Challenge4Impact

Fit for the future,

Playbooks for training skills regarding
Sustainable Entrepreneurship,
Creative Problem-Solving,
and Cross-Cultural Negotiation.

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C4I	Challenge-4-Impact
CBL	Challenge-based Learning
S4S	Scaleup4Sustainability
SBSC	Student-Business Sustainability Challenge

1 Introduction

1.1 AIMS, CONTEXT & STRUCTURE

The aim of this document is to provide learning, teaching and training material. It is a user manual or handbook for all who are interested in serious games as a training method to promote sustainable entrepreneurship. It offers guidance material and "food for thought" for educators, support staff of Higher Education Institutes and Challenge providers. The educational aims of our special topic serious games are (adapted from Bourn, 2018):

- developing of 21st century skills;
- addressing directly real-world issues of today;
- understanding of global sustainability themes by focusing on specific aspects;
- promoting critical and reflective thinking in concrete ways;
- encourage 'active learning' of the participants, make and improve connections; between their own lives and the lives of others throughout the world.

In general, 21st century skills include aspects of 4Cs: Collaboration, Communication, Critical thinking and Creativity. In addition, they are relevant in modern VUCA-circumstances (Volatile-Uncertain-Complex-Ambiguous) and aim to promote cross-disciplinary problem solving in a global, multi-cultural context. These aimed to be learning units to train future oriented 21st century skills to be used in full-term Challenge-based Learning Programs concerning student business sustainability challenges.

This handbook is developed as part of the Challenge4Impact[1] (C4I) project and focuses on the following concrete C4I-objectives:

1. Develop skills and competencies of students (curricular & extracurricular) and business partners in fighting climate change and other sustainability challenges by entrepreneurship;
2. Increase the quality of Challenge-Based and digital teaching and learning formats;
3. Working in international teams to share knowledge, values, learning experiences and to prepare students for an international labor market and create the ability to work cross-cultural.

This manual builds on other project results of the C4I-project. In addition, we build on knowledge and experience from predecessor projects such as "ScaleUp4Sustainability" (S4S).

[1] For more information about C4I, see our website: https://www.challenge4impact.eu

Content of the manual

In this manual, we describe the design, implementation, and evaluation of serious games that are related to international virtual student-business challenges in sustainable entrepreneurship. The maual is aimed to promote cooperation, peer learning and exchange of experience at European and global level. The results are re-usable, transferable, up-scalable and, have a strong transdisciplinary dimension. We report the experiences and evaluations of our serious games. The results of these have been and will be further discussed in scientific papers. We include overviews of conceptual backgrounds of the 3 themes: creativity, negotiation, and cross-cultural competences. This information can be used during the wrap-up evaluation phases at the end of all serious games. We discuss the expected impact and transferability potential as well.

Serious games

A serious game is a relatively new educational format in order to develop complex soft skills. Serious games combine experiential learning with game characteristics such as a story-line, application of rules, and competition. An important category of serious games in education are simulation games: in a realistic, engaging environment, learners experience directly the consequences of their decisions. Learning actively, high levels of interactivity, and immediate feedback contribute to the learning outcomes of serious games (Dankbaar, 2015).

Stand-alone or integrated

The connection of the serious game learning units to Student-Business Sustainability Challenges (SBSC) can be different. Our special topic games can play a role in general entrepreneurship curricula or can be used as an extra-curricular learning unit as a stand-alone activity. The serious games can also be a useful preparation or embedded element in a full-term SBSC-program. For instance: Cross-cultural games serve as preparation for the international virtual SBSC-program "Future of Healthcare Challenge" (PR4).

Our serious games differ from complete SBSC-programs not only in a shorter duration, but also in the fact that the involvement of and close cooperation with practice partners is not required. Although it does not cover all elements of SBSC, the serious games focus on specific vital skills necessary to conduct international and digital full term SBSC. Because by their very nature, our serious games are more like traditional learning units aimed at developing higher-order 21st century skills with practical tasks, tend to be motivating for the participants. Therefore, the approaches are valuable tools to develop higher order skills.

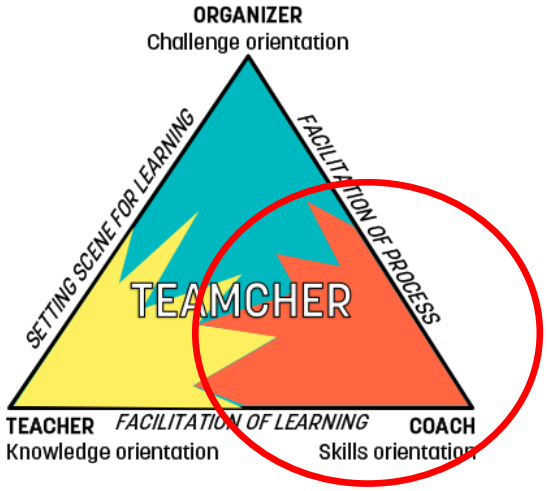
Target groups

This manual focuses on specific defined target groups: teaching staff and students.

Firstly, this manual is aimed at teaching staff, who are interested in updating their curricula. Teaching staff of Higher Educational Institutes can use our new toolkits as a stepping stone in sustainable entrepreneurship programs. Apart from supplying the essential cognitive aspects of the course subject, and leading reflective evaluations, the main role of teaching staff is to act as

coach, who facilitates the learning of the participant. The focus of a coach is more on supporting students than instructing, illustrated by the circle in Figure 1. Coaches usually stimulate reflexivity and create awareness of attitude and skills, and ensure a safe and open team climate that is vital for developing new behavioral skills. In CBL the title of "Teamcher" is given the teacher (or the teacher team), see Fig.1.

Figure 1: The three roles of teachers in CBL



Source: Eldebo et al., 2022 (C4I - PR1)

Secondly, students develop their skills through serious games, tools of 'active learning' or learning-by-doing and reflecting on their individual and team performance aimed at personal growth. Our serious games are aimed to develop the mindset and skills to become sustainable entrepreneurs. Our serious games are aimed at advanced Bachelor and Master students due to the fact that the efficacy of the serious games is dependent upon reflexivity towards self-development, which usually is higher at these parts of the student population: in serious games, students need to take responsibility for their own learning process. Therefore, intrinsic motivation is vital. A "fun" factor motivates as well. Serious games are aimed to have such a factor.

Innovative character

The special topics challenges are innovative because of their digital, transnational and transdisciplinary character. Ideally, students with different nationalities and faculties participate. Participants act either virtually or personally on campus. Our serious games offer a raised awareness, improved understanding and experience of trans-sectoral and international implementation of certain key skills of sustainable business.

1.2 RELEVANCY

1.2.1 The importance of new skills

Companies can be considered to be unique bundles of competences or capabilities (Lavie, 2006). Core competences of a company are the basis of competitive advantage (Spekman et al., 2000; Ulrich and Smalwood, 2004). Competences have both a technical and a social aspect. Technical competences are for instance, the functional expertise in manufacturing or developing new products. Social competences are for example an organizational culture of open mindedness towards new developments or an ability to influence and persuade external partners. Apart from companies, teams and individuals have competencies. We consider "competence" at the organizational level and "competency" at the individual level. Competencies or skills involve attitudinal aspects, behavioural skills and specific cognition (known as the "ABC" factors) necessary to perform well. Competencies are, e. g. creative problem solving to meet changing demands, or a person's potential for development. Individual competencies reflect a person's ability to apply knowledge, intuition and skills that are necessary to achieve the required performance. Individual competencies are defined as "behavioural patterns that are instrumental in the delivery of desired results (Bailey et al., 2001).

Skills are important and increasingly scarce

In their report "The future of European competitiveness", Draghi (2024a: 257) conclude that *"skills are the foundation of a thriving and competitive economy because they are essential for productivity"*. Future competitiveness and successful execution of the green and digital transitions require a labor force with appropriate knowledge and skills: these are a key determinant of labor productivity. Although the EU has a highly skilled labor force, Draghi et al. (2024b) conclude that there are continuing skills shortages across different sectors, resulting in a limited ability to compete globally. Around one-quarter of European companies have faced difficulties in finding employees with the right skills, while another half report some difficulties. Even 77% of EU companies report that even newly recruited employees do not have the required skills. Skills are also lacking at the managerial level (Draghi, 2024b).

