

# Gamification of Strategic Thinking: Using a digital Board Game on Steam

Thorsten Kodalle

Bundeswehr Command and Staff College, Germany

[thorstenkodalle@hotmail.com](mailto:thorstenkodalle@hotmail.com)

**Abstract:** This is the third article in a series of articles reflecting on implementing the Commercial Off The Shelf (COTS) Board Game "Scythe" in an educational setting. It reflects on the evolution of a Game-Based Learning (GBL) approach teaching fundamental management methods and training 21<sup>st</sup> Century Skills. The first iteration of Scythe as the board game platform to train and educate students in OODA-Loop and decision support techniques was planned as a three-day on-premise workshop in February 2020. The kick-off was in November 2019 and was followed by a long self-study preparation phase. It transformed into a fully distributed learning event on short notice due to the advent of COVID-19. The second iteration, from November 2020 to March 2021, was a four-month closely supervised distributed learning experience featuring SWOT-Analysis, Kanban-Board, Scrum and other agile management methods next to the OODA-Loop. These two iterations had one thing in common. The board game Scythe was used as an analogue board game, and a Slack Workspace was used to submit pictures of the physical board game to reflect on the current situation. In the second iteration, Steam licences for the digital version of Scythe (Digital Scythe) were provided to students as a decision support tool. From November 2021 to February 2022, the third iteration implemented Digital Scythe entirely. Therefore, the final tournament and highlight of the learning experience were also fully digital, with new challenges for facilitation. This complete digitalisation also provided unique learning opportunities, particularly concerning 21<sup>st</sup>-century skills. Overall, this new seminar prototype was a huge success, and the demand for this kind of learning experience looks pretty high. It emphasises virtualisation using the popular gaming platform Steam. This article also applies a framework for distributed wargaming.

**Keywords:** Gamification, Scythe, Steam, Design Thinking, Distributed Wargaming, Framework

## 1. Introduction

This article applies a framework for distributed wargaming to the "Gamification of Strategic Thinking" seminar, benefiting from hindsight. The framework is currently under construction by the NATO System and Analysis Research Task Group 170, "Distributed Wargaming in a COVID-19 World". Educational Wargaming is a variation of Game-Based Pedagogy (GBP) from the facilitator's point of view. From the participant's point of view, it is Game-Based Learning (GBL). Katrin Becker briefly explains Games, Serious Games, Educational Games (Games for Learning or G4L), GBL, GBP, and Gamification (Becker 2021). There are takeaways from developing and facilitating wargames that apply to GBP, GBL, Serious Games and vice versa.

With the benefit of hindsight, this article reconstructs the development and facilitation of the "Gamification of Strategic Thinking" seminar applying the CASL Game Development Cycle (Figure 1) and a framework for distributed wargaming which is also applicable to other distributed GBP projects.

