data

Players also showed little enthusiasm when discussing data-centric tasks such as defining tables or statistical tracking methods. As a result, the structured preparation of datasets progressed only minimally during the session.

4.2.1.2 Reliance on qualitative replay discussion

Because structured data preparation was limited, much of the session evolved into a qualitative review of available gameplay recordings. The team analyzed two scrim sets and briefly discussed a ranked warm-up match.

Discussion of the ranked match primarily focused on preparation habits. One player remarked that “those ranked games have really been helping,” suggesting that warm-up matches were perceived as beneficial for match readiness.

The first scrim set was discussed more briefly. Players remembered the series as a missed opportunity due to a controller malfunction that occurred while the team was leading. However, the discussion also returned to concerns about the team becoming predictable during matches. One participant explained that “a lot of people start getting used to how we play and then we just get countered.”

4.2.1.3 Identification of recurring playstyle patterns

The second scrim review produced more detailed observations about the team's gameplay. Players recognized a recurring pattern in their offensive approach: although they frequently produced a higher number of shots than their opponents, these attempts rarely translated into dangerous scoring opportunities.

One participant summarized this observation by stating that "we always have more shots than other teams." Another immediately added that these attempts were "all just cheap shots, basically." Players acknowledged that their tendency to shoot whenever possible limited their ability to create higher-quality scoring chances.

This pattern was also linked to a lack of coordinated offensive plays. One player observed that "we don't really go for many passing plays to be honest." Another confirmed that the team's offense was "all quite individual." These reflections suggested that the team's playstyle emphasized individual actions rather than coordinated team plays.

4.2.2 Step 4 – Data Analysis

The fourth session focused on analyzing the collected data. Because the primary data consisted of match recordings, gameplay footage, and team discussions, a qualitative data analysis approach was applied. Gameplay footage and transcripts from review sessions were examined to identify recurring patterns in team performance. Observations and player reflections were grouped into thematic categories related to team coordination, decision-making, and strategic adaptation

Findings

As in previous sessions, the players had limited prior experience with structured data analysis. Consequently, matches were reviewed collaboratively using a qualitative approach based on gameplay footage and discussion transcripts. During the session, the flow of the meeting was briefly disrupted when the recording software stopped functioning. Although the issue was resolved quickly, it temporarily interrupted the discussion process.

Analysis of the review sessions revealed three primary themes: rotational coordination, decision-making and spacing, and adaptation to opponent strategies.

4.2.2.1 Rotational coordination

The first series analyzed was an early-season 4-0 defeat. Players acknowledged that the team was experiencing poor cohesion and inconsistent decision-making during this period. Video review and discussion transcripts frequently referenced problems with overlapping rotations and defensive coverage. Players described the situation as "being on top of each other," which limited offensive opportunities and reduced defensive stability.

When reviewing a match that occurred after the team had a separate coaching session, participants reported improvements in this area. Players described rotations as becoming "cleaner," and noted that teammates were "not on top of each other as much." Video

analysis supported this observation, showing more consistent coordination of first-, second-, and third-man[5] responsibilities.

4.2.2.2 Decision-making and spacing

A second recurring theme concerned spacing and ball control decisions. Early gameplay examples demonstrated frequent clustering around the ball and impulsive challenges. Players reported that these situations often resulted in unnecessary double commits[6] and loss of possession.

Reviewing recent matches, players identified improvements in spacing and decision-making. One participant noted that improved positioning “made it easier for the guy going for the ball.” Another player described how the team was “not double committing nearly as much and our spacing is a lot better.” Players also reflected on their ball control approach, noting that they were “booming the ball too much” and should instead maintain possession through controlled touches.

4.2.2.3 Adaptation to opponent strategies

A third theme related to the team’s ability to adapt to different opponent playstyles. Early in the season, players attributed several losses to “tunnel vision” and difficulty responding to changes in opponent tempo. Opponents often alternated between slow possession-oriented play and rapid counterattacks, which disrupted the team’s rhythm.

Through repeated review sessions, players began to recognize these strategic variations and discussed possible adjustments during gameplay analysis.

[5] Responsibilities of a player during a match. 1st man is the direct attacker, 2nd man covers the attacker, 3rd man stays behind and covers a counter.
[6] when multiple teammates challenge the ball at the same time, leaving the team out of position and vulnerable to a counterattack.

4.2.3 Step 5 – Interpretation & Conclusion

The fifth session focused on interpreting the findings from the previous steps and drawing conclusions that could support the following phases of the framework. During this session, participants reflected on the issues, causes, and gameplay patterns[7] identified in earlier meetings.

Findings

Analysis of the discussion revealed three primary findings: partial improvement in previously identified gameplay issues, differing interpretations of adaptability among players, and difficulty translating observations into clear analytical conclusions.

4.2.3.1 Partial improvement of recurring gameplay issues

Players revisited several problems that had been identified during earlier sessions, including cutting rotations[8], poor positional spacing, communication breakdowns, and inefficient defensive positioning. Participants generally agreed that these patterns had improved over time, although they still occurred occasionally during matches.

One example frequently discussed was rotation interruption, which occurs when a player challenges the ball before a teammate's rotation has been completed. Players acknowledged that this behavior had become less frequent but had not been completely eliminated. These reflections suggest that the team recognized progress in certain aspects of coordination while also acknowledging that some issues remained present in specific situations.

4.2.3.2 Diverging interpretations of adaptability

A second finding concerned how players interpreted the concept of adaptability. As the discussion progressed, participants attempted to connect the observed gameplay patterns to the broader idea of adapting during matches.

However, the group did not fully agree on how adaptability[9] should be defined or measured. One participant argued that the inability to correct mistakes during a match indicated limited adaptability. Another player suggested that the team was capable of adapting in some situations, particularly when responding to specific opponent strategies.

This difference in interpretation indicates that players did not share a fully consistent understanding of what adaptability meant in the context of their gameplay.

[7] recurring and observable behavioural structures in gameplay, identified across multiple instances, that capture how players position themselves, make decisions, and coordinate actions in response to in-game situations.
[8] when a player interrupts a teammate's rotation to challenge the ball earlier, often causing positional confusion or double commits.
[9] The ability to change team or individual tactics during the match to outperform the opponent.

4.2.3.3 Difficulty translating observations into conclusions

A third observation concerned the way players discussed gameplay evidence. Much of the conversation focused on describing specific gameplay situations rather than interpreting what those situations implied for the team's adaptability.

For example, players frequently recalled moments such as "cutting rotation on the ball side" or failing to maintain spacing. While these descriptions demonstrated awareness of recurring problems, they were not always followed by analytical conclusions about why these patterns occurred or what they meant for overall team performance.

As a result, the discussion contained a noticeable imbalance between descriptive reflection and analytical synthesis.

4.3 Intervention Phase

This phase operationalises the analytical insights gathered in earlier stages by designing and executing concrete improvement strategies. Step 6 translates conceptual findings into a measurable implementation plan using structured templates and behaviour change principles. Step 7 involves the practical implementation of these changes during live gameplay. Finally, Step 8 evaluates the intervention's success by comparing qualitative observations against quantitative performance metrics to determine if initial objectives were met.

4.3.1 Step 6 – Intervention Design

The sixth session focused on developing a performance improvement intervention by translating the conceptual findings from earlier sessions into a measurable implementation plan. The session built on insights gathered during previous meetings, where gameplay issues, causes of inconsistency, and adaptability challenges had been identified.

As stated in Section 2.5, this step was completely altered. By leveraging practices from IM and BCW, activities can be created that guide intervention design. The resulting sequence of activities for Step 6 is illustrated in Figure 2:

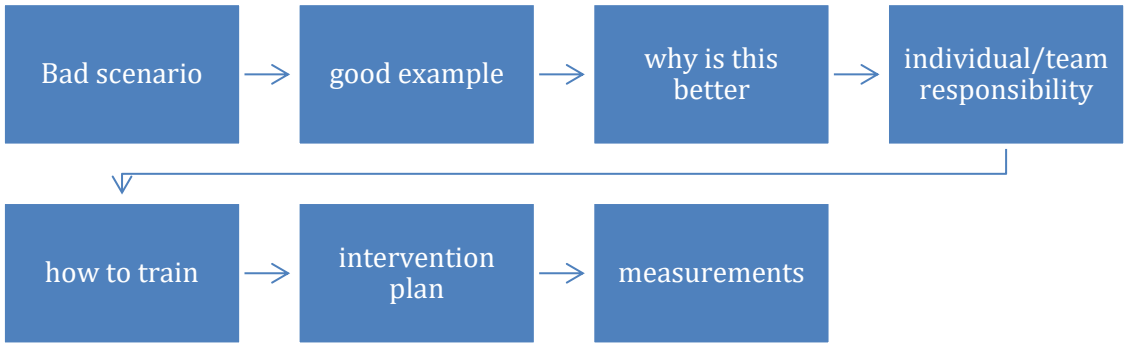


Figure 2 Workflow diagram of intervention design activities

Findings

Analysis of the session revealed three primary findings: players demonstrated strong conceptual understanding of desirable gameplay behaviors, difficulties emerged when translating these concepts into concrete training actions, and the selection of measurable evaluation metrics proved challenging.

4.3.1.1 Conceptual understanding of desirable behaviors

Players showed a clear ability to describe what effective gameplay behaviors should look like. When discussing examples of improved play, participants were able to articulate desirable patterns related to positioning, decision-making, and coordination. Given the team's competitive experience, this level of conceptual understanding was expected.

Players were also able to explain why these behaviors would lead to improved performance. During discussion, participants connected improved coordination and positioning to better offensive opportunities and reduced defensive vulnerability. This reasoning indicated that players understood the strategic importance of the behavioral changes they were proposing.

4.3.1.2 Difficulty translating concepts into training actions

Although players could describe desirable behaviors conceptually, the discussion revealed difficulties when translating these ideas into concrete training actions. When asked how the desired behavior could be actively trained or changed, participants required additional prompts and facilitation.

Individual	Team
individual mechanics	team skills
individual decisions	team readability
individual perception	team playstyle
	team culture

Table 7 Categories for intervention training

Part of this difficulty emerged when the team attempted to categorize training needs. Players were asked to determine whether specific behaviors should be trained individually or collectively. The initial set of training concepts proved insufficient, as players struggled to directly relate these abstract categories to specific gameplay situations. With additional guidance, participants were eventually able to assign the desired behaviors to appropriate training categories. The categories used are shown in Table 7.

The team also discussed possible improvement strategies. One idea involved reflecting on gameplay performance between matches to reset mentally and evaluate team coordination. While players agreed on the usefulness of such reflection, the exact structure of these reflection moments remained unclear.

4.3.1.3 Challenges in defining measurable evaluation metrics

A final observation concerned the difficulty of selecting measurable evaluation metrics. Players recognized that performance improvements would need to be assessed objectively rather than relying solely on subjective impressions.

With facilitator support, the team identified two quantitative metrics that could potentially reflect improved behavior. However, participants expressed uncertainty about whether these indicators would reliably represent actual performance improvement. As a result, the team continued to rely primarily on subjective judgment when evaluating gameplay situations.

This outcome suggests that players felt more confident identifying meaningful gameplay moments qualitatively than defining statistical indicators that could capture those moments objectively.

4.3.2 Step 7 - Implementation

The seventh session focused on implementing the improvement plan developed during the previous meeting.

The intervention aimed to test whether the team could apply the previously defined behavioral adjustments during live gameplay and between-match reflection periods.

Findings

Analysis of the gameplay communication and between-match discussions revealed three primary findings: an initial pattern of reactive communication, the gradual emergence of anticipatory team coordination, and the increasing use of intermissions for reflective problem-solving.

4.3.2.1 Reactive communication in early matches

Communication during the first matches of the session was largely reactive. Players focused primarily on immediate gameplay events, such as reacting to opponent actions or expressing frustration regarding pace and positioning.

Typical examples included remarks such as “they’re always pre-jumping[10] us” or “we just have to be more calm even if they’re sending it on us.” These statements reflected awareness of the opponent’s strategy but remained primarily descriptive rather than strategic. Communication during these early games therefore emphasized reacting to problems rather than proactively coordinating team responses.

4.3.2.2 Emergence of anticipatory communication

As the session progressed, the team’s communication became more structured and anticipatory. Players began to discuss positional responsibilities and defensive coordination more explicitly. Tactical instructions such as “stay back on the third man” and “let them send it into you” indicated a clearer distribution of roles and increased trust between teammates.

This shift suggested that players were beginning to apply elements of the improvement plan during live gameplay. Rather than reacting individually to situations, players increasingly coordinated their actions through shared tactical language.

4.3.2.3 Reflection during intermissions

Between matches, players have up to 60 seconds to change loadout, or quickly discuss strategy. The team used these short breaks to discuss gameplay observations and potential adjustments. These intermissions functioned as informal debrief sessions in which players analyzed strategic weaknesses such as overcommitting, spacing errors, and rotational confusion.