Management skills play an essential role for the successful implementation of new sustainable technologies. Absence or inappropriate adoption of modern managerial practices is frequently given as a reason why SMEs fail. Draghi (2024b) conclude that (1) the value of these skills is underestimated and (2) there is a lack of easily accessible, publicly recognized, high-quality education programmes covering these new evolving skills. Despite this, entrepreneurs often underinvest in the acquisition or development of managerial skills.

According to Draghi, 2024a,b, shortages in Europe are felt across a wide variety of skills and occupations: "*Europe is suffering from skills gaps across the economy, reinforced by a declining labour force" (*Draghi, 2024a:32). OECD data shows that one-fifth of adult workers in the EU lack basic skills. The deficit in managerial skills is particularly acute among SMEs in the EU. Skills shortages are likely to worsen in the future, which hampers EU's future competitiveness. Similarly, a lack of skilled workers in 'green sectors' can become a severe obstacle to realizing the EU's green transition, despite accounting for only around 5% of total employment today.

Green and other new skills are needed

Every 3 year, the World Economic Forum conducts a large-scale survey concerning the job priorities of companies. In their 2023 edition, they covered the expectations of a wide cross-section of the world's largest employers related to job trends and directions for the 2023— 2027 period. In total 803 companies, representing more than 11. 3 million workers – across 27 industry clusters and 45 economies from all world regions participated. In their "Future of Jobs report 2023", the World Economic Forum (2023) concludes that most new jobs will be created from investments concerning *green transition of businesses* and the broader implementation of ESG standards. Climate change adaptation, especially in developing and emerging economies, is also a strong contributor to net job growth.

Additionally, the adoption of new and emerging technologies, along with expanded digital access, is expected to become more important; the World Economic Forum (2023) concludes that 44% of workers' skills is likely to be disrupted in the following five years, an increasing percentage compared to earlier studies: in the future, skills shortages may become even more severe. This concerns various types of skills, traditional and new emerging alike. In the future, a much broader range of skills is necessary than in the past. Basic foundational skills are, e. g. basic knowledge literacies and numeracy. New evolving functional and social skills are necessary to cope with a rapidly evolving socioeconomic environment include *digital skills* (to develop capacities in digital technologies and to new technologies in areas as AI, data management and cybersecurity), *green skills* (skills to develop and execute green or circular technologies), and *specialist skills*. Fast technological developments make up-to-date Science, Technology, Engineering, and Mathematic (STEM) skills more important. These so-called 'hard' skills – linked to explicit knowledge - are crucial to mastering the use of new technologies and advancing their development. The nature of many existing occupations is evolving and requirements in terms of specialist skills are increasing. According to Draghi, 2024a, European workers are generally unprepared to take advantage of the widespread digitalisation of work: around 42% of Europeans lack basic digital skills. The rates of job vacancies for green skills, clean tech manufacturing, in the EU doubled between 2019 and 2023, with 25% of EU companies reporting labour shortages in the third quarter of 2023.

Renewal of curricula: more focus on future oriented 21st century skills

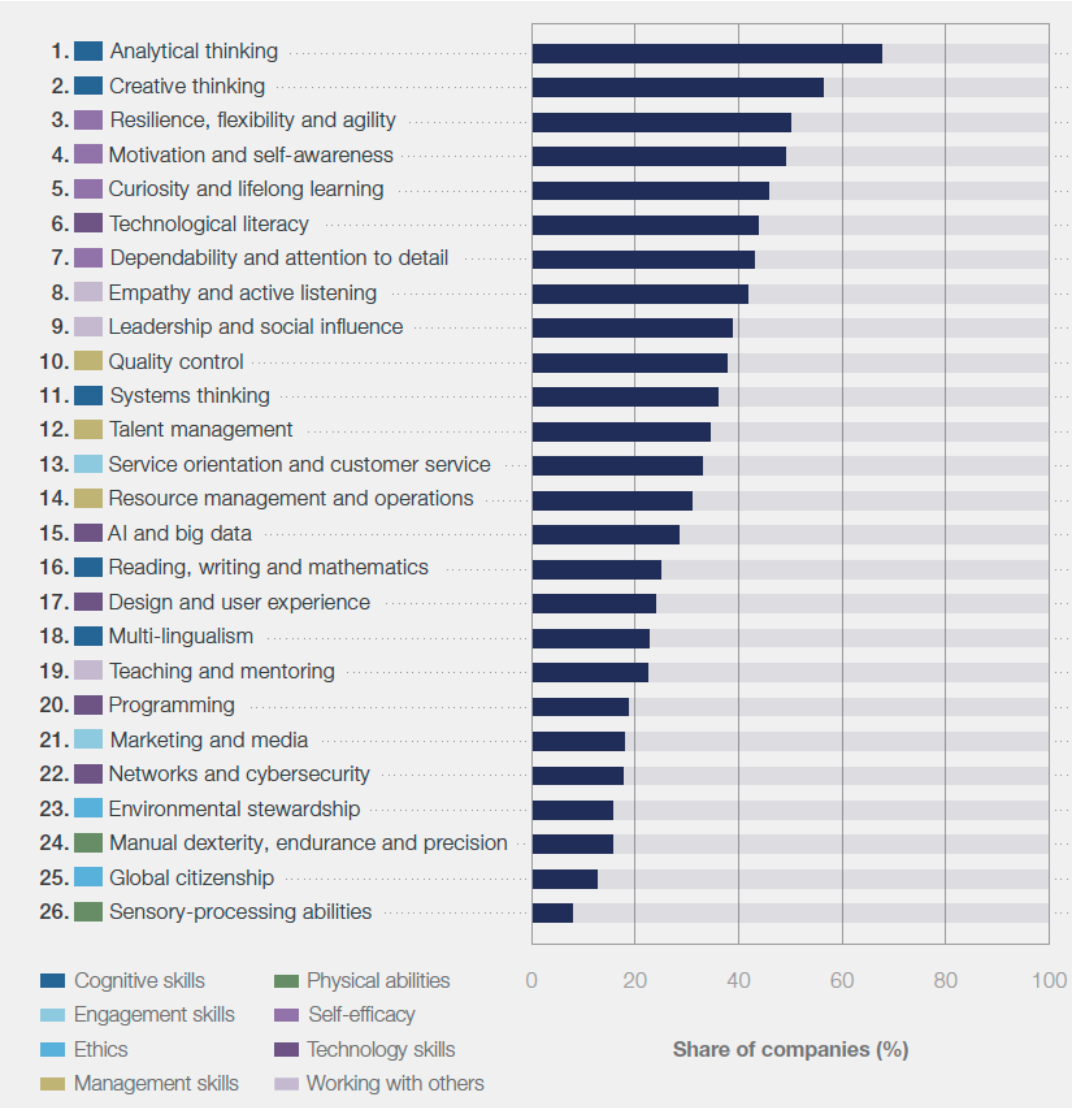
Beyond technical or specialist functional skills, transversal skills are crucial. These 'soft' or social skills are also coined "21st century skills". These include creativity, teamwork, communication, adaptability, critical thinking, problem solving, leadership and emotional intelligence. Transversal skills must be developed throughout the whole education and training process to complement 'hard' and specialist skills (Draghi, 2024b; World Economic Forum, 2023).

Therefore in light of changing skills needs, Draghi, 2024a,b, propose to revise educational curricula. The revision of curricula needs to be done through an inclusive approach, with the involvement of teachers, companies and other stakeholders. Rather than focusing on generic programmes, curricula will need to explicitly target the development of the most needed skills within the EU labour market. At STEM skills, this implies including more interdisciplinary approaches to integrate STEM into other subject areas. Other revisions comprise skills for the green transition by integrating sustainability as a core aspect of curricula and structurally giving more attention towards developing competences regarding communication, teamwork, problem

solving, creativity, adaptability, resilience and emotional intelligence, some transversal or 21st century skills. The EU should focus more on future-oriented skills and on emerging skill shortages (Draghi, 2024a). They urge to collaborate more cross-industry and cross-country within Europe to develop more and quicker new innovations while reaping the economic benefits from it within Europe. Last, Draghi, 2024a advises to make entrepreneurship education a regular aspect of curricula. A particular focus is needed on adult life-long learning.