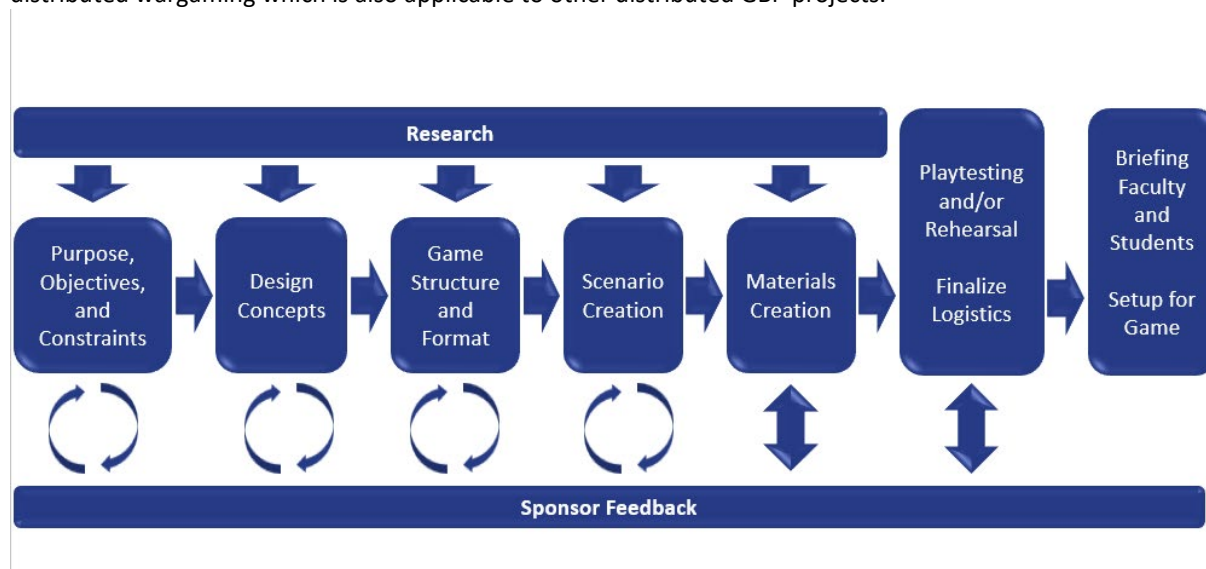


Figure 1: CASL Game Development Cycle

Figure 1 shows the Wargame development cycle of the Center for Applied Strategic Learning (CASL) (CASL 2022).

## 2. Why? Purpose – Educational Wargaming

After all, a wargame is a game, and game design rules apply to wargames (Schell 2020; Phillis 2014). *Design Thinking* is appropriated for game development and used to develop wargames (Wong 2020). Design Thinking can be used within the CASL Game Development Cycle. Imitation drives innovation, and game designers copy successful game mechanics from other games (Katzenbach et al. 2016, 838). This paragraph covers the first step in Herbert Simon's approach to Design Thinking (Simon 1969) *Define*. The Define step also answers the central question about the purpose of the (war)game.

### 2.1 Decide what issue you are trying to resolve

According to the Wargaming Handbook of the UK Ministry of Defence, wargames have two general purposes (see Figure 2) (Development, Concepts and Doctrine Centre 2017, 10).



**Figure 2:** Purpose of a war game

After playing the board game "Scythe", the author hypothesised that this commercially available *recreational wargame* could provide an in-depth decision-making experience. Because Scythe is a complex game, the author also hypothesised that the game should not be played single player vs single player but team vs team. Scythe would provide a set of learning opportunities centred around the 21<sup>st</sup>-century skills of communication, collaboration, creativity, and critical thinking (Battelle for Kids 2022; Fadel et al. 2015; van Rosmalen et al. 2014), focusing on strategic thinking and planning methods like SWOT-analysis (Mullerbeck 2015), the OODA-loop (Richards 2012) and Red Teaming (Howard 2021; Katz 2019; Red Teams 2018). The intended learning outcome evolved during the last three iterations of the seminar "Gamification of Strategic Thinking" (Kodalle 2021b). The facilitator introduced the Scrum framework for agile project management (Schwaber and Sutherland 2020). However, the gaming experience of Scythe is not directly applicable to real-world situations. Scythe provides a fictional model of a world in an alternated timeline. But the skills trained in the seminar and the intended learning outcome apply to real-world situations.

### 2.2 Agree on who the audience is

The author designed the seminar for students of the Technical University of Hamburg (TUH).

### 2.3 Prioritise this project in terms of urgency

Nobody prioritised this project in any way, and the author did run the seminar as a result open educational experiment.

## 2.4 Determine what will make this project successful

The seminar Gamification of Strategic Thinking would be successful if the intended learning outcomes were accomplished. Additionally, GBL should provide intrinsic motivation to engage the students.