[10] jumping before the ball is hit or before an opponent makes contact, in order to anticipate the play and reach the ball faster.

During these discussions, players gradually moved from expressing frustration toward identifying possible solutions. One participant, for example, remarked that they had “finally figured them out… just back as third man,” indicating that reflection between games directly influenced tactical adaptation during subsequent matches.

These intermissions therefore served as opportunities for collective reflection and adjustment, allowing the team to refine their approach during the series.

4.3.3 Step 8 - Evaluation

The final session focused on evaluating the outcomes of the improvement intervention implemented during the previous meeting.

This evaluative phase aimed to assess whether the communicative, tactical, and behavioral adjustments observed during gameplay translated into measurable performance changes.

Findings

Analysis of the evaluation discussion revealed three primary findings: observable improvements in gameplay behavior, alignment between qualitative observations and quantitative indicators, and active player involvement in interpreting evaluation metrics.

4.3.3.1 Observable improvements in gameplay behavior

Participants generally agreed that the team's overall performance had improved compared to earlier sessions. The summary assessment provided by the players characterized the outcome as having "did good," marking a transition from ongoing adjustments during gameplay to a retrospective evaluation of the team's development.

Several behavioral improvements were identified during the evaluation. Players observed reductions in random ball-chasing behavior, more controlled positioning, and improved pacing during matches. The team also reported better boost management[11] and greater consistency in maintaining defensive structure.

These observations suggest that the communicative and tactical adjustments introduced during earlier sessions had begun to influence gameplay behavior during matches.

4.3.3.2 Alignment between qualitative observations and metrics

Players also noted that the observed gameplay improvements were reflected in available performance metrics. Indicators related to speed, boost usage, and positional consistency supported the qualitative impression that the team's play had become more structured and less chaotic.

This alignment between subjective gameplay observations and quantitative indicators reinforced the perception that the team had progressed from the earlier stage of reactive and fragmented play toward more coordinated gameplay.

Rather than evaluating isolated match events, participants framed the evaluation as an assessment of the team's development over time. The comparison between current performance and the team's earlier state provided context for interpreting these improvements.

[11] the strategic collection and use of boost to maintain speed, positioning, and the ability to challenge or recover during play in Rocket League.

4.3.3.3 Player interpretation of evaluation metrics

A third observation concerned how players engaged with the evaluation metrics. Rather than accepting statistical indicators at face value, players actively interpreted and contextualized them based on their gameplay experience.

Participants occasionally questioned the relevance of certain metrics. For example, one player stated that “the other stats don’t really matter,” suggesting that some indicators were perceived as less meaningful for evaluating actual performance improvement.

Players also emphasized situational interpretation when discussing the metrics. References to adjustments made during the final matches indicated that players considered tactical context more important than raw statistical outputs.

4.4 Synthesis

The application of the framework across the eight stages revealed several recurring patterns that characterize how the team engaged with the methodology and where difficulties emerged. These patterns provide insight into how reflective improvement processes unfold in practice within esports teams.

A first pattern concerns the team's consistent difficulty with categorization and structured reasoning tasks. Activities that required identifying categories, defining causal relationships, or preparing structured data inputs frequently prompted uncertainty among participants. Players often questioned where specific observations belonged and relied on facilitator clarification when completing analytic tasks. This suggests that activities requiring abstraction and structured reasoning were less intuitive than those grounded in concrete gameplay reflection.

A second pattern relates to the team's strong preference for qualitative, dialogue-based analysis over systematic data-driven procedures. Structured tasks such as defining datasets, completing tables, or preparing statistical summaries were often replaced by conversational replay analysis and situational discussion. This tendency became particularly visible during the data collection phase, where planned activities such as replay pre-sharing and dataset preparation were only partially executed. Instead, the session evolved into an open replay discussion. Although these conversations produced meaningful insights about playstyle patterns, they limited the development of stable analytical routines and introduced inconsistencies in how evidence was collected and prepared.

A third pattern concerns the team's willingness to engage in self-critical reflection. Across multiple sessions, players openly discussed individual and collective shortcomings, including toxic communication, frustration during losses, disengagement, and poor decision-making under pressure. This openness created productive conditions for reflection and shared understanding. However, these insights were not always formalized. Several sessions concluded with collective interpretations that remained undocumented, particularly when defining key causal explanations or specifying concrete training criteria.

A fourth pattern was the gradual convergence toward psychological and situational explanations for performance inconsistency. Although early stages generated a broad range of mechanical, tactical, and behavioural observations, players ultimately emphasized psychological resilience as a central challenge. Participants repeatedly described how early mistakes influenced emotional states and subsequent decisions within a series. During causal analysis, the team further refined this interpretation by identifying excessive adaptation to scrim opponents as a core factor. According to the players, adapting too strongly to scrim playstyles often produced poor starts in official matches, followed by frustration and delayed recalibration.

A fifth pattern concerns the gap between conceptual understanding and practical implementation. Players demonstrated a clear ability to describe desirable gameplay behaviours and articulate why certain practices would improve performance. However, difficulties emerged when translating these insights into operational training plans. Tasks requiring the definition of measurable indicators, structured practice routines, or evaluation

metrics proved particularly challenging. As a result, several intervention strategies remained conceptually defined but operationally ambiguous.

A sixth pattern involves the progressive refinement of communication and team coordination during the intervention phase. Early sessions were characterized by fragmented reasoning, reactive communication, and emotionally driven responses to gameplay events. Over time, however, communication became more anticipatory and coordinated. Players increasingly adopted shared tactical language, clarified positional responsibilities, and demonstrated greater awareness of emotional regulation during matches. Short intermissions between games functioned as informal reflection cycles in which players analyzed mistakes, adjusted strategies, and recalibrated emotionally. Such moments coincided with more coordinated communication and perceived improvements in team rhythm.

Finally, the results reveal persistent ambiguity surrounding the construct of adaptability. While players were able to identify behaviours related to adaptability, such as responding to opponent strategies or managing frustration, they often struggled to connect these behaviours to a clearly defined conceptual framework. This uncertainty limited the clarity of conclusions during interpretive stages and influenced the design of the intervention, where operational definitions and evaluation criteria remained partially unresolved.

Taken together, these patterns indicate that the team engaged meaningfully with the reflective components of the framework but encountered recurring challenges when tasks required abstraction, categorization, or formal analytical procedures. At the same time, the sessions fostered increasing reflective capacity. Communication evolved from reactive responses toward anticipatory coordination, with players adopting shared tactical language during matches. Participants also demonstrated greater awareness of emotional regulation, using intermissions to recalibrate after mistakes. Finally, players collectively identified improvements in positioning, pacing, and defensive structure, indicating a shared perception of performance development.

4.5 Implications

The patterns identified in Part A indicate that the framework's reflective components successfully supported player engagement, whereas several analytical components require redesign to better align with participants' reasoning practices. These findings provide design requirements for the subsequent stage of framework development.

First, players demonstrated difficulty with abstraction, operationalisation, and structured categorisation, even when they possessed relevant gameplay knowledge. Future iterations of the framework should therefore provide clearer examples, predefined categories, and more explicit task instructions when analytical precision is required. Narrower decision pathways may help participants translate experiential knowledge into structured reasoning processes.

Second, while formal analytical steps were only partially completed, players demonstrated improvements in communication, emotional regulation, and positional coordination once reflective discussion became a recurring practice. This indicates that the effectiveness of the framework may depend less on strict completion of analytical tasks and more on maintaining structured reflective dialogue throughout the intervention process.

Third, participants frequently avoided structured data preparation tasks such as dataset creation, statistical aggregation, or systematic coding. Requiring teams to independently construct such datasets may therefore limit adoption. Instead, the framework should distinguish between essential reflective tasks and optional analytical extensions. Simplified indicators, predefined metrics, or facilitator-curated summaries may enable data-informed reflection without imposing excessive cognitive or procedural demands.

Fourth, the results highlight the importance of task clarity and cognitive load management. Several planned activities shifted toward improvisational discussion when participants perceived the original tasks as unclear or overly complex. Future steps within the framework should therefore be evaluated for clarity, feasibility, and cognitive effort before implementation. Providing step-by-step task guidance and concrete examples may reduce deviation from the intended analytical structure.

Finally, the findings suggest that facilitated interpretation is necessary for connecting gameplay observations to broader behavioural constructs such as adaptability. While players were able to identify errors and situational patterns, they required external prompting to link these observations to higher-level concepts. This indicates that facilitators must play an active interpretive role in guiding synthesis and evaluation stages.

Taken together, these implications suggest that the next stage of framework development should focus on designing a structured process that supports reflective dialogue while providing stronger scaffolding for analytical reasoning. The subsequent part B therefore translates these requirements into a refined framework architecture that integrates guided interpretation, simplified analytical procedures, and clearer task structures for collaborative performance analysis.

5 Part B: Prototype

This section describes the methodology used to design the prototype. The objective of this stage was to translate empirical findings from Part A into a functional tool that supports the structured performance improvement framework. The results of this stage are presented in Section 5.1 onwards.

The development process consisted of two stages. First, empirical findings from Part A were translated into design requirements. This intermediate step ensured that design decisions were grounded in observed challenges rather than ad hoc implementation choices. Second, these requirements were implemented in a prototype tool, allowing evaluation of whether the design addressed the identified needs.

Procedure

The empirical findings from Part A were synthesised into a set of practical design requirements. These requirements addressed recurring challenges related to categorisation, analysis, intervention planning, and evaluation observed during the framework sessions. Each requirement translated a specific empirical insight into a functional capability that the prototype needed to support.

Following requirement definition, the prototype was developed to operationalize these capabilities within an interactive workflow. The implementation focused on supporting collaborative reflection, organizing gameplay data, and reducing operational effort during analysis. The resulting prototype functions as an experimental artifact through which the framework can be enacted and evaluated. This approach allows examination of how teams interact with the structured process while maintaining traceability between empirical findings and design decisions.

Materials

The prototype was developed in Python using the PyQt framework for the graphical user interface and Dash for interactive data visualisation. Python was selected to support rapid prototyping and flexible integration of analytical components. PyQt enabled modular interface construction, while Dash provided dynamic graphs and interactive tables required for gameplay data analysis. An overview of the system architecture can be found in Appendix D.

The tool was implemented as a dashboard that guides users through the framework workflow via an interactive interface. Development was conducted using the PyCharm integrated development environment, and the application was packaged for testing with the participating team. The implemented functionality was assessed against the previously defined requirements to determine whether the prototype sufficiently supported the intended workflow.

5.1 Design Objectives

The empirical insights from Part A were translated into a set of design requirements that guided the refinement of each step of the systematic performance improvement framework. These requirements address the recurring challenges observed during the intervention while preserving the reflective practices that supported team learning. The list is shown in Table 8

Table 8 overview of design requirements

Part A Finding	Requirement	Rationale
Players struggled to categorise observations and identify causal relationships.	R1 – Example-based conceptual scaffolding	Provide examples and explanations that link analytical concepts to gameplay situations.
Players preferred discussion over formal analytical exercises.	R2 – Dialogue-centred analysis workflow	Support collaborative reflection rather than individual analytical tasks.
Replay review generated more engagement than abstract datasets.	R3 – Replay-centred evidence analysis	Make replay footage the primary evidence source.
Players found dataset construction difficult and time-consuming.	R4 – Simplified quantitative indicators	Automate data processing and provide predefined metrics.
Insights from replay discussions were rarely recorded systematically.	R5 – Structured pattern documentation	Enable persistence and revisiting of identified patterns.
Players described events well but struggled to draw broader conclusions.	R6 – Guided interpretation support	Provide mechanisms that encourage interpretation beyond description.
Players struggled to convert observations into interventions.	R7 – Operationalisation of behavioural interventions	Support translation from observations to training activities.

Players interpreted metrics through gameplay context.	R8 – Contextual performance evaluation	Combine statistical information with gameplay evidence and reflection.

5.2 Interface Design

This section describes the initial design considerations for the interface. The specific design and implementation can be found later in section 5.3

5.2.1 Navigation

In order to keep navigation clear and separate the exercises, persistent navigation and step-based workflow indicators were used as a basis for the interface. This design decision was informed by Part A findings showing that participants frequently deviated from intended analytical procedures when tasks became unclear or insufficiently structured.