According to World Economic Forum (2023), two cognitive skills are most important: analytical and creative thinking, followed by self-efficacy skills: resilience, flexibility and agility; motivation and self-awareness; and curiosity and lifelong learning. These skills highlight the growing importance of adaptability in today's rapidly changing business environment. Dependability and attention to detail rank sixth, just behind technological literacy. Rounding out the top 10 core skills are two interpersonal skills—empathy and active listening, and leadership and social influence—along with quality control. These priorities are summarized in Figure 2.

Figure 2: Core 21st century skills



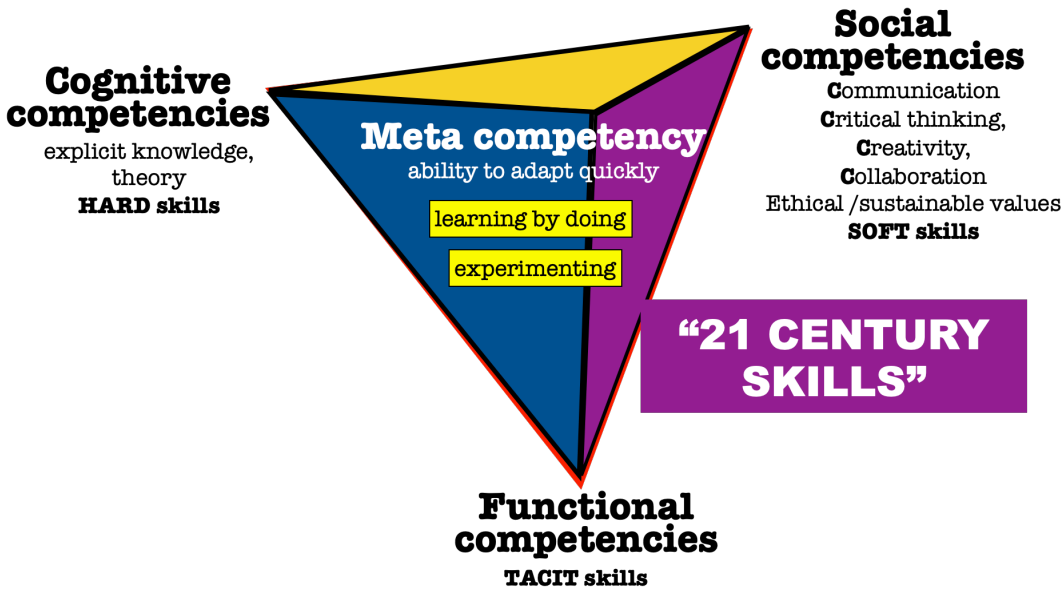
Source: World Economic Forum (2023)

1.2.2 Sustainable entrepreneurship demands a balance of skills

At the implementation of sustainable international business, a balanced development of four types of individual competencies or skills are relevant. First, cognitive competencies matter, based on coded and explicit information, for instance specific theories that may lead to the understanding of certain phenomena (Stel, 2015). Second, functional competencies are essential: specific technical or tacit skills or in German: "Fachkompetenzen". Third, social competencies are indispensable for successful execution of business assignments: specific attitudes and / or underlying personal values e. g. ethical values These three dimensions are fairly universal known as "savoir, savoir faire, savoir être" or KSA (knowledge, skills and attitudes).

On top of these three personal competencies, a fourth meta competency is playing an increasingly important role at sustainable entrepreneurship: the ability to learn quickly from volatility, uncertainty, and ambiguity. This meta competence is rather different from the first three dimensions of competency because it concerns the ease of acquiring new knowledge or skills. The relationship between these four dimensions of competence is illustrated in the tetrahedron of Figure 3 (Salas et al., 2009; Stel, 2015).

Figure 3: Balance of competencies



Adapted from: Le Deist and Winterton, 2015.

An individual's success within a company or someone's employability involves the right balance of all four competencies. Apart from formal education, enough time and energy should be spent on the other aspects of competencies - e. g., experiential learning, social skills, ethical values, dealing with increasing uncertainty or ambiguity, learning to learn, and collaborating effectively with external partners.

Sustainability is gaining in importance and so are social competencies (such as ethical values) and meta competencies. When dealing with the transformation towards sustainability, one

has to consider a broader and more complex set of issues. In rapidly changing, uncertain and complex environments, horizons extend beyond those that are usually taken into consideration; radical "out of the box" thinking is indispensable combined with an attitude of perseverance, agility and resilience. One must be able to understand complex systems in which economic, social and environmental aspects influence one another; a multidimensional holistic approach is essential. Using both, head and heart, a new mindset is needed that recognizes the potential for business action on social and environmental issues. In the words of the Brundtland committee: "*We need to develop new basic attitudes which, in human solidarity and compassion, look beyond national and sectoral borders. We have to recognize that the issues with which we wrestle are globally interconnected* (Brundtland, 1987)".

1.3 EXECUTED SPECIAL TOPICS SERIOUS GAMES

During the C4I project, the following serious games were implemented and tested. All games had a highly international, and sustainable component, see Table 1:

Table 1: Special topics games and their relevance to C4I

			Relevant dimensions		
	No. of games	No. of par-ticipants	International	Virtual	Sustainability topics
Creativity games	4	190	++	-	++
Negotiation games	6	157	++	++	+
Cross-cultural games	4	176	++	-	+

Notes: ++: strong focus; +: some focus; --: on campus

Creativity games: In the period 2022- 2023, 4 games with in total 190 participants were organized at the University of Twente, NL, at master tracks "Change Management & Consultancy, Change Leaders (Honor Master level), Processes of Change (Honor Bachelor level) and Healthcare Consultancy (Bachelor level). Several different formats creativity games were tested.

Negotiation games: In the period 2022- 2023, 6 games with in total 157 participants were organized for the Master course "Game Design" at the Caledonian University, (UK), University of Twente, NL, "Change Leaders" track (Honor, Master level), "Processes of Change" track (Honor

Bachelor level), a "Healthcare Consultancy" course (Bachelor level), and at Telkom University, Indonesia a communication science course (Bachelor level). Several formats of dyadic and multi-partner games were tested.

Cross-cultural games: In the period 2023- 2024, 4 games with in total 176 participants were organized at the University of Twente, NL, some master tracks "Change Management & Consultancy", "Change Leaders" (Honor Master level) and "Healthcare Consultancy" (Bachelor level). Several versions cross-cultural games were tested.

2 Creativity games

2.1 INTRODUCTION

2.1.1 Conceptual background

Creativity is an important 21st century skill (World Economic Forum, 2023). It is defined as the generation of original and appropriate ideas; the first aspect requires divergent thinking, whereas the second requires convergent thinking (Baas et al., 2015). Creativity is determined by cognitive, emotional and neural processes. Cognitive processes, include cognitive flexibility and cognitive persistence; mood and motivational states influence creativity (Nijstad et al., 2010). Cognitive flexibility, divergent thinking or idea originality is operationalized as the number of new viewpoints whereas cognitive persistence as convergent thinking, detailing ideas into greater accuracy. Baas et al., 2008 researched motivational or emotional aspects of creativity, such as happiness, joy or dislikes. Negative emotions reduce divergent and flexible thinking, although the effects depend upon circumstances.

Team creativity is determined by characteristics of individual team members, as well as the combination of traits of team members (Gilson et al., 2015). In teams, two or more individuals socially interact (face-to-face or increasingly, virtually) and face a certain degree of interdependence regarding executing tasks and processes (Kozlowski & Ilgen, 2006). Adaptability of team members, interpersonal communication and coordination of activities are drivers of team performance (Mathieu et al., 2014). Therefore, it is important to involve members in a team who can conduct these behaviours. Won et al. (2014) found that synchronized nonverbal behaviour leads to greater team creativity. Team composition affects team creativity, which in turn promotes innovation implementation depending on the team's climate for innovation. (Somech & Drach-Zahavy, 2013:684). Team creativity can be defined in terms of outcomes or processes. Team creative outcome concerns the production of new and useful ideas of products and services, whereas creativity as a process concerns the journey toward possibly producing creative outcomes through the collaborating behaviourally, cognitively, and emotionally (Gilson & Shalley, 2004; Gilson et al., 2015). Creative processes are an important ingredient for creative outcomes. In this study we

relate to the distribution of personal attributes among interdependent team members, in particular we focus on team members' heterogeneity in terms of personal behavioural preferences.