## 2.5 Establish a glossary of terms

The relevant terms in the seminar are SWOT analysis, OODA loop, Wargaming, Red Teaming, 21<sup>st</sup>-century skills, agile project management, and Scrum. The **SWOT analysis** is a fundamental planning tool for strategic thinking, analysing strengths, weaknesses, opportunities, and threats. The **OODA Loop** applies the scientific method to the strategy-building process in four steps: observe, orient, decide, and act. **Wargaming** is a dynamic representation of conflict or competition in a synthetic environment in which people make decisions and respond to the consequences of those decisions. **Red Teaming** is testing its defensive posture against predetermined adversarial behaviour. **21<sup>st</sup>-century skills** are communication, collaboration, creativity and critical thinking. **Agile Project Management** is an incremental approach to project management, designed as a self-learning experience with feedback loops. **Scrum** is the most prominent framework for agile project management, standing on three pillars: transparency, inspection, and adaption.

## 3. What? A COTS Board Game for GBP

With the decision to use an already commercially available board game, we skip almost all the other steps in the CASL Game Development Cycle. There is no requirement for further research. The Faculty of Management of the TUH was the sponsor and provided funding and administrative support. There was only the question of how to implement this GBP approach.

Scythe is supposed to be one of the best strategy games ever (Zimmerman 2017). Various strategy board games offer an in-depth planning experience, like Twilight Imperium (Military Strategy Magazine 2022). However, the playing time is often considerably longer, and Scythe provides a particular set of mnemonic hints in the design of the game components that reduce the time to learn the game's rules. For an in-depth description of Scythe within the seminar, see (Kodalle et al. 2020; Kodalle et al. 2021) and, particularly (Kodalle 2021a). Parallel to the analogue board game, Digital Scythe became available, first on Steam in the basic edition, later with additional downloadable content (DLC) and across different platforms.

## 4. How? A Best Practice Guide for Distributed Wargaming

This chapter applies a framework for Distributed Wargaming (DW) with the benefit of hindsight to the seminar. The best practices portion of the guide has been organised into the four domains of **Communications**, **Environment**, **Control** and **Engagement**, which encompass all aspects of the design for a DW. Many such frameworks can be created and organised in any number of ways. The SAS-170 team chose these domains as a reasonable set that would be meaningful and familiar to all wargamers. The domains are presented in no particular order, and the user does not need to begin with communications and sequentially proceed through the rest.

The first iteration of the seminar started at the beginning of the pandemic. Therefore, it was a cold start to distributed wargaming with only two weeks of preparation. The second iteration was one year later, with lots of experiences in distributed learning and collaboration by the facilitator and all participants. The third iteration introduced a new approach to facilitation, a complete transfer of all gaming activity to Steam. This was a paradigm shift in facilitation because the facilitator lost control of the technical facilitation of the game. The *White Cell* (the facilitator and his supporting staff) could not host the game on a White Cell computer, but a participant had to run the game on his/hers computer.

### 4.1 Communications

Communication is the essential 21<sup>st</sup>-century skill that provides the foundation for collaboration. It also enriches creativity and critical thinking. Therefore, communicating in a distributed environment is the foundation for everything else (Fadel et al. 2015).

#### 4.1.1 Network Characterisation

The seminar was unrestricted, and the facilitator and the students used the internet. There was limited usage of the university intranet. However, the seminar leveraged several communication and collaboration applications, particularly Slack, Tello, Zoom, Steam Chat and WhatsApp. The backbone of communication was a Slack