In order to quickly design the core layout, PowerPoint was used. This general layout included a section on the left side for the index. The right side is used to populate content for each workflow. An initial design is shown in Figure 3 below:

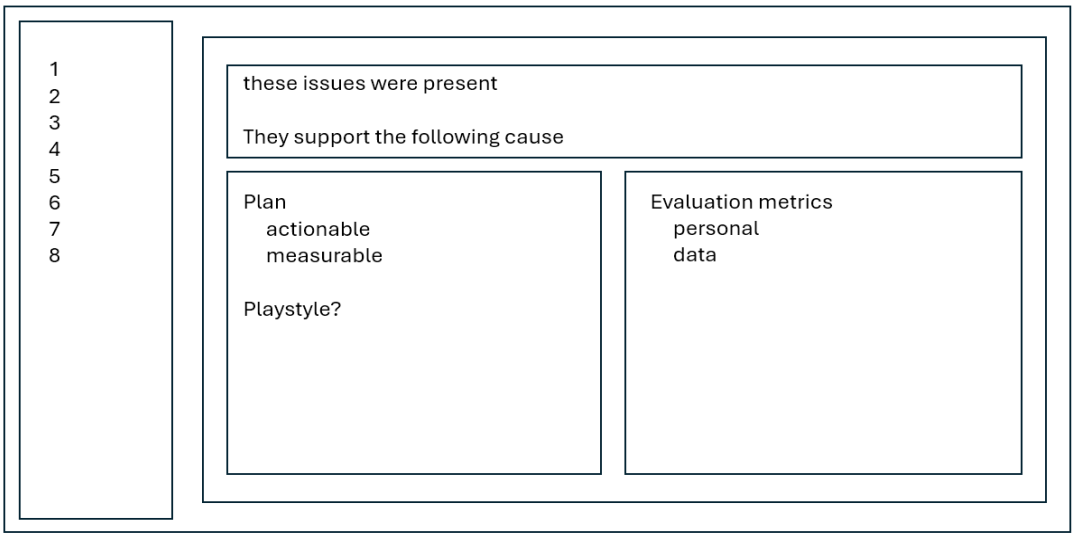


Figure 3 lofi design example

5.2.2 Elements

Designing content layouts for specific uses required considering expected interactions. In data centric steps such as 3 and 4, dropdown boxes and buttons will be more present, like in Figure 4. Dropdown menus can be expected due to the number of selectable variables in the dataset. This approach preserves screen space while maintaining flexibility for large parameter sets. Similarly, graphs and charts are expected to fill the content. Other sections would use simpler interactions like textboxes such as Figure 5.

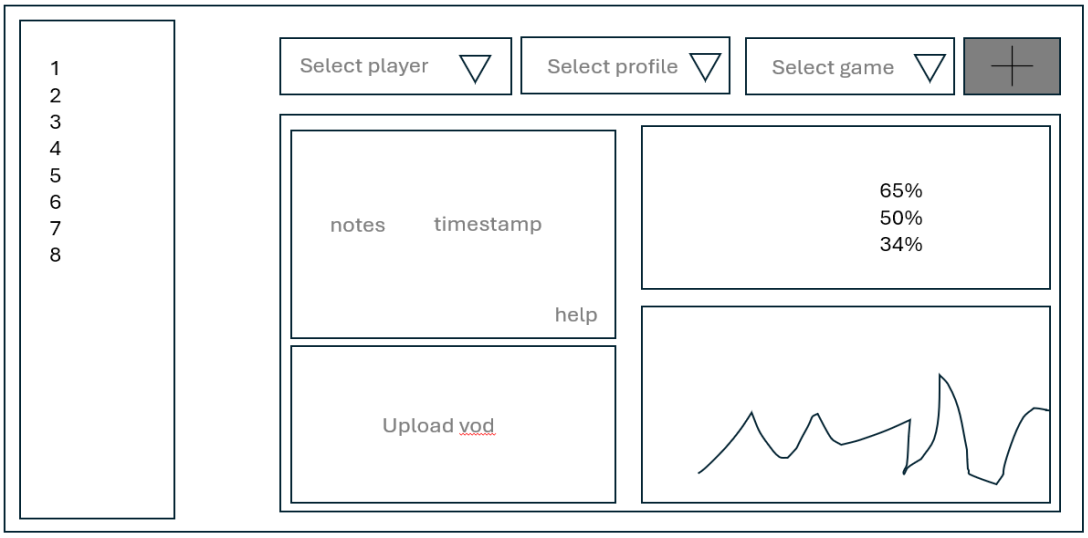


Figure 4 Lo-fi design example

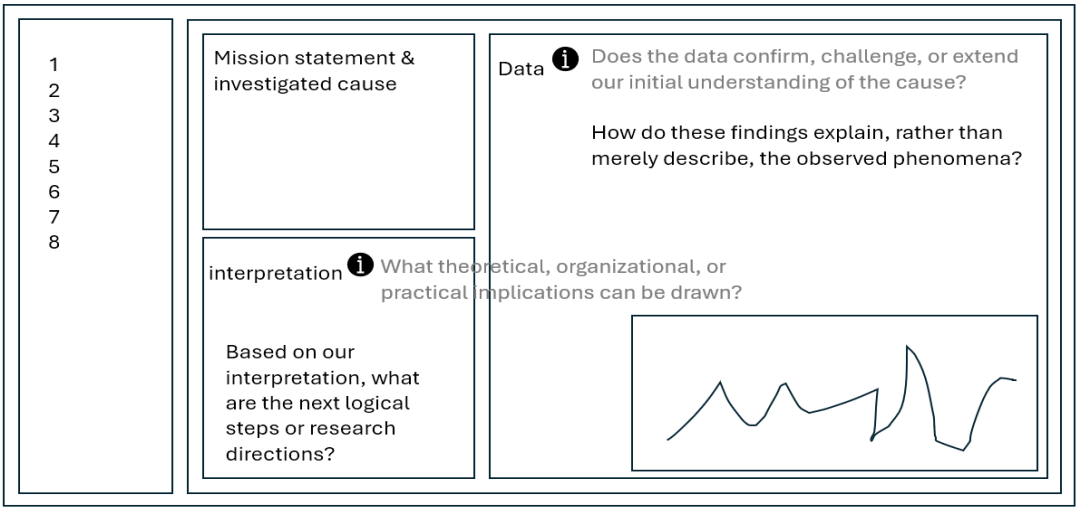


Figure 5 Lo-fi design example

5.2.3 Platform

The implementation of the dashboard required the translation of conceptual design elements into a functional software architecture. The graphical user interface was developed in Python using the PyQt framework, which provides modular interface components comparable to web-based elements. PyQt was selected as the primary framework due to its rapid desktop application development workflow and compatibility with Python-based data processing pipelines. This architecture enabled flexible layout management and responsive interaction design. However, the native functionality of PyQt proved insufficient. The configuration used in this project does not allow for interactive data visualization components such as dynamic tables and graphs. To address this limitation, the Dash framework was integrated to support interactive analytics and real-time graphical rendering.

Point 1 in Figure 6 below represents the eight sequential steps derived from the underlying framework. Each step is operationalised as an individual button within the navigation interface. When a user selects a step, the corresponding button changes to a bright blue colour, thereby signalling active engagement while maintaining consistency with the overall visual identity. Upon completion of a step, the interface updates the button colour to green, visually indicating progress and supporting user orientation within the process structure.



Figure 6 hifi general visuals

Point 2 displays the exercises associated with each selected step. These exercises are presented in a secondary navigation panel. Similar to the primary step navigation, the selected exercise is highlighted in bright blue. This consistent colour logic enhances usability by creating a clear visual hierarchy between steps and subcomponents.

Point 3 constitutes the central content area of the dashboard. This section dynamically renders the instructional material, interactive components, or analytical outputs corresponding to the selected step and exercise. The architecture ensures that content

updates occur without disrupting the overall layout, thereby maintaining structural stability while allowing contextual variation.

Beyond functional considerations, deliberate attention was given to visual design. The colour palette was selected to align with the thematic identity of the game-based environment to which the dashboard relates. Shades of blue form the dominant base colour, establishing visual coherence and structural calmness. Accent colours in green, grey, and orange are used selectively to differentiate functional states, highlight feedback mechanisms, and guide user attention. A darker blue tone serves as the primary background colour, providing contrast for interactive elements while maintaining consistency across interface components. Green was selected for completed steps due to its common association with progress confirmation, while bright blue provides high contrast against the darker background and supports rapid identification of the active interface state.

5.3 Workflow Design

This section describes the unique workflow elements of several steps. Generic workflow items are described in section 5.4.

5.3.1 Step 3

As demonstrated in section 5.1, one requirement is the inclusion of automation to support the collection and preprocessing of game data. This requirement emerged from the need to reduce cognitive demand associated with tasks that users experience as complex or error-prone. Part A demonstrated that players engaged more effectively with contextualized gameplay review than with abstract analytical procedures. Automating these processes allowed analytical effort to be redirected toward interpretation rather than data preparation.

Data loading

To operationalise this requirement, the dashboard was developed to load, transform, and visualise data directly from raw game files. As illustrated in Figure 8, point 1 represents the entry point for initiating a new dataset. Upon activation, the interface reveals a text input field and a confirmation button. The text field allows users to assign a custom identifier to a new dataset, thereby facilitating structured data management and traceability. Following this naming step, the button In Figure 8, and enlarged in Figure 9, as point 2 becomes available. This function initiates the automated loading and transformation of the selected data files, converting raw gameplay logs into structured analytical formats.

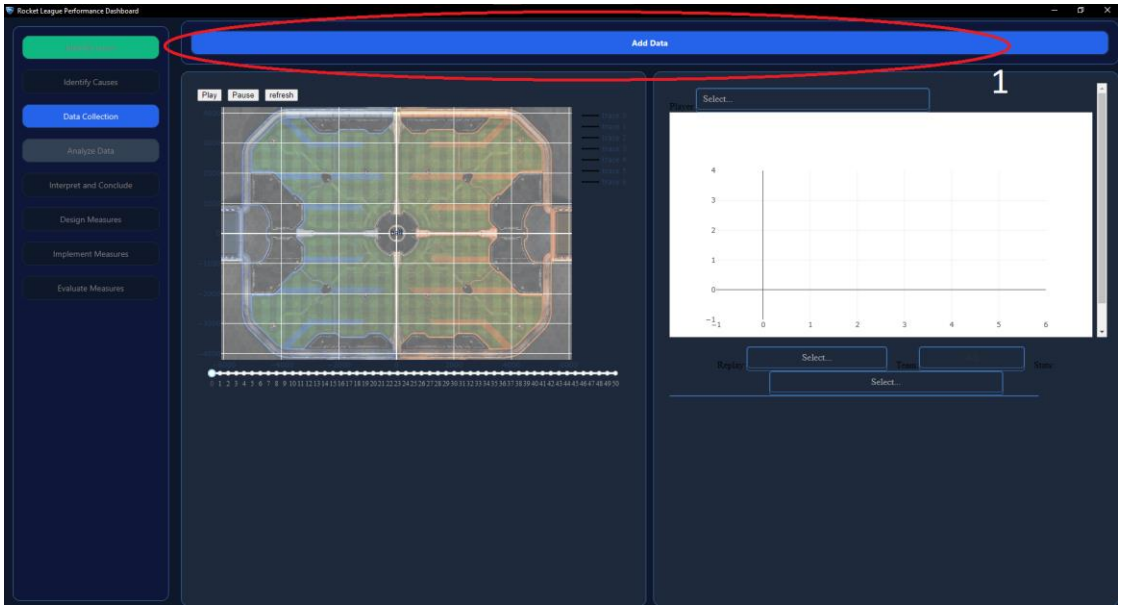


Figure 7 step 3 general visuals

Point 3 provides functionality for previously processed datasets. When selected, the system retrieves already transformed data in a format comparable to a structured spreadsheet. Because preprocessing has been completed in earlier sessions, only data loading is required, thereby enabling faster continuation of prior analyses. This distinction between new

and existing datasets enhances workflow efficiency while preserving analytical continuity by preventing re-processing of saved sets.

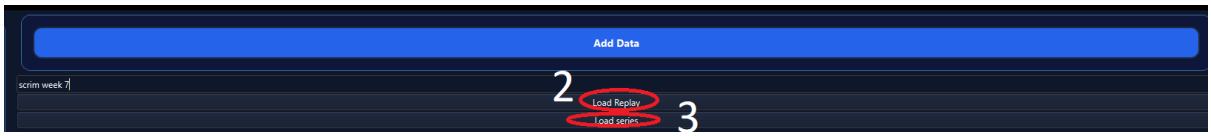


Figure 8 step 3 visuals enlarged

The system supports both single-file analysis and multi-file series analysis, thereby accommodating different analytical objectives. File selection is managed through an integrated internal file selector, which enables users to select multiple files when longitudinal or comparative analysis is required. Upon selection, the system generates two outputs. First, a text file is created containing the identifiers of the selected game files. This file functions as a reproducibility mechanism by documenting the analytical input. Second, in order to improve retrieval speed during subsequent sessions, another file stores relevant gameplay variables and positional data.