By using new creative methods, intuition and imagination can be stimulated, new insights can be created resulting in more novel and surprising solutions to problems (Gauntlett, 2007). An interesting new creative method is storytelling: articulating innovative ideas, sharing these and persuading others to adapt and implement these. Storytelling is considered to be a useful tool for presenting innovative ideas and getting interest and support from others (Sergeeva & Trifilova, 2017). It can enable shared understanding of multiple viewpoints of innovative ideas (Garud et al., 2013). Storytelling plays a crucial role in innovation processes, from the exploration of new ideas through to their implementation and promotion innovations. At the discovery of new ideas, storytelling contributes to capturing attention, interest, and getting approvals from others, who should be motivated to assist in refining and developing the new ideas to make implementation more feasible. Therefore, a skills training that comprises storytelling is highly relevant (Sergeeva & Trifilova, 2017). To increase the commitment of storytelling, Niemi & Multisilta (2015) advise to involve emotional aspects, such as fun as well.

2.1.2 Key parameters

Table 2 below summarizes the key parameters of the creativity games. Teachers can use it to promote this game to students, students can use this table to decide whether to participate.

Table 2: key parameters of creativity games

Intended Learning Objectives:	Develop 21st century skills using Challenge-based Learning: creativity, complex problem-solving. Develop solutions for Sustainable Development Goals (SDG).
Elements:	serious challenge game, active learning, interactive lecture.
Why participate	**Understand creativity processes: Students** learn to understand and improve their role in team creativity. They become aware of their own creativity, and the styles of their team members in a challenging, action-oriented, international environment. Students understand the concepts of radical and incremental creativity, divert and convert, creative ambidexterity, creative friction, team flow and supportive team climate. Students understand the value of shared storytelling, the impact of fuzzy problems, VUCA-circumstances and the character of wicked sustainability. **Develop your creative skills: Students** use their imagination in combination with hands-on implementation. They develop out-of-the-box

	ideas and evaluate creative ideas within a team. Students acquire new tools, change their behavior and develop a new mindset
Duration:	1/2 - 1 day
Who participate?	Business, technical, and design students from various countries.
Practicalities.	The event is free of charge. Participant will obtain a certificate of participation afterwards. This event will be held on campus. We create a virtual community and a way to communicate with team chats or personal messages via social media and interactive tools.

2.1.3 LSP Method

Lego Serious Play®2 (LSP) is a facilitated workshop method in which the aspects of visualization, commitment, fun and storytelling are combined. LSP is an attractive tool to implement Challenge-based Learning. In LSP, participants generate new solutions to wicked problems by creating symbolic and metaphorical models. They build these models with specific Lego Serious Play bricks and discuss individual and team metaphors through storytelling with the aim to enhance creativity in ideation exercises and shared understanding of the implementation aspects. This process coined as shared storytelling (Frick et al., 2013; Kristiansen & Rasmussen, 2014; Schulz et al., 2015).

LSP is a tool-kit and method for collaborative creativity. In contrast to usual brainstorming methods as mind mapping, or the 'six thinking hats' method, it offers the advantages of tangibility and unpredictability: the tangible shapes, sizes and colours of the Lego bricks offer infinite unpredictable combinations (Al-Jayyousi & Durugbo, 2020). In addition, it has the advantages of open and participatory communication, collaborative learning, and incites intuitive imagination (Simon et al., 2020). LSP is a method that facilitates creative problem-solving and team building (Al Jayyousi & Durugbo, 2020). It involves all participants equally without hierarchical constraints. This creates an open team environment that stimulates conversation and discussion and avoids 'free ridership' in innovation teams (McCusker, 2020). Because of these factors, it is easier to achieve a 'train of thought' or 'flow' within a team, i. e. building upon each other's ideas, known as interactional synchrony (Primus & Sonnenburg, 2018; Zenk et al., 2020). Furthermore, LSP stimulates commitment to the team, resulting in active participation in the decision-making. According to Primus & Jiang (2019), LSP facilitates developing novel and surprising solutions to problems. Zenk et al., 2021 conclude that LSP improves the creative team output.

LSP is a form of a serious game, that uses constructionism (converting abstract ideas into visible and tangible metaphors), hand-mind connection (building on the complex interplay between the hands and the brain), and playful fun to stimulate imagination (Frick et al., 2013). The LSP method is based on four essential steps (1) introducing a wicked challenge to the participants

[2] LEGO Serious Play is a registered trademark of the LEGO® company.

by a facilitator; (2) constructing potential answers to the challenge making metaphoric models with LEGO bricks individually. While building their models, participants assign a meaning to them and develop a story covering the meaning. In doing so, they construct new knowledge; (3) share stories and the meanings assigned to the models with each other; (4) reflecton what is heard and seen in the models (Frick et al., 2013).

Our LSP serious games consisted of the following phases (see Table 3): after the introduction of game and assignment, the participants conducted a warming-up skills exercise to familiarize themselves with the Lego bricks. After this, we introduced the creative task of the serious game: to develop an innovative and feasible solution to the accessibility of education for all boys and girls in low-income countries. This task is inspired by the UN Sustainable Development Goal # 4 (Education for all – see Appendix 2 for the full text of the assignment). After this, participants silently developed individual solution metaphors and explained these individual solutions to each other. In the next phase, they combined the best elements of the individual models, and developed a shared solution. To increase reality and test robustness of the team solution, in the last phase of our LSP-process, the team added internal and external relationships and discussed the consequences through discussing 'what-if' questions. These indicated whether relationships were flexible or inflexible, and to what extent the relationships were vital to the solution (of major or minor importance). In their 'what-if' discussion, they considered what would happen to the feasibility of the solution if major disruptions would occur, e. g. climate change, corruption, war, famine. To what extend were the model to be adjusted when major external circumstances would occur? The serious game was concluded by making a one-minute explanatory video of the shared solution and an ex-post questionnaire concerning team performance and team climate. In Figure 4 we illustrate a solution of an LSP-workshop and in Figure 5, shared storytelling.

Figure 4: Example of solution to a wicked problem during an LSP-workshop

Source: own research

Figure 5: Visualization of shared storytelling

Source: own research

2.2 PLAYBOOK

2.2.1 Activity overview

Before the game, facilitators have to be trained. Ideally, facilitators are being trained and certified as Lego Serious Play® facilitator. Facilitators are essential for the efficacy of the LSP-method: they guide the different phases of the process, while asking in-depth follow-up questions to the participants to stimulate the group process and reflections of all team members. The number of participants per facilitator is limited to ideally 4-5 persons. The larger the group, the more complicated the team processes, the more complicated the facilitation as well. When groups are smaller, there are less viewpoints to share between the participants, when the groups are larger, team processes tend to be complex. Before the game, also cards with the case and the problems question (see Section 2.2.3) have to be prepared as well as the play material: sealbags with Lego Serious Play® bricks and plates to click the Lego bricks. In addition, facilitators have to bring along timers. The participants are asked to use their smartphones to make videos of their output and respond to performance questionnaires.

During the game: the facilitators introduce the phases of the game: (1) to create individual metaphors of the ideas; (2) explain the stories of the intended solutions to each other; (3) guide the sharing of the story-telling and coach the teams to select radical new ideas and feasible ideas; and (4) combine the most interesting elements of all individual ideas to a joint team solution.

After the game: the facilitators guide the reflection about the creative problems solving: interactive master class "How to improve your creative skills". We developed templates to collect all Lego Serious Play® bricks, put these in sealbags for re-use by next groups.

2.2.2 Detailed script

The creativity games followed the following playbook script, see Table 3 and explaining text below.

Step 1 (5') - Introduction of the assignment and Lego rules

a. Plenary meeting for all students. Explanation of the research and explanation of UN Goal #4 (see Section 2.2.3)[3].
b. Check/Adjust team composition (max of 6participants). No smartphones allowed **during** the building sessions.
c. **After** the game: use the smart phone to respond to a questionnaire. All students note the names of their team members.
d. **Instruction LSP / Explanation LSP rules: Give the following instruction: "**When you focus you get new insights. Our mind is not capable of multitasking. So that is why the building takes place without talking. Focus on the bricks. There's no right or wrong in building. It is not about the best builder it about *your* story."