Workspace that was supposed to be a backup channel for administration during the planned on-premise facilitation. Slack was the primary information and documentation channel for the first two iterations and Trello for the third. Comms restrictions: There are no restrictions on communication within the seminar by design. Comms channels: The seminar had different communication channels on different levels, some formal and some informal, some for synchronous (Zoom) and some for asynchronous communication (Trello, Slack, WhatsApp). The facilitator used a Zoom channel for general synchronous announcements. A Slack Workspace and Trello Boards flanked this for asynchronous communication. Of course, there was an email system. In the first iteration (out of desperation), there were many different systems and no tested structural approach. The second iteration leveraged the lessons learned from the first iteration. Trello became the visual backbone of communication, and Slack was still the primary platform for tracking the tournament at the end of the seminar. Although all teams from the THU had access to the university zoom account, and each team had their Zoom group available most of the team interaction was conducted in the specific team WhatsApp groups. Teams used various communication channels for their informal communication, including Steam chat. Network access: The collaboration networks are public but private clouds with access only to an invitation. Security breach: Due to the unclassified setting, there was no danger of a security breach. However, due to data protection regulations, participants were not required to use their real names on Trello, Slack or Steam. This caused friction and additional coordination requirement.

#### *4.1.2 Geographic Separation*

All participants were located in Germany. **Time offset:** There was no time offset; everybody was in the same time zone. **Isolated config:** The degree of isolation correlated with the relevant local restrictions implemented during the pandemic. **Clustered config:** There were no local clusters by design. Local clusters emerged due to team collaboration settings. **Co-located config:** Co-location was possible only in the third iteration and could be implemented.

#### *4.1.3 Time Management*

The first seminar understood time requirements during the first iteration through observation. Based on this observation and a good understanding of the Scrum framework, the facilitator chose to observe and teach the students daily in the second iteration. Thereby, the facilitator shifted the main effort to the four-month preparation phase. The final tournament was still a highlight and a vital aspect of explicit gamification; however, the primary training and learning took place in the preparation phase and were closely observed. The Scrum framework provides a consistent time management framework, e.g. a Scrum "Daily" is limited to 15 minutes maximum. All Scrum events are timed and follow very strict facilitation. **Active speaker:** There were no problems or specific issues with active speaker management using (only) Zoom. **Technical issues with IT platforms:** Steam is a commercial web-based gaming platform. A user buys a licence for a game and downloads the game to her private hardware. This approach was not usable for the office PCs of any attendee from the Bundeswehr. The THU bought and provided the licences for their students and, by extension, to further seminar participants. The TUH provide an entire Steam account with one licence of Scythe. The digital game "Scythe" is cross-platform available, e.g. it can be bought for Windows, Mac, iOS and Android from the game company Asmodee. However, only the licence for the Steam platform was provided. Participants needed to purchase other licences, e.g. an Apple iPad (iOS). The game is not demanding expensive cutting-edge gaming hardware. However, a multiplayer online game requires permanent and reliable connectivity. Not all participants had reliable WLAN or WIFI connectivity available. The minimum requirement per team is one performant hardware and WIFI connection.

However, the preferred option is for all team members to participate with appropriate hardware and sufficient connectivity. **Fatigue management:** The seminar was designed to minimise fatigue as much as possible by gamification. Overall, this was successful; in each iteration, teams worked overtime voluntarily and had fun doing it (Kodalle et al. 2020; Kodalle et al. 2021). **Scheduling:** In all iterations, the facilitator provided a strict schedule. In the first iteration, scheduling was based on trial and error regarding the improvised virtualisation of the seminar. In the second iteration, there was a clear understanding of the time demand, either provided by the Scrum framework or for the final tournament based on experience. However, the third iteration tried something new again by playing only Digital Scythe on Steam. Therefore, scheduling for the third iteration started with trial and error but clearly understood time demands until the final tournament.

#### *4.1.4 Information Sharing Amongst Participants*

Participants shared information based on the provided virtual environment (Zoom, Slack, Trello and WhatsApp) by their team preferences. The facilitator provided a birdview of the seminar on Trello and a Google spreadsheet.

**Misc channels: Player to player:** Players used most of the time WhatsApp for player-to-player communication. However, most of these communications took place in the provided WhatsApp groups. Secret communication was revealed in the AAR, including the chat protocols from WhatsApp. The facilitator did not explicitly or implicitly forbid secret communication. This secret communication was an emergent property of gameplay and immersion in the tournament.