Once processing is completed, the dashboard dynamically updates its visualisation components. Interface elements, including dropdown menus, are automatically populated based on the attributes available in the loaded dataset. This can be seen in Figure 10 below.

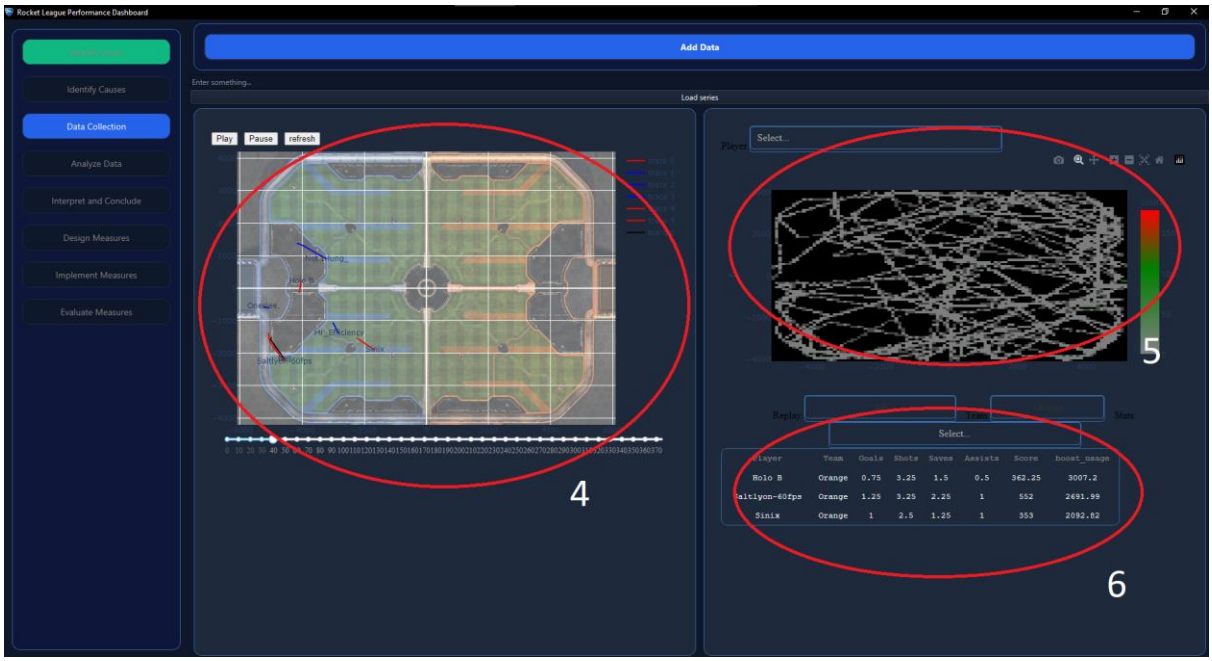


Figure 9 step 3 generated data

Graphical elements

Because analysis of Rocket League gameplay is often highly situational, players frequently need to revisit specific segments of recorded footage. This resulted in fragmented attention during initial testing in Part A. Consequently, a replay review component was incorporated into the dashboard. This feature enables players to efficiently evaluate gameplay situations

without relying on external tools, thereby maintaining focus within the dashboard environment.

Point 4 presents a two-dimensional representation of the playing field. A two-dimensional representation was selected instead of a full 3D replay because it reduces visual complexity and allows positional relationships to be interpreted more rapidly. After data loading, users can replay the match within this spatial interface. Each player is displayed using a distinct colour and name label, while the ball is rendered as a separate visual entity. Player positions are updated over time, and movement trajectories are displayed as trails behind each player. The length of these trails provides an indication of movement speed, thereby enabling temporal-spatial analysis of player dynamics.

Point 5 displays a heatmap[12] representing the spatial distribution of a selected player or the ball across the field. This visualisation supports the identification of positional patterns and territorial dominance. For example, clusters concentrated near a team's own goal area may indicate defensive pressure and limited offensive progression, potentially corresponding with lower possession metrics. The heatmap thus facilitates macro-level pattern recognition across entire matches or series.

Point 6 consists of a conditional statistics table accompanied by a complementary distance matrix. This metric was included as results from Part A showed that distance was an important insight in estimating the team's performance. The upper table presents aggregated performance metrics, either averaged across a series of games or displayed per individual match. Users may filter these statistics by team or extend the table with additional metrics as required. The lower table provides a cross-comparison of average inter-player distances. These values indicate the relative spatial dispersion of team members, thereby offering insight into team structure and formation compactness during play.

The selection of these visual outputs was guided by the objective of supporting multiple analytical perspectives. Spatial replay enables micro-level tactical evaluation, heatmaps facilitate macro-level pattern detection, and statistical tables provide quantitative performance assessment. Together, these components form an integrated analytical environment that connects automated data processing with interpretable visual insight.

[12] A visual representation of a players position across the match. Patterns can show aggressiveness, decisiveness or average position.

5.3.2 Step 4

The improvements implemented in Step 4 aim to strengthen the analytical functionality of the dashboard regarding in-game performance evaluation. This phase builds upon the previously established data processing infrastructure and focuses specifically on generating interpretable performance metrics. The metrics used were guided by participants, which indicated that only spacing-related indicators could be interpreted with sufficient validity at this stage of development. Consequently, the analytical scope was deliberately restricted to spatial coordination and positioning dynamics. Other potential performance indicators were excluded due to insufficient empirical validation.

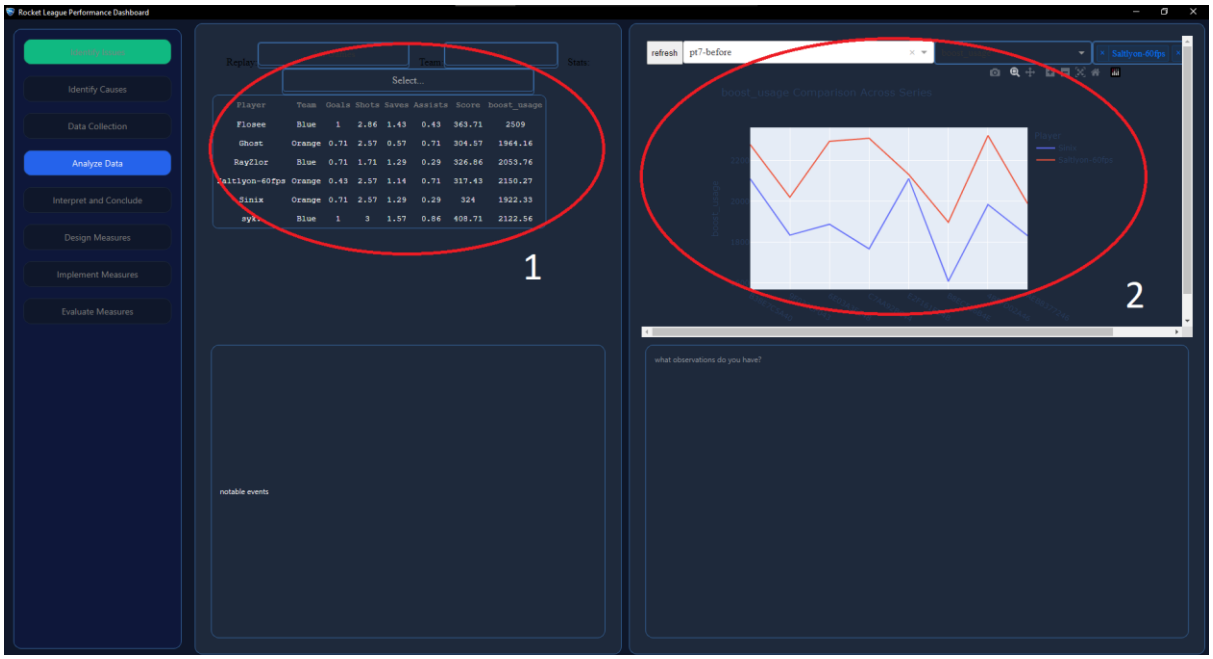


Figure 10 step 4 general visuals

Point 1 in Figure 11 presents a panel of general match statistics. These include outcome-related variables such as score, goals scored, and saves made. The interface allows users to apply filters based on team or specific match selection, thereby enabling targeted analysis within a series. In addition to the metrics directly displayed, users may activate supplementary variables, such as average player speed or ball distance, through configurable selection options. This flexible filtering structure supports comparative and context-sensitive evaluation of performance indicators.

Point 2 displays a comparative line graph designed for longitudinal performance tracking. The dataset created by players in Part A was rudimentary and incomplete, resulting in difficulty tracking performance. Line graphs are great for this purpose because temporal trends and fluctuations are more easily recognised through continuous visual representations than through tabular summaries. In this visualisation, a selected metric for a specified player is plotted across individual matches or across an aggregated series. This structure enables the identification of performance fluctuations, including declines, improvements, or anomalous outcomes. The graph supports simultaneous display of multiple players, thereby facilitating intra-team comparison. Such comparative functionality is

particularly relevant for assessing consistency and relative contribution within coordinated gameplay contexts.

5.3.3 Step 6

The improvements implemented for Step 6 were primarily methodological in nature, and the corresponding adjustments to the dashboard were designed to reflect these methodological choices. Results from Part A showed that operationalising behavioural improvements can be challenging. structured templates were created to support the translation from insights into actionable activities.

Given that this stage of the workflow incorporates multiple interrelated and adaptable elements, a flexible container was chosen. Specifically, the dashboard integrates an embedded website to present the whiteboard, ensuring that the revised procedural structure remains visible and accessible within the broader workflow context.

In addition to this integration, an interactive table was introduced to support the team's justification of selected training techniques, which can be seen in the lower left side of Figure 13. Part of what made operationalising difficult for participants is matching the appropriate training method to the identified game behaviour. This table bridges that gap by providing an overview of relevant intervention methods based on the type of troubling behaviour.

By facilitating targeted filtering and comparison, the table supports informed interpretation of training techniques in relation to the chosen intervention strategy, while preserving flexibility in how these techniques are applied.

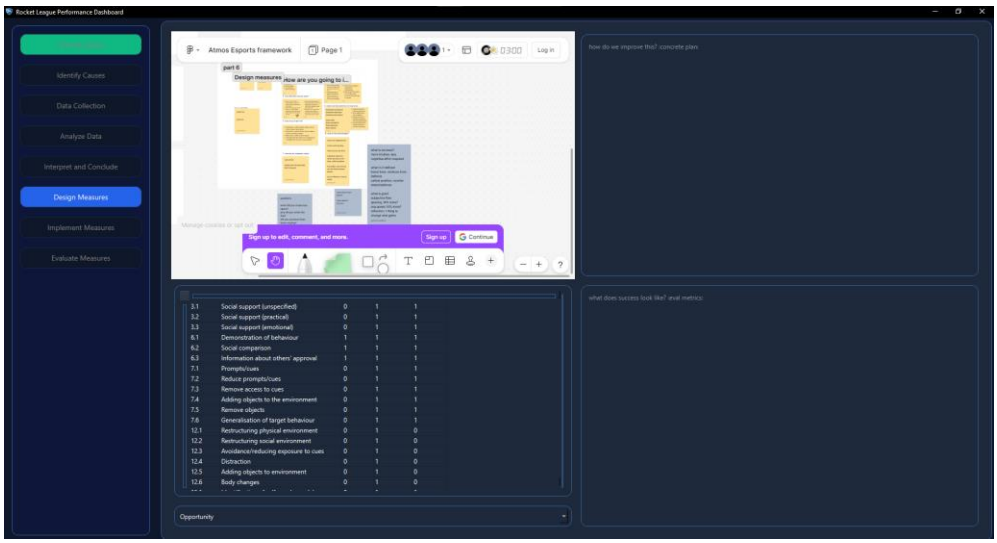


Figure 11 step 6 general visuals

5.3.4 Step 7

As was shown in Part A, step 7 requires functionally the same elements as step 3. Therefore, step 7 houses the same automation, where users can upload files. The design is shown in Figure 14. However, as the intervention most likely will span multiple sessions, selecting the right set can become overwhelming. In this part of the dashboard, an overview of uploaded sets is added. This ensures the user has uploaded the correct sets for comparison in step 8.