Step 2 (10') - Skills exercise 1: "Build a bridge with the widest and highest span possible".

a. opening the bag and explanation of building-bridge-assignment (1'). When finished it must be possible to pass at least one hand under your bridge.
b. Set timer and give a "still 30 secs signal" and "now it's time to add the last brick".
c. Explain/share (2' p. p) Let students share building experiences and ask questions like: How did you experience the building? What was important for you while building? What was your tactic? Are you inspired by other bridges? Did you check your neighbors building?

Step 3 (20') - **Build an individual model**: *What idea contributes to the task/question/challenge given?*

a. 2' explanation. Hand-outs with the question, the extra information (accessibility for both boys and girls) and criteria (the idea must be innovative and feasible).
b. 8' individual building. Set timer and give a "still 1 minute signal" and "now it's time to add the last brick".
c. 10 ' (5 x 2') individual sharing of stories. Stimulate that students ask each other questions: e. g. what part of your model is important for accessibility / what part of the model is

[3] This is an example of a creativity task. Of course, other cases can be introduced.

specific for low-income countries / why is your model innovative / etc. Make sure students talk through their models. Let them point at the models while explaining.

Table 3: Script Creativity games

#	duration	Activities	Plenary / Sub-group	Instruct	Build	Explain & Share
1	0:05	Introduction of game & assignment; check availability of students Why: Make everyone familiar with the program, the question/challenge to find solutions for and manage expectations	P	0:05		
2	0:10	Skills exercise (simple construction task): for instance "build a model of a bridge large enough to place your hand under it" Why: Warm-up, bring students into doing, avoiding "not daring to build something"	S	0:01	0:03	5"
3	0:20	A. Individual model - *Visualize INDIVIDUAL prototype 1st idea. Work silently.* Why:	S	0:02	0:08	10" (2" pp)
4	0:20	B. Shared model – *Combine and build a shared prototype* *Why:*	S	0:02	0:10	10 (2' pp)
5	0:20	C. Relationships – Include internal and external links and discuss 'What-if' consequences Why	S	0:02	0:10	5"
6	0:10	Exercise & record a ONE MINUTE video pitch of solution on smart phones. One person explains with pinpoint, one person films. NB1: students need to exercise your pitch first. NB2: beware of background noise – this can spoil the recording.	S	0:02	0:10	10" (2" pp)
7	0:15	Ex post questionnaire (for research purpose onlyu)	S	0:02	0:10	8"
8	0:10	Teams sort the bricks according to the checklist and put back in the seal bags.	S	0:01		9"

9	0:10	In case time is left: Final evaluation. What are the main eye openers?	P			10"
10	00:30	Group interview: lessons learned	S			

Step 4 (20') - **Build a shared model:** Combine the best aspects of the individual models.

a. 2' explanation: it is important to make a **new** model in which the most important aspects of the individual models are represented. That means you can use all bricks on the table, also the bricks in the individual models. **Goal:** to share all ideas and build "the best of all worlds".
b. During building ask questions: is the most important part of your individual model -your answer to the research question- represented in the shared model? Does the new model answer the research question? Does it meet the criteria (innovative and feasible)? Etc.
c. Keep talking through the model.
d. Practice the story. Who's going to tell the story in the video?

Step 5 (20') - Add Relationships & discuss "what-if" situations (robustness check)

a. To increase realism, add internal and external **relationships** to your shared model. These can be *rigid or flexible* and *very frequent/important or less very frequent/important*
b. Discuss "what-if" situations: what happens if major disruptions occur, e. g. corruption, famine, climate change, war, natural disasters (grasshoppers, diseases).

Step 6 (5 ') - Make a 1-minute-video of the shared model.

a. Start the video by mentioning date – group number – names of group members **!!**
b. Make sure one student explains the model by pointing at the model. Speech clarity is important.
c. Exercise the pitch before you record it
d. Reduce/avoid background noise!
e. WhatsApp the video to [game coordinator]

Step 7 (15 ') - Fill in performance questionnaire via mobile phones

a. Report the names of the team members
b. If the 5th or 6th team member are missing: fill in blank or "xxx"
c. Personal judgment, don't consult each other

Step 8 (10') Sorting bricks according to checklist into the sealbags.

Step 9 (10') Optional: Evaluation. Lessons learned? Eye openers? What was most interesting / difficult?

Step 10 (30'): Group interview (combined with step 9)

2.3 SUPPORTING MATERIAL

2.3.1 Sustainable creativity case

The creative task was to develop an innovative and feasible solution to the accessibility of education for all boys and girls in low-income countries. This task is inspired by the UN Sustainable Development Goal # 4 (Education for all). To develop new solutions, we used the Lego Serious Play (LSP) method, in which participants create symbolic and metaphorical models made with special LEGO bricks and presenting them to the other team members, coined as "shared storytelling" (Frick, Tardini, & Cantoni, 2015). According to Primus & Jiang (2019), LSP facilitates developing novel and surprising solutions to problems. The LSP method consists of several phases; after an exercise aimed at develop skills working with the Lego bricks, participants build an individual model and explain this to their team members. Later, the team members combine aspects of individual models and build a shared model. To increase reality and test robustness of the team solution, the team include internal and external relationships and discussed "what if" questions: to what extend does the model have to be adjusted when major external circumstances will occur (e. g. climate change, war, corruption etc).

Education is the foundation for improving people's lives and sustainable development. That is why it is one of the development goals. Education is important in eradicating poverty and hunger and in promoting sustainable, inclusive and equitable economic growth and development. This involves accessibility, quality and affordability. Greater attention to improving the participation rate of young people, especially marginalized young people, is needed to ensure that they acquire the knowledge, capacities, skills and ethical values needed for good governance, social inclusion, tolerance and peace, for example. Despite decades of efforts to get every child into the classroom, progress has stalled, according to data from the UNESCO Institute for Statistics (UIS). More efforts are needed to ensure that education at primary, secondary and tertiary levels is more responsive to the needs of young people in their own living environments.

United Nations Sustainable Development Goal # 4: "Ensure inclusive and quality education for all and promote lifelong learning". Education is important for the development and improvement of people's lives. Despite many efforts, education is still not accessible to all. Particularly in low-income countries, a part of the population is still denied access to education (for example, in sub-Saharan Africa, one in three children and adolescents do not receive schooling.

The Purpose of the workshop is to generate ideas for improving access to education for all boys and girls in low-income countries**.**

The **assignment** of the workshop is: *Develop together with your team innovative and feasible solutions to increase access to education for all boys and girls in low-income countries.*

Criteria for ideas: 1. Innovative; 2. Feasible in practice, feasible, workable

2.4 ASSESSMENT AND EVALUATION

After the creativity games, participants gave their feedback via an online questionnaire. In total, we collected 421 statements. The key takeaway is that the participants valued open communication, inclusiveness, creativity, and teamwork, fostering a collaborative and respectful environment that helps to achieve shared goals.

2.4.1 Strengths

Regarding "what went well in the team" we conclude as follows:

1. **Collaboration and Teamwork**: There is a strong focus on working together, combining ideas, and ensuring that everyone's voice is heard. Words like "*collaboration", "teamwork", "cooperation,* and "*everyone was involved*" appear frequently.
2. **Communication**: Clear and open communication is another prevalent theme, often associated with listening, respect, and feedback. Phrases like "*communication was clear", "listening to others", "everyone was heard"* point to the importance of this.
3. **Inclusiveness and respect for opinions**: Many phrases highlight that all team members contributed, were given space to share, and their opinions were valued. The idea of integrating multiple perspectives and making decisions collectively was key.
4. **Idea Generation and Creativity**: A recurring theme is the generation and combination of ideas to arrive at innovative solutions. Words like "*creativity, brainstorming, combining ideas,* and *creative thinking"* appeared frequently.
5. **Positive and Open Atmosphere**: Many statements refer to the importance of a safe, positive, and open environment, which encourages participation, respect, and fun. Phrases like "*positive atmosphere, humor, safe atmosphere"* suggest a team that thrives on mutual encouragement and respect.
6. **Problem-Solving and Decision-Making**: There is an emphasis on solving problems through teamwork, critical thinking, and collaboration, along with making decisions that reflect everyone's contributions.