## 4.2 Environment

Absent from the very first kick-off in November 2019 at the TUH, the environment was always virtual and, in most cases, the home office.

### 4.2.1 Game Materials and Data Management

A COTS board game provides all relevant game materials. The provided communication channels (Trello, Slack) also handled any data management issues. In the last iteration, all data management was provided by Steam. The main disadvantage was the fluidity of the state of the game. The facilitator and one additional observer had to take screenshots to document the state of the game for the AAR and evaluation. Otherwise, all information about the game is lost.

### 4.2.2 Visualisation

Steam provided a complete visualisation of the state of the game and gameplay for the third iteration. Trello provided a complete visualisation of the task board system for planning purposes. All moves and turns were captured and pasted in a WhatsApp channel and later pasted on a Trello board. **Context-awareness:** Scythe provides all relevant contexts. One question concerning the learning outcome was the transferability of the experience into the real world. The concept of deterrence can be felt within the game. However, is this experience transferable and applicable to geopolitical actual life events? Participants confirmed this. **Change history:** All corrections and changes are fully documented within the Slack Workspace. In Digital Scythe, no changes were possible after starting the game. The game engine took care of everything but did not provide an entire history after the game ended. **Shared viewpoint:** The viewpoint was the same for every participant during the first two iterations. Everybody could see the same pictures in the Slack Workspace. In the third iteration, all participants had the opportunity to join the game as an observer. Thereby some information was hidden from the observer, but the observer could change her point of view as preferred. **View sharing:** Any form of synchronous view sharing was conducted using Zoom. **Highlighting:** Digital Scythe did provide some nonadjustable highlighting features for visualisation purposes. **Different views:** Digital Scythe delivers a variety of different views for observers. **Collab Doc Edit:** Trello was the collaboration platform of choice and was used extensively in all three iterations. Slack was prominent in the first two iterations, and Google Docs became relevant in the last iteration. **Audio / Written:** The facilitator provided some prerecorded content for clarification, and the audiobook for the Scrum Guide 2017 were provided in the second iteration.

**Backchannels:** WhatsApp and Slack Workspace provided backchannels. **Plenary Discussions:** Plenary discussions were conducted with Zoom. **Breakout rooms:** Each team had a breakout room within Zoom. WhatsApp groups were also functional breakout rooms. **Text comms between participants:** Teams communicated mostly within their WhatsApp groups. **Message analysis:** The facilitator evaluated open text messages at once and secret after their revelation. The facilitator emphasised actions posted in the Slack Workspace or strategies and plans on Trello. **Game Materials & Management:** The facilitator managed all analogue game material during the first two iterations. The third iteration made this obsolete, Digital Scythe provided all game material, and Steam managed the entire game. **Accessibility:** The analogue board game was provided to the TUH. However, Digital Scythe provided much more accessibility. Configuring access to the offered Steam account was a challenge for every participant without experience using Steam. **Read-ahead package:** The facilitator provided a read-ahead package. There was a seminar resource Trello board next to the Seminar Birdview board. The read-ahead package became a living document used before, during and after the seminar. **Game control materials:** During the first two iterations, game control was firmly in the hands of the facilitator and the White Cell. The facilitator approved all changes and corrections in the state of the game. In the last iteration, the facilitator let go of all game control. Steam completely controlled the game, and the facilitator could only observe. **Player-generated data & materials:** Players could store all relevant data on dedicated Trello boards, Slack channels, or Google spreadsheets.