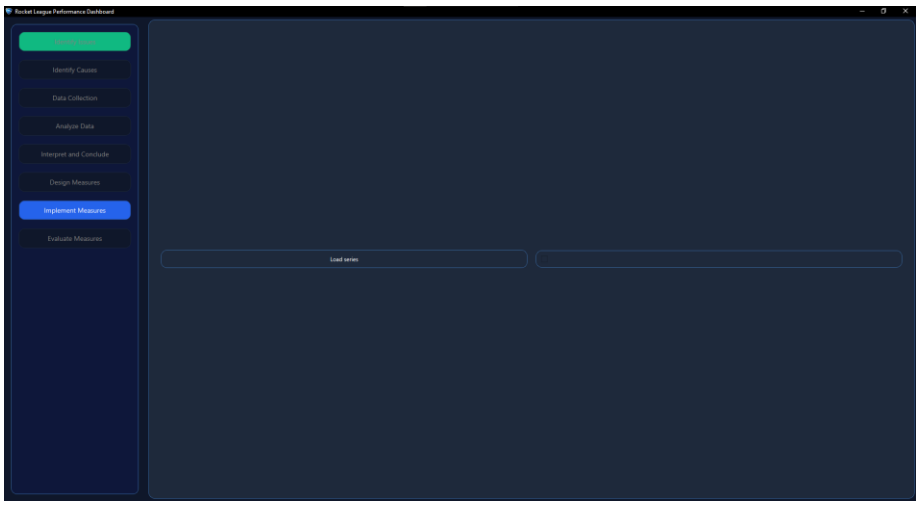


Figure 12 step 7 general visuals

5.4 Reflection Design

This section describes the more common design elements present in the prototype. The final overview can be found in section 5.5

5.4.1 Step 1 & Step 2

For Step 1, analysis indicated that the existing interaction structure already met functional requirements for collaboration. As a result, substantial functional changes were considered unwarranted. Rebuilding the whiteboard component was therefore rejected, as it would have disrupted established interaction patterns without providing proportional usability benefits. The design can be found below in Figure 7.

Instead, the previously used collaboration platform was retained and embedded directly within the dashboard. This decision reduced unnecessary context switching by enabling users to engage in collaborative activities within a single interface. Visual refinements were introduced to improve coherence and readability, including a more consistent application of color across categorical elements and the selection of a typeface optimized for on-screen legibility. To further support visual continuity, the background color of the embedded platform was aligned with the dark theme of the dashboard, reinforcing a unified visual and interaction experience.

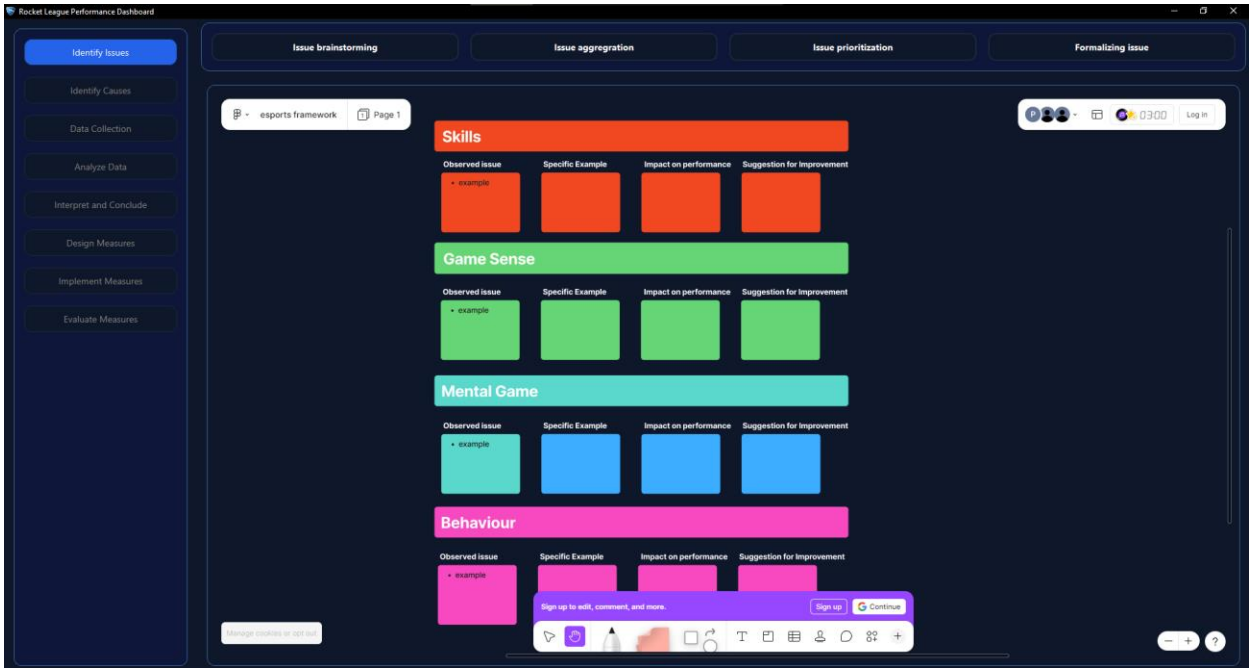


Figure 13 Step 1&2 general visuals

5.4.2 Step 5

The improvements implemented in Step 5 were limited in scope. As discussed in Part A, the team was able to interpret findings and formulate conclusions effectively using the existing workflow. The evaluation indicated that the analytical sequence and interface structure sufficiently supported reflective assessment and decision-making processes.

As such, the dashboard shown in Figure 12 integrates Step 5 without modification. Rather than introducing structural or functional changes, the design preserves the established workflow to maintain continuity and usability.

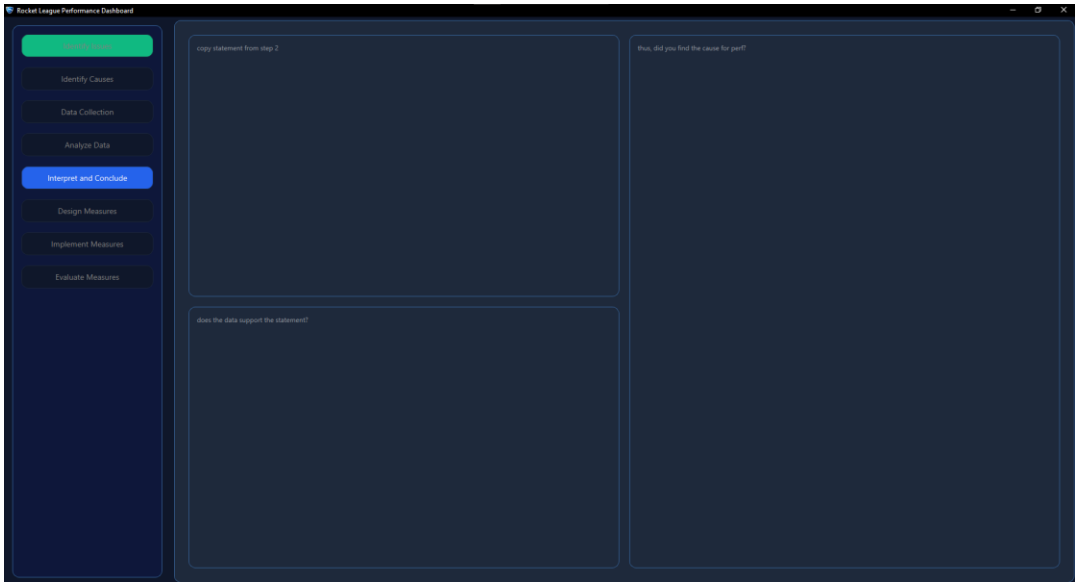


Figure 14 step 5 general visuals

5.4.3 Step 8

The functionality implemented in this step mirrors the analytical structure introduced in Step 4, with continued limitations regarding quantitative expansion. The dashboard retains the same comparative features, enabling users to examine selected variables over time and across datasets. This continuity supports consistency in analytical procedures while reinforcing previously validated functionality.



Figure 15 step 8 general visuals

The interface shown in Figure 15 includes several structured text fields designed to reconnect the analytical output to earlier strategic decisions. Point 1 recalls the mission statement formulated in Step 1. Point 2 retrieves the objective defined in Step 2. Point 3 displays the analytical plan developed in the intermediate stages of the workflow. By systematically presenting these elements, the dashboard ensures that performance evaluation remains aligned with the original strategic intent.

Point 4 contains the same comparative graph introduced in Step 4. Users may select the relevant series, performance metric, and player or players for longitudinal comparison. This visualisation supports structured performance tracking while maintaining methodological consistency across stages.

By restating previously defined objectives and strategic intentions within the analytical interface, this step reinforces interpretative alignment. The design enables teams to evaluate whether observed data patterns correspond to predefined goals and whether identified outcomes are substantively relevant to their stated requirements.

5.5 Final prototype

The final prototype consists of a lightweight dashboard-based environment intended to support collaborative reflective analysis within esports teams. The prototype operationalizes the adapted SPI framework by structuring replay-centered review activities, observation management, categorized reflection, and intervention-oriented discussion into a coherent analytical workflow.

Rather than functioning as an automated analytical system, the prototype was designed as a facilitative support environment that maintains workflow continuity and supports collaborative interpretation throughout the SPI process. This design approach reflects the findings from the initial framework walkthrough, where participants demonstrated greater engagement with contextualized replay discussion than with highly formalized analytical procedures. Consequently, interpretive reasoning remains intentionally discussion-driven, while the system primarily supports operational aspects of structured reflection.

Users interact with the prototype through a sequential workflow in which gameplay footage serves as the central contextual reference point for collaborative analysis. Within this workflow, players review replay situations, identify relevant gameplay events, categorize observations, discuss interpretations, and formulate potential intervention strategies. The system thereby supports iterative reflective practices without prescribing analytical conclusions or replacing existing team reasoning processes.

The implemented prototype includes replay integration, structured workflow navigation, gameplay annotation, categorized observation support, and lightweight analytical interaction features intended to facilitate collaborative review activities. More advanced capabilities, including automated analytical interpretation and longitudinal performance tracking, remained outside the scope of the current implementation. As a result, the prototype is intended to complement existing team workflows by supporting structured reflective analysis rather than replacing established coaching or collaborative practices. The conceptual workflow of the prototype is shown in Figure 16, accompanied by requirements implemented in Table 9:

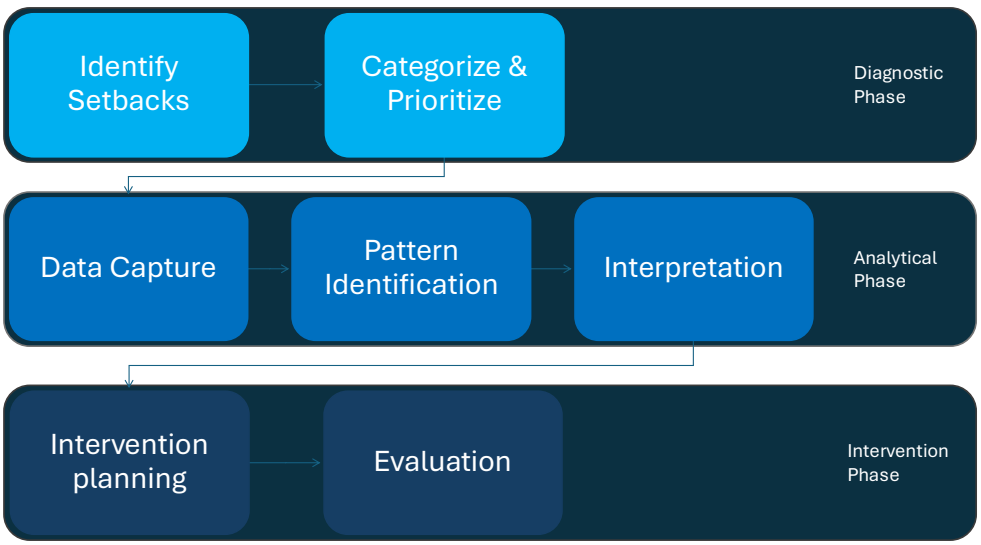


Figure 16 workflow of prototype

Table 9 overview functional requirements

Framework Step	Requirements Addressed	Implementation
Step 1 – Mission	R2	Embedded collaborative whiteboard supporting discussion.
Step 2 – Objective Setting	R2	Shared planning environment supporting collective reflection.
Step 3 – Data Capture	R3, R4, R5	Replay loading, automated preprocessing, dataset persistence.
Step 4 – Pattern Identification	R3, R4, R8	Heatmaps, statistics, comparison graphs, replay analysis.
Step 5 – Interpretation	R2, R8	Existing reflective workflow retained without major modification.
Step 6 – Intervention Planning	R2, R7	Training-method support table and intervention planning workspace.
Step 7 – Data Capture (Follow-up)	R4, R5	Dataset management and comparison support.
Step 8 – Evaluation	R4, R8	Comparative metrics, objective recall, longitudinal evaluation.

5.6 Synthesis

The comparison between the final dashboard design and the initial requirement set indicates that several apparent deviations are the result of a deliberate separation between operational system support and interpretive or cognitive scaffolding.