2.4.2 Suggestions for improvement

Reflexivity is an essential part in serious games: direct after participating reflecting upon once's learning regarding Attitude (awareness), Behavioral skills (new competencies learned?) and Cognition (new knowledge acquired?). Therefore, we asked the participants to give some suggestions for improving their team's performance. The themes based on recurring topics mentioned are:

- **Increase active participation of all members**: Many statements emphasize improving participation, ensuring quieter or less active members contribute, asking everyone for input, and fostering more inclusive communication. In addition, many comments revolved around improving collaboration and making sure all team members were equally involved in discussions and decision-making. Some statements were: *"Ask explicitly if someone has a different opinion"; "Give everyone the time to talk"; "Letting everyone speak in turns"; "Ask for everyone's opinion"; "Maybe motivate a bit more to talk to those who were not as active"; "Listen more to each other"*. There were calls for more feedback between team members during the workshop to improve ideas and solutions: *"Give more feedback to each other" ; "Provide sharper feedback" and "more reflection time" ; "*Better involving others".
- **Clearer instruction and guidelines for communication**. Some needed structured leadership or facilitation during tasks to guide discussions and decisions. Suggestions on more direct, organized, and open communication were frequent. Some statements were: "*Our communication was quite chaotic; "Clearer instructions from the organization"; "Appoint a leader who guides the discussion";* "Someone to lead the process". Although others commented: *"we need more collective leadership"*.
- **Stricter task management & reduce time pressure.** Some participants noted the need for more questioning and deeper exploration of ideas. Some statements were: "*Challenge ideas more critically"; "We didn't really test assumptions" ; "Seek depth, ask why"*. Time constraints and better use of time were recurring topics, especially around tasks, with remarks as: "*Better use of time for deeper discussions"; "Get more time for an assignment"*. "We need more time to build and think".

A substantial proportion of our participants reported statements like *"All was good" or "I don't really know what to improve"*.

However, time pressure and uncertainty are common aspects of Challenge-based Learning programs. Some lessons learned are

1. to select and train facilitators of the creativity games more intensively;
2. to focus on time management or take more time in the script for the phases in the serious game;
3. to guide the discussion more explicitly with a focus on participation of all team members.

2.4.3 International and sustainable aspects

All games had a highly international, and sustainable component. Participants had various nationalities: they had an Albanian, Aruban, Brazilian, Danish, Dutch, French, Georgian, German, Greek, Hungarian, Indian, Indonesian, Iranian, Irish, Italian, Kenyan, Kuwaiti, Latvian, Mexican, Nigerian, Philippian, Polish, Romanian, Russian, South African, Spanish or Ukrainian background.

Sustainable problems are multi-faceted and complex. Visualization of sustainable problems in metaphors can clarify and lead to new insights. Sharing these metaphors with others, discussing various aspects of all individual solutions and creating a joint solution that involves internal and

external relations can facilitate exploring how to improve feasibility of the chosen solution. Therefore, LSP as a method to solve sustainable issues is a useful tool to creative sustainable problem solving in a global, multi-cultural context.

LSP focuses on direct communication while making abstract phenomena tangible with Lego Serious Play® bricks. Therefore, it is difficult to digitalize the LSP-method.

3 Negotiation games

3.1 INTRODUCTION

3.1.1 Conceptual background

Two types of negotiations are distinguished: distributive and integrative negotiations. In a distributive competitive negotiation, negotiators claim as much value as possible for themselves; and an integrative collaborative strategy, they focus on mutual interest for all partners involved. When negotiation partners perceive the available resources to be distributed as limited, they are compelled to become competitive and attempt to maximize their own gains at the expense of others - a win-lose situation, or distributive negotiation (Lewicki et al., 1999), often present in fixed-sum bargaining.

Although personality drives performance, there is no common opinion how personality matters to negotiation outcome due to the fact that research on personality and negotiation resulted in no conclusive findings (Elfenbein, 2013; Falcao et al., 2018). Personality traits are, e. g. - ethical values (honesty–humility), emotionality, extraversion, agreeableness, conscientiousness, and openness to experience.

Ethical values, such as fairness and sincerity, have an impact on social interactions. If negotiations are considered only to be competitive, secrecy and even deception may be the consequence. Fairness and sincerity make negotiation offers more attractive as opposed to self-interest-based approaches. Deception lowers the transfer of information between negotiation partners; fairness evokes more cooperative behavior and increased satisfaction without a lower final price. Thus, one might conclude: honesty pays (Agndal et al., 2017).

3.1.2 Key parameters

Table 4 below summarizes the main aspects of the negotiation games. Teachers can use it to promote this game to students, students can use this table to decide whether to participate.

Table 4: key parameters of negotiation games

Educational aims:	to develop 21st century skills using Challenge-based Learning: become a more effective and reflective negotiator in a cross-cultural context
Elements:	• international digital challenge game, learning by doing; • awareness of personal negotiation values and preferences; • exercise distributive and integrative negotiations; • reflect upon your negotiation performance; • interactive lecture: how to become more effective in international negotiations – tips & tricks, do's and don'ts, facilitating and complicating factors
Why participate	• Understand the processes of negotiation. Learn to understand and improve your role in effective negotiations. • Become aware of your own personal negotiation style and the styles of your counterparts in a challenging, action-oriented, international environment. Understand what happened and predict what is likely to happen next. Understand the differences between distributive and integrative negotiations. • Develop your negotiation skills. Acquire hands-on practice. Develop a situational approach for maximizing value and minimizing risk and resistance in your negotiation. Acquire new tools, change your behavior and develop a new mindset.
Who participate?	Business, technical, and design students from universities of various countries
Duration:	2 hours (can be extended by including multiple modules)
Practicalities:	• Number of students: max. 24x per workshop (= 8 teams of 3 people). • Language: English • Practicalities. The event is free of charge. Participant will obtain a certificate of participation afterwards. • In case of digital workshop: Participants should have enough bandwidth connection and a working camera (to be able to observe non-verbal negotiation behavior) and microphone are essential for participating actively. • We create a virtual community and a way to communicate with team chats or personal messages via social media and interactive tools. • Participant will obtain a certificate of participation afterwards

3.2 PLAYBOOK

3.2.1 Activity overview

We developed two negotiation games: (1) dyadic negotiation games, in which one negotiator deals with one counterpart; (2) multi-partner negotiation games about distributive and integrative negotiations. Both games can be played either virtually or on campus. Both games include distributive and integrative negotiations.

Before the games: (1) participants fill in a questionnaire with personal preferences (for research purposes and personal feedback); (2) confidential instructions for the participants are printed (in case of on campus games); (3) class rooms are reserved with flexible furniture and grouped as indicated in Table 4. A maximum number of participants is advised of 20 people; when exceeding this number co-facilitators are designated, each having their subgroup of max. 20 people.

3.2.2 Detailed script

In the dyadic negotiation games, we used the following script, see Table 5.

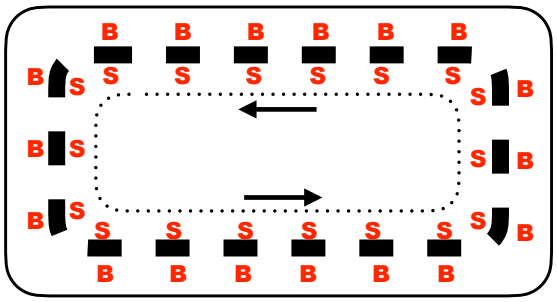
Table 5: script of dyadic negotiation games

#	Start time	Finish time	Duration (minutes)	Activities	Explanation
1			10	Start – Welcome and read confidential instructions	Explanation of the game, form pairs. Buyer / Seller -> different instruction
2			15	Case: Table or TV – 1st round of negotiation	
3			5	Questionnaire and change partners	Different counterparts, roles Buyer / Seller do not change
4			15	Case: Table or TV – 2nd round	
5			5	Questionnaire and change partners	
6			15	Case: Furniture negotiation, 3rd round	roles Buyer / Seller change
7			5	Questionnaire and change partners	
8			15	Case: Furniture Int. negot, 4th round	Different counterparts, roles Buyer / Seller do not change
9			5	Questionnaire	Only Buyers are changing
10			30	Plenary Evaluation; interactive lecture	Lessons learned. Success factors, hurdles.