#### 4.2.3 Platform Requirements

**General selection principles:** The facilitator chose the Slack Workspace from experience from his educational Matrix Wargame (Kodalle 2019). Trello became the central part of the seminar, particularly concerning the visualisation of agile project management. WhatsApp was the messenger everybody seemed to have on default. **Fit for purpose, reputable, adaptable:** Steam and Digital Scythe were reputable platforms and games. They were fit for purpose because the seminar was built around the game. The analogue version of Scythe allowed for adaptability, e.g. the White Cell could preselect secret missions and events. However, Digital Scythe and Steam offered no possibility to adapt these features. **Collaboration in distributed teams (clustered):** During the first two iterations, every attendee was distributed, and there was no clustering possible due to pandemic regulation. The third iteration made clustered distributed teams possible. However, the level of clustering differed from team to team. No team was entirely clustered at one location; every team always had at least one member at a different place. **Collaboration between distributed participants:** Almost all participants were distributed all the time. **Distributed vs Co-located Controllers:** All White Cell personnel were distributed during the first and third iterations. Only during the second iteration did a collocated person support the facilitator in his home office. The **Game System** was Scythe. **Tool access:** The TUH provided access to dedicated Steam accounts. WhatsApp, Slack and Trello also require individual accounts by every participant. **Productivity – ad hoc:** In the first iteration, the productivity was limited due to the pandemic and almost no experience with distributed collaboration. However, every attendee, including the facilitator, made a quantum leap in distributed collaboration. In the second iteration, the strict application of the Scrum framework increased productivity almost by default because Scrum increases productivity due to fast friction identification and mitigation. Scrum has three pillars, transparency, inspection and adaptation. Everything that slows down productivity is identified daily in the Scrum Dailys and thoroughly reviewed in the Scrum Review, particularly in the Scrum Retrospective. In the Scrum Retrospective, the team reflects on the tools and their usage.

#### 4.2.4 Classification (accrediting/security)

All information in the seminar was unclassified. The only issue that required some accrediting was the handover of Steam accounts.

### 4.3 Control

#### 4.3.1 Facilitation/Adjudication

**Execution control:** The facilitator and the White Cell had total execution control during the first and second iterations. The facilitator moved every game component by hand, took a photo and posted it in the Slack Workspace. In the third iteration, the facilitator had no control whatsoever. One participant in one team started the game, and Steam provided the facilitation of the game. Digital Scythe is a full constructive simulation of the board game, including all the rules. Thereby it was not possible to cheat any participant. However, it was possible to make an irreversible mistake. During the first two iterations, every mistake by the facilitator was traceable and could be reversed. This was impossible in the third iteration if a team member pushed the wrong button.

Everybody was aware of this, and mistakes during data input were avoided. On the other hand, all rules were attended to by default. **State (of the game) broadcast:** During the first two iterations, the state of the game was a high-resolution static picture posted on Slack. This picture was saved and could be referred to later. In the third iteration, the state of the game was not fixed; almost a movie due to the constant streaming of the game on Steam. **Reporting (turn resolution):** The facilitator performed resolution in the first two iterations. All teams could contribute to the solution by pointing out an error that could be corrected. In the third iteration, Steam provided the turn resolution automatically. **Stage timing:** In the third iteration, each team initially played with an overall time limit. A team had one hour of total game time and was eliminated from the game if this time expired. Therefore, every team had to decide under time pressure. However, this seemed to be too difficult for the final tournament. The facilitator chose to conduct the game using another game mode with no time pressure. **Action control:** The facilitator controlled all the actions in the first two iterations. In the third iteration, he had to let go, and the participants had all control. **Discipline (around social behaviours):** All iterations relied on self-organising teams. Therefore, a high degree of discipline for all participants was required. In the end, team discipline was essential. The seminar was designed so that every participant could contribute equally to overall team performance due to the required Red Teaming. However, some participants did not contribute in the required way. The facilitator could observe this based on work results on Trello. In one case, he became aware of one team bullying a team member due to her non-contribution. **Personnel constraints:** The seminar required one facilitator, one White Cell member from the TUH for license management and organisational support and

at least one other person to help the facilitator. **Training for distributed designs:** The first iteration was a cold start with no training. Everybody did muddle through the first iteration. During the second iteration, the Scrum framework supported the learning curve. The seminar included by design all relevant aspects and increased the team performance from Scrum Sprint to Scrum Sprint to the final tournament. The third iteration provided five learning opportunities in distributed gaming on Steam before the final match. Every team was familiar with the requirements to perform at a high level during the final tournament. **Teacher (new facilitator role):** The facilitator was already qualified as a distributed teacher from the Bundeswehr. In addition, he had a specialisation in virtual teaching from Coursera. Without this experience, the first iteration would not have been possible.