The requirements were originally derived from observed challenges in gameplay analysis workflows, particularly difficulties related to categorisation, interpretation of performance metrics, causal reasoning, and the operationalisation of abstract concepts into measurable indicators. However, the design rationale established in Section 5.3 indicates that many of these challenges do not stem from interface design, but by the level of analytical experience required to perform structured performance analysis within the intervention context.

As a result, the dashboard was intentionally scoped to support the operational layer of the workflow, including:

- data access and preprocessing,
- visualisation of gameplay behaviour,
- replay inspection,
- and structured comparison of metrics across time and players.

In contrast, scaffolding was not embedded into the interface. Instead, such elements can still be included in the process, such as extra material in the accompanying booklet.

This separation explains why several requirements that initially appeared to imply system-level functionality were not fully implemented within the dashboard itself. Embedding interpretive guidance directly into the interface would have created a system tightly coupled to a specific level of user expertise and a particular coaching structure. The walkthrough and design rationale (Step 1–Step 3, Step 5) support the interpretation that users benefit more from stable operational tools combined with external interpretive guidance, rather than embedded reasoning mechanisms.

Within this scope, the implemented design choices become consistent. Collaborative steps retain shared access to data and replay environments without enforcing interpretive pathways. Automated preprocessing reduces mechanical workload and allows users to focus on discussion rather than data preparation. Spatial visualisations, heatmaps, and statistical summaries function as shared reference artefacts that support discussion, while interpretation remains deliberately external to the interface layer.

Across the later workflow stages, this boundary remains consistent. The dashboard provides structured representations of performance data but avoids encoding causal models or automated judgments about performance quality. Instead, it prioritises consistency, comparability, and accessibility of information, allowing interpretation to emerge through facilitated discussion.

Taken together, the system satisfies the operational dimension of the original requirements when interpreted through this two-layer framework. What initially appears as partial or missing implementation is better understood as a redistribution of responsibility.

This distinction reframes the design outcome not as incomplete implementation, but as a deliberate architectural separation intended to maintain flexibility across teams with different levels of analytical maturity and coaching support. An overview of requirements and their status is shown in Table 10:

Requirement	Status	Reason
R1	Not implemented	Considered facilitator responsibility rather than dashboard functionality.
R2	Partial	Collaboration supported, discussion structure not enforced.
R3	Implemented	Replay and visual analysis fully integrated.
R4	Implemented	Automated processing and predefined metrics included.
R5	Partial	Workflow continuity supported, pattern logging not formalised.
R6	Not implemented	Interpretation intentionally externalised.
R7	Partial	Intervention support provided, behavioural templates incomplete.
R8	Implemented	Evaluation combines metrics with strategic context.

Table 10 Overview of implemented design requirements

5.7 Implications

First, system effectiveness should not be evaluated in isolation, but as part of a combined support environment consisting of the dashboard and external interpretive scaffolding. Because conceptual reasoning is intentionally handled outside the interface, evaluation must focus on how the dashboard functions within facilitated reflection sessions rather than as a standalone analytical tool.
This implies that the primary evaluation focus should be whether the dashboard:

- reduces operational friction during data exploration and replay review,
- supports shared access to consistent performance representations,
- and enables teams to ground discussions in shared visual and statistical evidence.

Second, evaluation criteria should prioritise workflow efficiency and analytical accessibility rather than interpretive completeness. The intended role of the system is to streamline data handling and visual exploration, not to provide automated explanations or embedded decision logic. Success should therefore be assessed in terms of:

- speed and ease of data retrieval,
- clarity of visual representations,
- and effectiveness of shared reference points during discussion.

Third, the modular separation between operational tooling and interpretive scaffolding suggests that the system can remain adaptable across teams with varying analytical expertise and coaching environments. Rather than enforcing a fixed interpretive model, the dashboard supports flexible integration into different facilitation approaches. Evaluation should therefore include whether the system remains usable and effective across different levels of team maturity and coaching structure.

Finally, the evaluation must explicitly account for the boundary between system functionality and external scaffolding. Without this distinction, the dashboard risks being incorrectly assessed against requirements that were intentionally addressed outside the interface layer. The evaluation should therefore focus on how the system contributes to the overall analytical process by enabling structured data exploration, shared reference creation, and continuity in collaborative performance review.

Overall, the evaluation shifts from assessing the completeness of system features to assessing how effectively the dashboard supports facilitated, data-informed reflection within a broader coaching-driven workflow.

6 Part C: Evaluation

This section describes the methodology used to evaluate the prototype. The evaluation aimed to assess how the dashboard supports collaborative performance analysis in practice. The results of the evaluation are presented in Section 6.1.

Participants

Not all participants involved in Part A were available for the evaluation. The competitive season had concluded prior to the evaluation phase, and communication with several team members ended during this period. Consequently, the evaluation was conducted with one player from the same team who agreed to participate.

Procedure

The evaluation consisted of three complementary stages designed to capture different perspectives on prototype use. First, a walkthrough of the dashboard was conducted in which the participant was introduced to the functionality and workflow of the tool. During this stage, the participant observed how the interface supports the structured performance improvement process. This step allowed assessment of whether the workflow and functionality were understandable in practice.

Second, the participant completed a User Experience Questionnaire (UEQ). The questionnaire captured perceived usability and interaction quality of the prototype. This stage provided a structured assessment of the interface independent of the observational walkthrough.

Third, a follow-up discussion was conducted to contextualize questionnaire responses and capture additional reflections on the usefulness of the tool. This discussion focused on perceived applicability, strengths, and limitations of the dashboard in a team environment. Combining these stages enabled triangulation between observed interaction, standardized usability measurement, and qualitative interpretation.

Material

Usability was assessed using the User Experience Questionnaire (UEQ). The UEQ measures pragmatic qualities, including efficiency, perspicuity, and dependability, as well as hedonic qualities such as stimulation and novelty. Because the dashboard functions primarily as an operational tool that supports data review and collaborative analysis rather than automated decision-making, these dimensions provide insight into whether the interface supports efficient and understandable interaction with gameplay data.

In addition to the questionnaire, the evaluation session was audio recorded. These recordings were used to analyse the follow-up discussion and identify recurring themes related to usability, applicability, and perceived usefulness of the prototype. Notes were also taken during the walkthrough to capture immediate observations regarding participant interaction with the interface.

6.1 Results

The evaluation session was conducted with one participant from the team. Other team members were unable to attend due to scheduling constraints.

General impressions

The participant indicated that the applicability of the tool may differ depending on the level of the players involved. In the context of high-ranking players within RSC, its usefulness may depend strongly on team commitment and cohesion. According to the participant, existing issues within RSC teams, such as players with very high rankings who may not always align with team goals, can make structured guidance more difficult to implement. In such cases, the success of the tool depends on whether it is applied within the right team environment.

In contrast, the participant suggested that the tool may be easier to apply with lower-ranked players. At that level, teams are generally more open to structured guidance. For example, when a coach instructs players to rotate during gameplay, players are more likely to follow these instructions and adapt their behavior accordingly.

The participant also noted that a more extensive evaluation would have been desirable. Due to time constraints within the project timeline, the evaluation remained limited in scope. Only toward the end of the season did the team begin reviewing how they implemented improvements, which reduced the opportunity to examine the tool in greater depth.

Perceived usefulness in the original context

The participant expressed mixed expectations regarding the usefulness of the tool within the original RSC team setting. One reason is the relatively short lifespan of many teams. Teams often play together for only one season before disbanding or changing composition. As a result, there may be limited value in investing extensive coaching effort within that context.

However, the participant indicated that the tool would likely be more useful in more stable environments. For instance, in a semi-professional or professional team setting where players remain together for longer periods, the participant believed the tool could be applied more effectively and consistently.

	1	2	3	4	5	6	7		
annoying	○	○	○	○	○	✕	○	enjoyable	1
not understandable	○	○	○	○	○	✕	○	understandable	2
creative	○	✕	○	○	○	○	○	dull	3
easy to learn	✕	○	○	○	○	○	○	difficult to learn	4
valuable	○	✕	○	○	○	○	○	inferior	5
boring	○	○	○	✕	○	○	○	exciting	6
not interesting	○	○	○	○	○	✕	○	interesting	7
unpredictable	○	○	○	✕	○	○	○	predictable	8
fast	○	○	○	✕	○	○	○	slow	9
inventive	○	✕	○	○	○	○	○	conventional	10
obstructive	○	○	○	○	○	✕	○	supportive	11
good	○	✕	○	○	○	○	○	bad	12
complicated	○	○	○	○	○	✕	○	easy	13
unlikable	○	○	○	○	○	✕	○	pleasing	14
usual	○	○	○	○	✕	○	○	leading edge	15
unpleasant	○	○	○	○	✕	○	○	pleasant	16
secure	○	○	○	✕	○	○	○	not secure	17
motivating	○	✕	○	○	○	○	○	demotivating	18
meets expectations	✕	○	○	○	○	○	○	does not meet expectations	19
inefficient	○	○	○	○	○	✕	○	efficient	20
clear	○	✕	○	○	○	○	○	confusing	21
impractical	○	○	○	○	○	✕	○	practical	22
organized	○	✕	○	○	○	○	○	cluttered	23
attractive	○	✕	○	○	○	○	○	unattractive	24
friendly	○	✕	○	○	○	○	○	unfriendly	25
conservative	○	○	○	○	○	✕	○	innovative	26

Figure 17 UEQ survey results

The participant's responses to the UEQ questionnaire are shown in Figure 17. Overall, the results indicate that the tool supported the collection, visualisation, and comparison of performance data across multiple game series. During the interaction, the tool was framed as a system for organising and displaying performance information rather than producing direct conclusions. Within this framing, the participant reviewed aggregated statistics, replay segments, and visual representations such as heat maps and player-specific metrics. The tool was described as "pretty efficient" and "what we needed for it," suggesting that its scope and functionality were perceived as sufficient for the intended task.

Visualisations primarily functioned as starting points for examination rather than as sources of immediate insight. The participant commented on observable patterns in the data, such as differences between series or players, but did not independently infer causal explanations. Instead, interpretation emerged through dialogue when prompted to consider whether observed differences suggested particular meanings. This indicates that insights were generated through guided questioning rather than from the interface alone.

Regarding Perspicuity, the participant repeatedly described the tool as understandable, straightforward, and easy to learn. The interface structure was perceived as clear, with visible affordances that made its purpose apparent. However, uncertainty occurred during data uploads and refresh actions, where the participant was unsure whether processes had completed successfully. This suggests that conceptual clarity was high, while system feedback during operations could be improved.

Perceptions of Efficiency were positive but expectation-based. Navigation between views and interaction with pre-analysed data were described as smooth, and system responsiveness was characterised as "pretty fast" and consistent with expectations.

Processing delays during new uploads were acknowledged but considered reasonable compared to other analysis tools.

The Usefulness dimension was reflected in comments related to coaching and team discussion. The participant indicated that visualised data could structure reflection and facilitate feedback, particularly in group settings. Data representations allowed performance issues to be addressed in a less confrontational way, functioning as a mediating artefact during team discussions.

Responses related to Stimulation were neutral. The participant stated that the tool was not exciting or entertaining, but clarified that this was expected for a functional coaching tool. Engagement was framed primarily in terms of learning and performance improvement rather than enjoyment.

Finally, responses related to Novelty indicated limited prior exposure to comparable tools. The participant described the concept as relatively new, while also recognising that the system represented a prototype and that a production version might involve different design decisions.

6.2 Synthesis

The evaluation session examined how the participant experienced the dashboard-supported SPI process during gameplay review and reflection activities. Overall, the dashboard was perceived as usable and supportive for organizing gameplay observations, particularly during collaborative review sessions.

The participant indicated that the replay-centered workflow contributed positively to the evaluation process. Gameplay footage allowed observations to remain closely connected to concrete in-game situations, which reduced the need for abstract interpretation detached from actual gameplay events. This supported communication during the review session and enabled gameplay situations to be revisited collectively.

The dashboard was also considered useful for organizing observations into a more structured workflow with comments such as “pretty understandable,” “straightforward,” and “easy to learn.” Sequential navigation through the framework steps helped maintain focus during analysis and reduced the likelihood that observations would remain isolated or disconnected from later discussion. In particular, the combination of replay review, note-taking, and categorized observations supported a clearer overview of gameplay-related issues.

At the same time, the evaluation demonstrated that meaningful interpretation still depended heavily on discussion between participants. The dashboard supported this process by providing structure and accessible gameplay information, but analytical conclusions themselves emerged through collaborative reasoning rather than automated system guidance. The participant therefore perceived the dashboard primarily as a facilitation tool instead of a decision-making system.

Several limitations also emerged during evaluation. While the structured workflow was considered beneficial, the participant noted that the overall usefulness of long-term SPI practices may depend on team continuity and sustained commitment. As they put it: “just play to have fun”. In competitive environments characterized by unstable rosters or short-term participation, teams may have fewer opportunities to iteratively apply structured reflective processes over extended periods.