Development of dyadic games:

The dyadic games were developed based on a validated case of Curhan, Eisenkraft, & Elfenbein (2013). The group of participants is divided into two groups: one group will start as buyers (B), the other group as sellers (S), see Figure 6. After having read their first confidential instructions, the TV case, which is a distributive negotiation (#1 – see hereafter), they negotiate with their counterpart (#2) to conduct their assignment. They report their outcome (#3) via a questionnaire for research and feedback purpose. The inner ring of Sellers (S in Figure 6 below) and change from seat to enable another negotiation exercise with the same role (B or S) and the same case (#4). After reporting (#5), the Sellers change again from position. All participants receive a second confidential instruction, a new case about Furniture, which is an integrative negotiation. At #6, they negotiate again, report (#7). The inner ring (now in the role of Buyers) change places again and start negotiate again in their 4th and last round (#8).

Figure 6: lay-out of dyadic negotiation games



Development of multi-partner multi-issue games

In the game, three negotiators (tribes) live together on Connor's Paradise island. The three Connor tribes live rather independently of each other, but need each other to construct essential project for their survival. The tribes have different amounts of materials and skills concerning the projects. They need to exchange their resources with each other to be able to construct. The tribes want to build as many projects as possible. In the first phase, the goal of every leader is to maximize their tribe's benefits (score) by gaining collective agreement to construct as many projects as possible. Only one tribe can be responsible for a project's construction. Being responsible means locating the project on the territory of their tribe, and customizing the project to your tribe's needs. Therefore, being responsible for constructing a project brings the highest payoff: 10 points. Sometimes, a tribe benefits from the construction of a project by another tribe. In this case: a tribe wins 5 points. In other cases, the construction of a project by another yields no benefit or penalty for a tribe resulting in no gains or losses. Unfortunately, sometimes, a tribe may suffer from the project being constructed by another tribe and gets a penalty of 5 points. It is possible that the three tribes do not reach an agreement. If for any reason a particular project cannot be constructed, then all three tribes suffer: 3 points will be deducted from their score for that project. The resources left unused cannot be used for other projects and are in effect worthless. Each tribe leader receives a confidential instruction regarding the number of resources their tribe owns, and

which benefits or penalties their tribe will have in case their own tribe or other tribes will construct the projects. The tribe leaders negotiate to discuss the sharing of resources and to define which tribe will construct which project. The goal of each leader is to maximize the score for their tribe and report the negotiation outcomes via a short internet questionnaire. The second phase about integrative negotiations: the tribe leaders are asked to do better and take a holistic perspective of the interests of all 3 tribes.

In the multipartner negotiation games, we used the following script, see Table 6.

Table 6: Script of multi-partner negotiation games

#	Dura-tion	Program	Plenary/ Sub-group	Actions facilitator	Actions host
1	0:10	Welcome & intro-duction of the negotiation game. Intro of program, learning aims, gen-eral video	P		(1) make facilitators co-host; (2) prepare breakouts - **max. time 20'**, assign people to A-B-C
2	0:20	Detailed instruction of negotiators VIDEO ("tribe A,B. C") & Developing negotiation strate-gies	S -tribes ABC	(1) All clear? (2) Share screen (don't forget to enable 'sound' at Zoom): Show video tutoral of tribe; (3) ask participants to make screenshot of score sheet - pause presenting; (4) ask participants to write down the name of the other negotiators and negotiation group # (they need that at the end ques-tionnaire)	Broadcast : 5' left; 2' left
2a	0:02	ALL CLEAR?			prepare breakouts - **max. time 30'**, assign people to breakouts 1-2-3-4-5
3	0:30	Multi-issue negotia-tions between tribe A-B-C	S - negot 12345	(1) observe negotiations; (2) ask the group to write down the results on paper/laptop - NOT via internet!	Broadcast : 5' left; 2' left
4	0:10	New instruction for 2nd phase-> 5' pause	P	youtube 5' count down of pauze via screen sharing Anne? https://www. youtube. com/watch?v=xTczn5RUgnk	prepare breakouts - **max. time 25'**, assign people to breakouts 1-2-3-4-5
4a	0:02	ALL CLEAR?	P		
5	0:25	Multi-issue negotia-tions between tribe A-B-C + ex post questionnaire	S - negot 12345	(1) observe negotiations; (2) After finising, ca. 15': ask participants to respond VIA INTERNET ex post questionnaire; (3) respond as well as 'observer' the same question-naire; if participants did not receive email w questionnaire:	Broadcast : 5' left; 2' left

				send them to the main room (QR code instead).	
6	0:20	Wrap up & lessons learned eye openers, research results – interactive lecture concerning awareness of negotiation processes.	P	report main observations;	(1) all responded to ex post questionnaire? (2) conclusions of observers; (3)Debriefing remarks (see text); (4) show optimal solution sheet; ; (5) Program next session 14 Dec. Certificate of Participation after 3rd session

3.3 SUPPORTING MATERIAL

3.3.1 Cases dyadic negotiation games

Case instruction for negotiators

Are you a great negotiator?

NEGOTIATION game 1 (Maximum negotiaton time: 15 mins)

Role: **Buying** a Table (for your eyes only!)

Confidential instructions for the BUYER of the Table:

- You are abroad on semester exchange. You just arrived in Melbourne.
- You need a table for your dormitory.
- You are interested in buying a used table that was advertised by a student.
- This kind of table used to **sell $300 new**, but new ones are no longer available)
- A local furniture store close to the university is selling a similar (used) table for **$190.**
- Try to buy the table from the student for as little money as possible.
- You do not have to reach an agreement. If you don't reach an agreement, you will buy the table at the store mentioned.

NEGOTIATION game 1 - Maximum negotiaton time: 15 mins)

Role: **SELLING** a Table (for your eyes only!)

Confidential instructions for the SELLER of the Table:

- You are abroad on semester exchange. You will go back home within a few days.
- The only furniture you own and have in your dormitory is a table.
- You have advertised this table, hoping an incoming student might be interested in buying it.

- A local furniture store nearby the university has offered **$50** for your table.
- Try to sell the table to the student for as much money as possible.
- You do not have to reach an agreement. If you don't reach an agreement you will sell the table to the store mentioned.

NEGOTIATION game 2 Maximum negotiaton time: 15 mins)

Role: **BUYING** a TV-SET (for your eyes only!)

Confidential instructions for the BUYER of the TV-set:

- You have just finished your studies and are about to start your first job in The Netherlands.
- You do not have a TV-set because you had no time to watch TV anyway.
- Per the 1st of the month, you plan to move into your new apartment. Your landlord, the apartment owner, just offered you an old TV-set to buy.
- Your partner is a game-enthusiast. However, neither of you has a game station or games.
- Try to buy the TV-set from the apartment owner for as little money as possible. This way you have some money left for games.
- You do not have to reach an agreement. If you don't reach an agreement, you will buy a used TV-set at a **local pond shop for $100**.

NEGOTIATION game 2 - Maximum negotiaton time: 15 mins)

Role: **SELLING** a TV-SET - (for your eyes only!)

Confidential instructions for the SELLER of the TV-set:

- You are the owner of an apartment. A new tenant will move into your apartment per the 1st of the month.
- The previous tenant left a TV-set and a lot of games and a game-station too. The TV-set is worth some money, the games and game-station seem old and of no monetary value, you think.
- You just asked your new tenant if he's interested in buying the TV-set.
- Try to sell the TV-set for a much money as possible.
- You do not have to reach an agreement. If you don't reach an agreement, you will give the TV-set to a family member and dispose of the game-station and games.

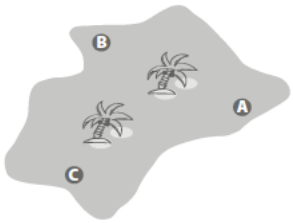
3.3.2 Case instruction: multi-partner Negotiation games

Case instruction for negotiators

De multi-partner case was developed based on a validate case (Smolinksi. & Downs, 2018). The instructions gave a general part (made known to all participants) and three separate parts (specific for the three 'tribe' negotiators – for their eyes only. To facilitate the instructions, we've made video tutorials (link included in the text):
(8 items version)

- **General instruction**
- **Tribe A: Azari**
- **Tribe B: Beluga**
- **Tribe C: Cinatu**

Welcome to Connor Paradise
Once upon a time, three tribes, lived together on the wonderful island of Connor Paradise. The island is located in the Mediterranean Sea and its inhabitants are called the Connors. Tribe A, the Azari, populate the eastern part of the island, tribe B, the Beluga, inhabit the north, and Tribe C, the Cinatu, live in the south.