#### *4.3.2 Playtesting*

Scythe was extensively playtested during development. This is one main advantage of COTS games: they are playtested thoroughly for the element of fun (Stegmaier 2015). **Distributed material generation:** The facilitator generated additional material using familiar file formats like PowerPoint and Word and distributed these materials via Slack and Trello. All participants developed material and posted it on Trello. **Load testing:** The third iteration required a lot of testing to familiarise the facilitator with the effective and efficient execution of Digital Scythe in tournament mode. **Data capture testing:** Everything was tested during the first iteration, including Trello and Slack data capturing. In the second iteration, this could be repeated with ease. However, the third iteration posed a new challenge for data capturing. This was again tested during the seminar on the fly and improved upon during the first tournament. **Platforms/IT:** Steam provides a high-fidelity platform for games in general. Asmodee provides Digital Scythe for different IT platforms: Windows, Mac, iOS and Android. Participants could access Slack, Trello, and Google Docs from Windows, Mac, iOS and Android. All applications were also available for mobile devices, providing the ability for mobile learning. **Platform functionality tests:** The facilitator tested all platforms in advance and found no issues. **Game design:** With the implementation of a fully developed and playtested game, there was no need for other game designs. **Intent specification:** See 2.1 for the purpose of the seminar. **New (wargaming) methods:** The seminar focuses on strategic thinking, plan development, execution, and friction mitigation. An additional approach was the application of agile project management (Scrum) to the learning process and framing intended learning outcomes as Sprint Goals. One unique feature of the seminar is the identical conceptual workload for each participant. In the second iteration, every participant had to play each role for a given time. Everybody had to use the same analytical skills to develop a SWOT analysis to perform as a Red Teamer. **Sponsor interaction:** The TUH acted as a sponsor, provided additional input in the kick-off, and evaluated the participants. **Funding timelines:** The seminar did not require much funding, next to the licenses for Steam accounts.

### **4.4 Engagement (Human Factors)**

The GBL and gamification approach engaged all participants.

#### *4.4.1 Common Elements*

The main idea was to put one of the best strategy games into the learning experience's heart. **Social engagement ratio:** The gamification approach worked. The facilitator observed a high degree of engagement even after office times in the communication channels. **Response time:** The response time for asynchronous communication was overall swift. However, this depended on the team spirit. In the second iteration, response time was predicted by the Scrum framework. **Immersion:** Due to the design of the seminar, the immersion was very high. **Engagement:** Due to gamification, particularly the competition, in the end, there was a constant level of engagement because every team wanted to perform at a reasonably high level. There was also a certain degree of peer pressure within every team to keep every member on board because every member could provide the same essential contribution.

#### *4.4.2 Fatigue*

**IT fatigue:** The facilitator did observe Zoom fatigue. In Zoom conferences for all participants, students from the TUH usually had their videos turned off. However, videos were turned on in dedicated team meetings with the facilitator. **Processing info:** The teams from the Bundeswehr processed information faster due to a higher engagement level of each team member. The teams from the TUH processed information reasonable well on the team level. However, some dropouts did lag considerably. **Time zone differences:** There were no time zone differences.

## 4.5 Participant distraction

### 4.5.1 Location Familiarity

Due to the distribution, every participant always was in a familiar location.