6.3 Implications

The evaluation findings suggest that structured SPI support within esports environments benefits primarily from facilitating reflective collaboration rather than automating analytics. The dashboard appeared most valuable when supporting replay-centered discussion, organizing observations, and maintaining procedural structure throughout the review process.

These findings reinforce the importance of designing SPI systems around practical usability and collaborative interaction. Rather than requiring players to engage with highly abstract analytical procedures, lightweight workflows combined with replay-based contextualization may provide a more accessible approach for esports teams with limited analytical expertise.

The evaluation additionally indicates that effective SPI support depends not only on interface functionality, but also on organizational conditions surrounding team usage. Teams with stable rosters, recurring review practices, and sustained participation are more likely to benefit from iterative reflective workflows than teams operating in highly temporary or unstable competitive environments.

The findings also suggest that dashboards should not be positioned as systems that independently generate strategic conclusions. Instead, their primary role may be to support communication, structure observations, and maintain analytical continuity throughout reflective sessions. Within this role, analytical understanding remains socially constructed through player interaction and collaborative interpretation.

Finally, the evaluation highlights several directions for future development. Additional longitudinal evaluation would be necessary to examine how structured SPI practices influence team performance over time. Future iterations could also explore expanded team integration, automated trend visualization, and stronger support for connecting short-term gameplay observations to long-term developmental objectives.

7 Discussion

This study investigated how a systematic performance improvement framework can support structured reflection and collaborative analysis within esports teams. The research addressed three questions concerning the application of the framework, the design of a supporting tool, and the evaluation of the resulting prototype. Together, the findings provide insight into how structured processes, practical analytical support, and guided interpretation interact in esports performance improvement contexts.

The first research question examined how teams engage with a structured performance improvement framework. The findings from Part A show that players were able to identify gameplay issues, reflect on performance experiences, and discuss behavioural patterns observed during matches. At the same time, participants encountered recurring difficulties when tasks required abstraction, categorisation, and operationalisation. Analytical activities involving structured reasoning or dataset preparation were often replaced by conversational replay discussion. Participants frequently relied on facilitator guidance when interpreting observations, categorising performance issues, and translating insights into actionable interventions. Despite these challenges, participants described experiencing greater shared understanding and more coordinated communication across sessions. These results suggest that the structured process may facilitate collaborative performance reflection, but that analytical components must align with participants' reasoning practices. The framework therefore functions most effectively for this specific team when it supports dialogue-based interpretation grounded in concrete gameplay evidence.

RQ2, can therefore be answered by noting that collaborative replay-centered reflection was associated with higher participant engagement than more abstract analytical activities. If required, facilitation can be fulfilled by a coach, analyst, performance specialist or other supporting roles.

The second research question addressed how insights from the framework walkthrough can inform the design of a supporting dashboard. The synthesis in Part B translated the observed challenges into a design that separates technical workflow support from interpretive scaffolding. Rather than embedding conceptual guidance directly into the interface, the dashboard was designed to support data access, visualisation, and collaborative review while leaving higher-level interpretation to facilitated discussion. This architectural distinction reflects the observation that many difficulties in Part A related to conceptual reasoning rather than interaction design. The resulting prototype emphasises automation, consistent data representation, and workflow continuity as design features intended to support structured reflection. By maintaining a modular separation between operational support and interpretive guidance, the design is intended to remain adaptable across teams with different analytical experience and coaching structures.

RQ3, can therefore be answered by identifying replay-centered review, structured workflow navigation, collaborative analytical support, and lightweight data interaction as central design requirements. The findings further suggest that supporting collaborative interpretation was more important than embedding prescriptive analytical functionality directly into the interface.

The third research question examined the extent to which the prototype can support teams in conducting structured performance analysis. The evaluation suggests that the participant was able to review, compare, and discuss gameplay data in a structured manner using the dashboard. Interaction with the interface focused on identifying observable patterns in visualised statistics and replay representations. Interpretive conclusions were formed primarily through dialogue rather than through automated interface guidance. This pattern aligns with the intended scope of the system, in which the dashboard provides accessible representations of gameplay data while interpretation remains a collaborative process. The UEQ responses further indicate that the interface was perceived as understandable and efficient, suggesting that the prototype could successfully support operational aspects of performance analysis.

RQ4, can therefore be answered by concluding that the evaluation provided preliminary evidence that the prototype can support operational and collaborative aspects of structured performance analysis, particularly through replay-centered review, workflow continuity, and accessible gameplay visualisation. At the same time, the evaluation demonstrated that analytical interpretation remained primarily dependent on collaborative discussion rather than automated system guidance.

Taken together, the findings suggest that systematic performance improvement may benefit from integrating structured processes, practical analytical support, and facilitated interpretation. The framework provides the structure for iterative reflection, the dashboard supports the operational handling of gameplay data, and guided discussion could enable teams to translate observations into meaningful conclusions. This combination reflects the collaborative and context-dependent nature of esports performance, where improvement emerges through shared reasoning rather than automated diagnosis.

The main research question asked how a structured framework can support systematic performance improvement in esports teams. The findings indicate that such a framework may support improvement by structuring iterative reflection, facilitating replay-centered collaborative analysis, and supporting teams in translating gameplay observations into shared analytical understanding. Rather than relying primarily on highly formalised automated analysis, the framework proved most effective when combining lightweight analytical support with collaborative interpretation grounded in contextualised gameplay review.

The study contributes to esports research by introducing a structured framework for systematic performance improvement at the team-level. Existing work has primarily focused on identifying performance factors or analysing gameplay metrics, while providing limited guidance on how teams can iteratively translate these insights into improvement practices. The proposed framework integrates structured improvement, collaborative reflection, and data-informed analysis into a coherent process that supports continuous development. In addition, the study contributes a prototype dashboard that operationalises this process by supporting data access, visualisation, and collaborative review. The design demonstrates how performance analysis tools can function as mediating artefacts that structure discussion and support shared interpretation without embedding analytical logic. Together, these contributions extend existing esports performance research by shifting the focus from isolated performance indicators toward structured team-based improvement processes.

8 Conclusion

This study investigated how a systematic performance improvement framework can support structured reflection and collaborative analysis within esports teams. Through a three-stage design process, the research examined the application of an initial framework, the development of a supporting dashboard, and the evaluation of the resulting prototype. The findings show that the participating team was able to engage with structured performance analysis when supported by an iterative process, but that interpretation and intervention design remain dependent on guided discussion. The results further indicate that performance analysis tools in esports should prioritise accessibility, workflow integration, and shared interpretation rather than embedding prescriptive analytical logic within the interface.

The first research question concerned how a systematic performance improvement framework supports collaborative performance analysis in esports teams. The results suggest that the framework may support collaboration by structuring reflection into sequential analytical steps and encouraging dialogue grounded in gameplay evidence. Rather than enforcing strict analytical procedures, the framework functioned as a scaffold for shared reasoning, through which players collectively identified issues, interpreted patterns, and formulated improvement strategies.

The second research question addressed how a prototype dashboard can operationalize this framework. The prototype translated the framework into an interactive workflow that organized gameplay data, integrated replay-based analysis, and provided visual representations of performance indicators.

The third research question examined the applicability of the system in a practical team context. The evaluation suggests that the dashboard was perceived as reducing effort associated with data handling, enabling structured reflection during collaborative sessions. However, the findings also indicate that applicability may depend on team stability and commitment. Structured analysis requires repeated use over time, and short-lived or loosely coordinated teams may have fewer opportunities to integrate the workflow into their practice. This raises the possibility that the system may be more applicable in teams that maintain continuity and actively engage in reflective performance development.

The main contribution of this study is the development and evaluation of a systematic performance improvement framework tailored to esports teams, together with a prototype dashboard that may operationalize collaborative analysis. The findings hint that structured reflection supported by lightweight analytical tools might be able to facilitate team-based learning without relying on automated interpretation.

Several limitations should be considered when interpreting the findings. First, the evaluation involved a single participant due to scheduling constraints, which limits the generalisability of the results. While the evaluation provides insight into how the prototype supports structured analysis, the findings cannot establish broader usability patterns across different teams or competitive contexts. Second, the study was conducted within a specific team environment, where players already shared experience and communication practices. The effectiveness of the framework may differ in teams with different levels of cohesion, coaching support, or

competitive experience. Third, the evaluation focused primarily on interaction with the prototype rather than long-term application across multiple training cycles. As a result, the study cannot assess sustained performance improvement or behavioural change over extended periods.

Future research should therefore examine the framework and dashboard across multiple teams and competitive levels. Applying the system in different organisational contexts would provide insight into how team composition, coaching structures, and competitive goals influence adoption and effectiveness. Longitudinal studies could further investigate how repeated use of the framework affects communication patterns, decision-making, and performance outcomes over time. In addition, future work may explore alternative forms of scaffolding that complement the dashboard, such as guided facilitation protocols or integrated interpretive prompts. Finally, further development of automated data integration and additional visualisation techniques may expand the analytical capabilities of the system while preserving the emphasis on collaborative interpretation.

Future research should therefore examine the extent to which SPI can be applied independently by teams and whether facilitator expertise influences the quality of resulting performance improvement processes.

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10 Appendix A

Esports search methodology

Search Query:
The chosen query is based on related key concepts to esports performance, such as skills, strategy and training.
((performance AND (monitor* OR optimiz* OR optimis* OR framework OR prediction OR model* OR metrics OR mechanism* OR indicator* OR competenc* OR (skill AND factor*)))

OR
(training AND (framework OR regimen OR model* OR strateg*)))

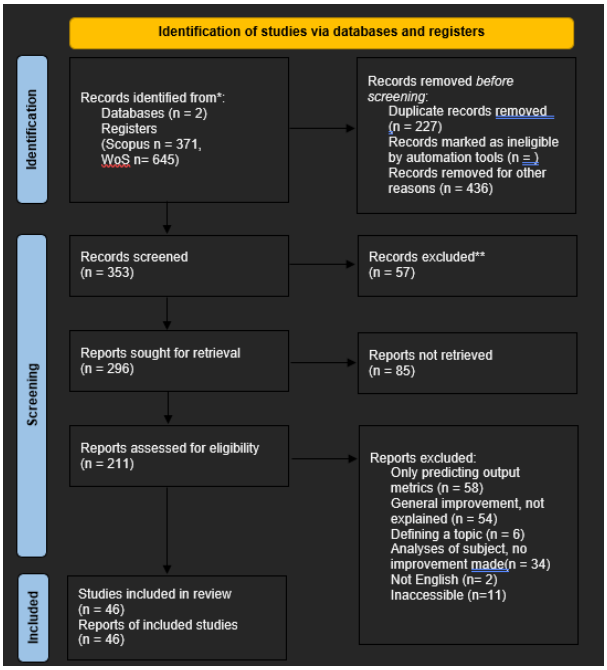
AND (esports OR e-athlete* OR esport OR e-sport OR e-sports)
Inclusion Criteria:

- Studies explicitly discussing esports training methodologies or performance monitoring frameworks.
- Research that provides insights into performance metrics, training strategies, or psychological models related to esports.

Exclusion Criteria:

- Articles where the title did not focus on game performance.
- Abstracts that did not explain performance in terms of metrics, training, or psychological models.
- Studies that focused only on game metric outcomes rather than improving performance.
- Papers discussing general performance enhancement methods (e.g., caffeine effects) without investigating which aspect was influenced.
- Research providing definitions without contributing to performance explanations.
- Studies conducting analyses without proposing performance improvements.
- Non-English publications.

- Articles that were not accessible in full text.



Esports results

	Themes									
	main	Training		Factors				Barriers		
Author	sub	**Mental**	**Mechanical**	**Mental**	**Physical**	**Environmental**	**Other**	**Mental**	**Physical**	**Other**
(Kleinman et al., 2021)		x								
(D. R. Poulus et al., 2022)		x	x	x						
(Hsieh et al., 2024)						x				
(Tregel et al., 2021)		x	x	x	x					
(Franks et al., 2022)									x	
(Zhang & Owen, 2023)				x						
(D. R. Poulus et al., 2024)				x				x		
(H. Lee et al., 2024)			x							

(Naidenova et al., 2024)						x		x		
(Bubna et al., 2023)			x	x		x				
(Matsui et al., 2024)								x		
(Miao et al., 2024)				x						
(Machado et al., 2021)				x						
(Brea Castro, 2020)			x							
(Daubert, 2021)				x						
(Białecki et al., 2024)		x	x	x	x					
(Hong, 2023)						x	x			
(Toth et al., 2023)				x						
(Emara et al., 2020)								x	x	
(Bikas et al., 2023)			x					x		
(He et al., 2021)						x				x
(Kleinman et al., 2022)			x	x				x		x
(Bikas et al., 2022)								x		
(Sharpe et al., 2024)								x		
(Sanz-Matesanz et al., 2023)				x			x	x	x	
(Dos Santos et al., 2024)			x							
(Domintean u et al., 2023)										x
(Beres et al., 2023)				x						

(Martončik et al., 2024)				x						
(Bonnar et al., 2019)			x			x				
(Thompson et al., 2023)						x				
(Park et al., 2021)					x					
(Trotter et al., 2023)				x						
(Trepanowski et al., 2024)										x
(S. Lee et al., 2021)					x					
(Moen et al., 2022)					x					
(D. Poulus et al., 2020)				x						
(Boldi et al., 2024)				x						
(Chang et al., 2024)			x	x						x
(Zhao et al., 2024)										x
(Caputo et al., 2023)		x		x						
(Rossoni et al., 2023)									x	
(Wang et al., 2022)				x						
(Behnke et al., 2022)							x			
(Nagorsky & Wiemeyer, 2020)			x	x	x	x	x			
(Beres et al., 2021)				x				x		

11 Appendix B

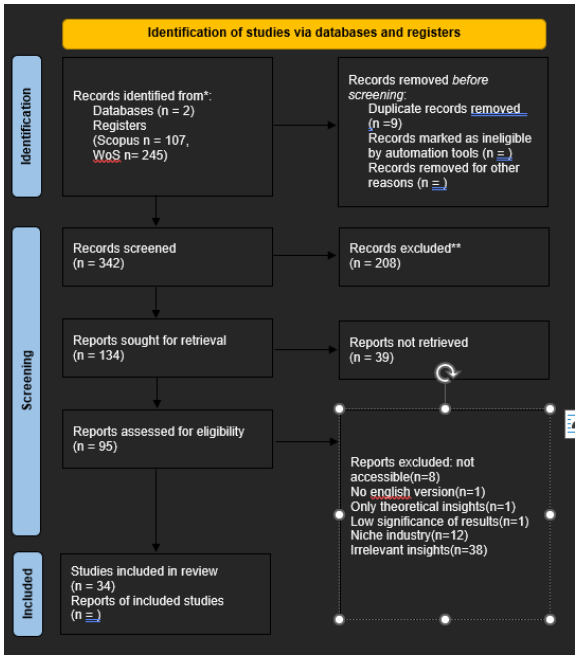
HPO search methodology

Search Query:
The definition of HPO brings several concepts with it, and as such the query includes various relevant models. These are more general such as continuous models, or more specific examples of known HPO models such as six sigma.
(continuous AND performance AND improvement AND model
OR continuous AND performance AND management
OR organizational AND continuous AND improvement
OR business AND excellence AND model
OR lean AND performance AND system
OR TQM AND framework
OR Six AND Sigma AND performance AND model)

AND
(high AND performance AND organization
OR HPO AND framework
OR high AND performance AND work AND system
OR HPWS OR high AND reliability AND organization
OR organizational AND excellence)
Exclusion Criteria:

- Titles or abstracts that did not refer to Lean, Six Sigma, or continuous improvement methodologies.
- Studies focused primarily on specific models, tools, or implementation enablers related to improvement frameworks.
- Papers limited to narrowly defined industries or contexts that restricted generalizability.
- Studies published in languages other than English.
- Articles not accessible in full text.
- Papers judged to lack methodological rigor or remain theoretical without offering applicable findings or mechanisms.

Initially, the study aimed to include only literature that explicitly referenced high performance organizations (HPO) as defined in prior theoretical frameworks. However, this criterion produced an insufficient number of relevant studies during the initial screening stages. As a result, this requirement was removed to broaden the scope and include studies addressing general organizational performance without reference to named improvement models.
After applying the revised criteria, a final set of studies was selected for synthesis. These formed the empirical and conceptual foundation for the analysis of organizational performance outside the scope of named continuous improvement models. An overview of the selection process is presented in Figure X.
The literature informing HPO is not further categorized in a webster framework. This was chosen as the purpose of this literature is not to fully scope out the information available, but rather to find global trends. Which does not require such precision.



HPO results

Author	Year of Publication	Model name	csf(y/n)
(Mahanti & Antony, 2006)	2006	six sigma	y
(Zellner, 2011)	2011	six sigma, BPI	n
(McAdam et al., 2005)	2005	six sigma, TQM	-
(Gamal Aboelmaged, 2010)	2010	six sigma, DMAIC DFSS	y
(A. K. Singh & Sushil, 2013)	2013	TQM	y
(Nonthaleerak & Hendry, 2006)	2006	six sigma, DMAIC DFSS	y
(Bhamu & Singh Sangwan, 2014)	2014	lean manufacturing	-
(Shanmugaraja et al., 2012)	2012	six sigma	y
(Chay et al., 2015)	2015	lean, kaizen	y
(Laureani & Antony, 2019)	2017	lean six sigma	y
(Raval et al.,	2018	lean six sigma	y

2018)			
(Antony et al., 2019)	2019	lean	-
(M. Singh & Rathi, 2019)	2019	lean six sigma	y
(Gupta et al., 2020)	2019	lean six sigma	n
(Psarommatis et al., 2020)	2020	many	y
(Sony et al., 2020)	2020	six sigma	y
(Jevanesan et al., 2021)	2019	many	y
(Bouranta et al., 2022)	2021	lean management	y
(Reynders et al., 2022)	2022	lean management	-
(McDermott et al., 2022)	2022	lean six sigma	y
(Thakur et al., 2023)	2023	lean six sigma	n
(Al Zaabi et al., 2023)	2023	operational excellence	n
(Sharma & Singh, 2023)	2023	lean six sigma 4.0	n
(Knapić et al., 2023)	2023	lean	y
(Taraza et al., 2023)	2023	six sigma, efqme	-
(Kumar et al., 2024)	2024	lean six sigma	y
(Patel & Patel, 2024)	2024	lean six sigma	-
(Citybabu & Yamini, 2024)	2024	lean six sigma	n
(da Silva et al., 2022)	2022	lean six sigma	y
(Mamoojee-Khatib et al., 2025)	2025	lean	y
(Bou-Llusar et al., 2009)	2009	tqm, efqm, mbnqa	n
(Oliveira &	2024	tqm, em	n

Gomes, 2024)			
(Dodangeh et al., 2012; Ubaid et al., 2020)	2012	many	n

12 Appendix C

Thank you for your interest in participating in our interview!

The **purpose** of this project is to investigate expert opinions and feedback on designing a systematic performance improvement framework (SPI), specifically for the esports title Rocket League. This project serves as graduation research in the Master Interaction Technology at the University of Twente.

Your participation is completely **voluntary**, and you can stop without stating reasons and without further consequences. Already collected data can then be deleted. After concluding the interview and anonymizing your data, it can no longer be identified or deleted on your request. Your data will be stored after the end of the session and will be deleted the latest after one year. The collected data is completely anonymous. There will be no compensation for your participation. There are no **risks** known for participating in this study and no sensitive or disturbing topics are touched on.

As part of the research process, we make **audio and screen recordings** of the session for later, detailed analysis. The recordings will be saved, accessed, and processed by the researcher(s) listed below. Your data will be anonymized before analysis or publication, so it will not be possible to infer your identity. The recordings from the session may be used in academic presentations or documentation of this study. You can ask to pause the recording at any time during the interview.

We will do our best to keep your **information confidential**. All data is stored in a password-protected electronic format. To help protect your privacy and personal data, the survey will not contain information that will personally identify you, apart from any identification you provide voluntarily. Your responses will be held confidential, and we do not collect identifying information such as your name, location, or IP address. The results of this study will be used for publication in the form of a research report.

The research will contain 8 to 9 meetings. You are more than welcome to inquire about the research progress and results. If interested, we are happy to also share the findings of this study.

The sessions will take approximately 1-2 hours.
We ask that you answer the questions truthfully. You are, however, free to quit the session at any point in time by notifying the experimenter.

If you have any **questions** about the research study, please contact:

Patrick Wolbers, Master Student, University of Twente
p.wolbers@student.utwente.nl

By participating in this interview, you **agree** that:

- You have read the information given above
- You voluntarily agree to participate in this user study
- You are at least 16 years of age

Signature Date

X _____

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13 Appendix D

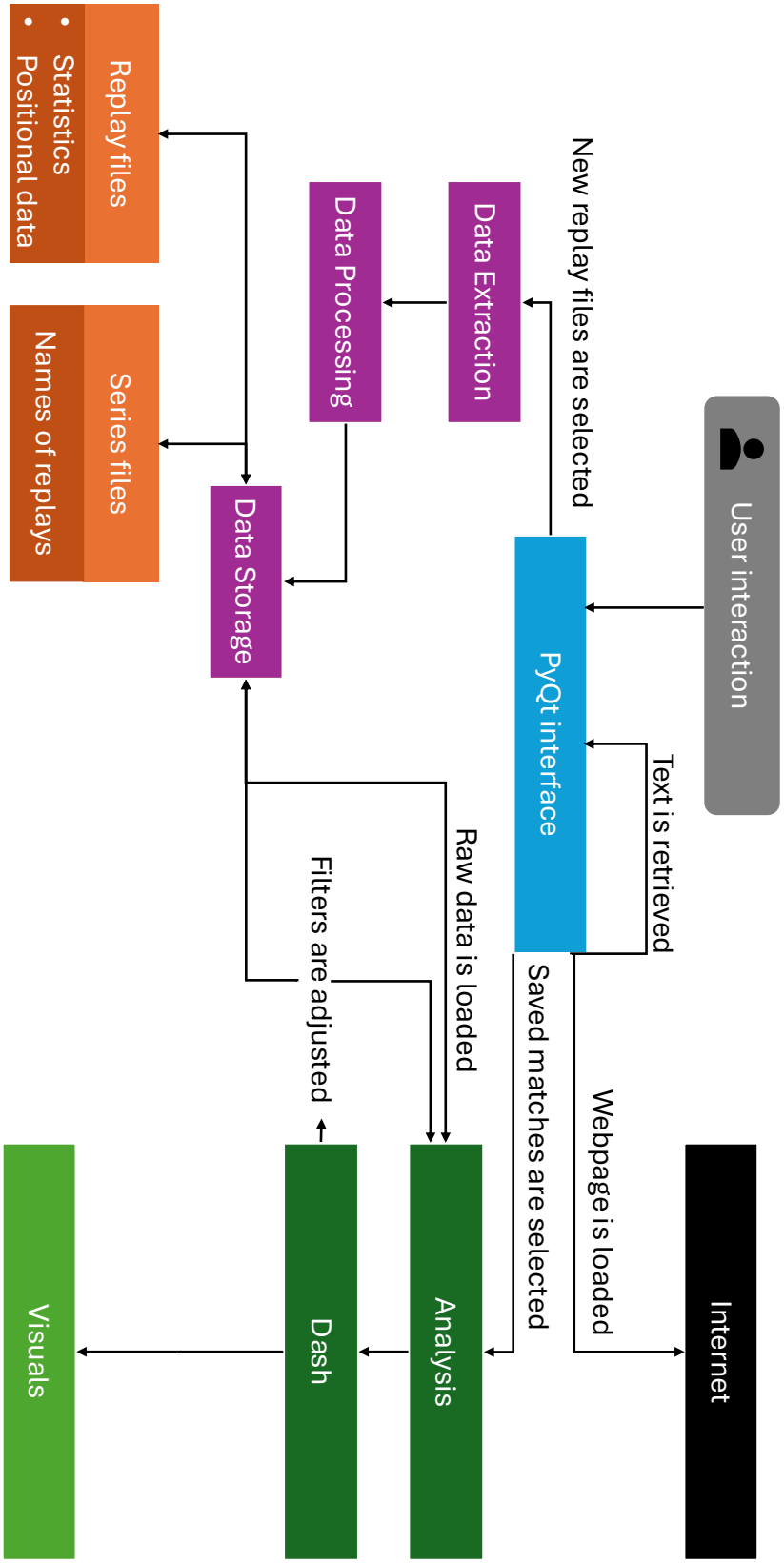


Figure 18 Overview of data flow

14 Appendix E

In Step 2, we will go through the following activities:

- Individual brainstorming
- Cause aggregation
- Prioritization
- Quantify Cause

1. Individual brainstorming

Each team member will complete the following table individually. Using current matches to sense awareness of the issue and old matches to check for similar behaviour, write down any possible cause for the specified problem.

An example table is given on the next page

When filling in the table, think of the following themes:

- *Cognition:* decisive overload, high pressure
- *Stress & Emotion: tilt, overtime*
- *Health:* sleep, nutrition, exercise
- *Knowledge:* rotations, mechanics, play style
- *Overtraining:* grinding freeplay, smurf gameplay

Figure 19 Example Booklet Page