### 4.5.2 Work/Life Interruptions

The facilitator observed work/life interruptions. Due to the high immersion and fun element, the game was played after office hours. In one rare case, a participant did not arrive for a tournament game in the final because he was a volunteer firefighter and was busy fighting a fire. **Domestic (home) interruptions:** The facilitator was unaware of domestic disruption.

### 4.5.3 Control Team: The White Cell

**Composition & selection:** The facilitator selected additional White Cell members based on their familiarity with Scythe. These were voluntary contributions. **Facilitator/Adjudicator/IT/Analyst:** The facilitator was familiar with Scythe and planned and constructed the whole seminar around this game. Additional White Cell personnel required familiarity with Scythe to contribute to AAR and strategy analysis.

### 4.5.4 Players

**Selection:** The first iteration selected students from the TUH as participants. Students from the Hamburger Fern-Hochschule were added on short notice. The second iteration added a team from the Bundeswehr Planning Office. The third iteration again added a team from the Bundeswehr Planning Office and a team from the Bundeswehr University Munich. **Comfort with tech/platforms:** There was a high degree of comfort with technology and platforms in the second and third iterations because everybody was used to the home office.

**Usability (ease of use):** Steam and Digital Scythe require some experience. However, this was not a problem due to the long preparation time before the tournament. **Training:** Notably, Digital Scythe provides a helpful tutorial on providing the basics of game rules and mechanics. Thereby, training for Scythe was outsourced to Steam. The seminar was, by design, a learning-by-doing experience. Thereby, all training activity was already integrated into the seminar. Mainly the second iteration depicted specific learning outcomes as training goals and framed them as Sprint Goals. **Training baseline:** The training baseline correlated with the seminar curriculum. The final tournament was the main event of the seminar and was designed to provide a stage for all teams to show off what all achieved learning outcomes.

### 4.5.5 Situational Awareness (SA)

The first two iterations provided situational awareness within the Slack Workspace. During the third iteration, situational awareness was provided from Steam and Digital Scythe and all non-players needed to join the game as observers. **Isolated, co-located, clustered:** The isolated distribution offered the highest SA because every participant had to use their hardware to become aware of the situation. Co-location usually results in sharing the same screen for two or more participants, which decreases SA, particularly for dedicated Red Teamer.

## 4.6 Participant Diversity

### 4.6.1 Experience With Wargaming

Participants had no prior knowledge of educational wargaming. The seminar approach was new to all of them. Some participants had limited experience in strategy games, and almost nobody did know the game Scythe.

### 4.6.2 Gender

There was an even distribution between the genders.

### 4.6.3 Age

The students were considerably younger (10 years on average) than the participants from the Bundeswehr Planning Office, all seasoned planners with a decade of planning experience. The students from the Hamburger Fern-Hochschule were also considerably older because they attended as part-time students in parallel to their regular business occupations.

#### 4.6.4 Ethnicity

The participants from the TUH were very diverse, and almost all of them were international students from Middle East countries. However, all participants spoke German almost like native speakers. All other participants were Germans.

#### 4.6.5 Internationalisation (Participants Able To Play From Around The Globe)

It would have been possible to play with participants from all over the world. The only restriction would be the different time zones and, thereby, the inconvenience.

## 5. Conclusion

After three iterations of experience observing participants playing Scythe to develop and train strategic thinking skills, the facilitator concluded that Scythe is a very engaging strategy game applicable to the intended learning outcomes. However, Digital Scythe opens new opportunities to train 21<sup>st</sup>-century skills. But there is a tradeoff. The facilitation of the game is almost entirely outsourced to the platform. Benefits are increased performance and high output (three to one). Disadvantages are reduced control and adaptability. However, these weaknesses can be mitigated, and the mitigation can be leveraged as a learning experience in collaboration in a distributed learning space. The facilitator recommends experimentation with COTS games on platforms like Steam. Any analogue board game suitable for GBL could be used in a distributed learning space with mitigations. The entire spectrum for GBL is reached if a digital version is also available.

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