Life is very good and peaceful on the island. There is an abundance of food due to the ideal agricultural climate. The three Connor tribes live rather independently of each other. Because of this, there has been only very limited interaction between the three tribes over the past decades. The members of all tribes love their island and cannot imagine leaving it under any circumstances. However, last week a very powerful storm, the worst in history, ravaged the island and severely damaged the infrastructure of every tribe. With so many houses destroyed and much of their crops lost, all are distraught and worried about their future. They fear the next storm and urgently demand significant improvements to the island's infrastructure, especially relating to disaster warning and response. The demands of all inhabitants have been collected by the leaders of all three tribes and are summarized into the following eight crucial construction projects.

1. Observation point - to identify storms and tsunamis in time
2. Wave breaker - to protect the coast of Connor Paradise
3. Astronomy Center – to improve weather forecasts
4. Temple - to appease and calm the god Connor
5. 5. Storm Shelter – to create a refuge from any future storms
6. Repair and improve homes – to repair storm damage

7. Warehouse - to store food
8. Improve crop yield - to increase agricultural productivity

Each project can be constructed only once among the three tribes

Exchange of resources
The leaders of each tribe have counted their remaining resources after the storm. After doing so, each has realized that not enough resources exist to construct any of these projects independently. The construction of each project requires ten units of different and unique resources. The resources are only useful for one particular project and cannot be substituted by resources from other projects. Therefore, they know that they need to find a way to combine their resources with the other tribes. To build an observation point, you need 10 pieces of wood. Ten units of stone are used to construct a wave breaker and 10 lenses are necessary to build the Astronomical Center. Ten units of gold are required to build a temple. Ten elements of steel are desired to build a storm shelter. To repair and improve houses 10 units of clay are indispensable You can build a storehouse if you have 10 pieces of insulation material in your possession. Finally, 10 units of fertilizer are crucial to realize the "improve crop yield" project.

Different skills
A complicating matter is that each of the tribes has differing amounts of materials and skills concerning the projects. Therefore, they need to agree on the specific distribution of responsibility among them to successfully complete as many projects as possible. The goal of every leader is to maximize their tribe's benefits (score) by gaining collective agreement to construct as many projects as possible. You will receive later more details concerning the ownership of resources, and the benefits or risks for your tribe when the projects will be constructed by your tribe or by another.

What are the scores for your tribe?
Only one tribe can be responsible for a project's construction. Being responsible means locating the project on the territory of their tribe, and customizing the project to your tribe's needs. Therefore, being responsible for constructing a project brings the highest payoff: 10 points.

Sometimes, a tribe benefits from the construction of a project by another tribe. In this case: a tribe wins 5 points. In other cases, the construction of a project by another yields no benefit or penalty for a tribe resulting in no gains or losses. Unfortunately, sometimes, a tribe may suffer from the project being constructed by another tribe and gets a penalty of 5 points.

It is possible that the three tribes do not reach an agreement. If for any reason a particular project cannot be constructed, then all three tribes suffer: 3 points will be deducted from their score for that project. The resources left unused cannot be used for other projects and are in effect worthless.

As said, more details will follow concerning the amount of resources your tribe owns, and which benefits or penalties your tribe will have in case your tribe or other tribes will construct the projects.

Survival steps:

- we give each tribe leader a confidential instruction.
- Then**,** the tribe leaders negotiate to discuss the sharing of resources and to define which tribe will construct which project.
- The goal of each leader is to maximize the score for their tribe.
- Last, you will report your negotiation outcomes via a short internet questionnaire.

GOOD LUCK!

3.3.3 Confidential Instructions for multi-partner games: Tribe Leaders

Confidential Instructions for Tribe A: the Azari

You are the elected leader of the Azari. In this video, you get more detailed information about the survival projects. This information is confidential: for your eyes only.

Your tribe lives in the eastern part of Connor Paradise. The people in your tribe are very religious. Your tribe is living close to nature and learning to recognize its signs. Moreover, your tribe has intense pride in its knowledge of astronomy. You and all members of your tribe, have discussed the projects in great detail. Naturally, you want to be responsible to construct as many of the projects as possible in order to guarantee that your interests and values are incorporated. Here is the summary of each project: the amount of resources you still have, and the scores your tribe will get when you or one of the other tribes construct a certain project. After all 8 projects have been introduced, you have the opportunity to make a photo with your smart phone of this screen to remember the amount of resources and scores.

1. **Observation point –** You still possess 6 units of wood. Although the last storm was not accompanied by a tsunami, Connor Paradise has been affected by them in the past. Therefore, you would like to be prepared before the next tsunami hits the island. Since the biggest tsunamis typically come from the east, your tribe finds it very important that it is the one to construct this observation point. when your tribe constructs, your score will be10 points. An observation point constructed by tribe B, would undoubtedly be bad since your tribe believes that tribe B do not have the necessary knowledge and experience to identify tsunamis correctly. At worst, this could lead to catastrophe for all and at best, lead to them raising numerous irritating false alarms. If B construct, you will lose 5 points. Although tribe C, is more reliable, they live on the south side of the island and could only observe a part of your coast: if C makes is in charge, you get 5 points. **Wave breaker** – Your tribe still owns 2 stones. You agree that a wave breaker system would be very useful for your island, especially if it is constructed by your tribe, and protects your houses. When you build a wave breaker, your score will be 10 points. Since tribe B, is planning a wave breaker protecting only their own territory, it is not beneficial or harmful for you if they build it. Therefore, if B builds the wave breaker, you win nor lose any points. However, as tribe C offered to build a wave breaker, which would also

protect some of your houses, you would partially benefit from them constructing it. If tribe C constructs, you will get 5 points.

2. **Astronomy center –** Your tribe has still 6 lenses after the storm. You believe that an astronomical observatory would help forecast upcoming changes in weather conditions by analyzing the position and movement of major astronomical bodies. You also know that your tribe has the necessary knowledge and experience to construct it. when you construct, your score will be 10 points. Although you suspect that astronomy is not the top priority for tribe B, at the moment, you know that some of its members have dealt with it in the past. If B constructs, you will obtain 5 points As far as you know, tribe C, has shown very little interest in astronomy. If C makes the observatory, you win nor lose any points.

3. **Temple –** Your tribe could save 6 unities of gold. As religion is a very important part of your culture, you believe that a temple would help improve the spiritual connection with the god Connor, which could decrease the frequency of natural disasters. When you build a temple, your score will be 10 points. You have heard that tribe B, is also religious and practices a similar form of Connorism. If tribe B constructs, you will obtain 5 points. You have no information whether tribe C, shares your religious beliefs and whether they would even be interested in building a temple. Therefore, if C builds the temple, you win nor lose any points.

4. **Storm Shelter** – You still possess 2 units of steel. Due to the disasters caused by last week's storm, it is imperative to build a shelter for the entire population of Connor Paradise as a refuge for any future events. As you expect the other tribes to build a shelter near their own territory, you would prefer to build it yourselves: in this case your score will be 10 points. However, constructing this project by another tribe will most likely not bring you any benefits. If B or C build Storm Shelter, you win nor lose any points.

5. **Repair and improve homes –** Your tribe still owns 1 unit of clay. Housing is fundamental to the future wealth and happiness of each tribe. Your tribe has solid technical and construction skills, and therefore, you strongly prefer and expect to gain agreement from the other tribes to construct this project. You believe that only your tribe can guarantee that the houses are repaired and improved properly. When you repair and improve homes, your score will be 10 points. You fear that if tribe C, is assigned to this project, they might use it to improve only their own housing situation. You do not see this risk with tribe B, but at the same time, you do not expect to benefit from the project in that case either. If B constructs, you will obtain no points, but if C makes the observatory, you lose 5 points.

6. **Warehouse –** After the storm, your tribe lost all its isolation material. Your tribe currently has sufficient food supplies. However, this is only the case because each member of your tribe routinely fasts for religious reasons and thus consumes less food. Despite this, you believe that you need to be better prepared for possible future storms by ensuring there is enough food when needed. Ideally, you would like your tribe to build and control the warehouse. Indeed, because you have no trading history with the other tribes, you are unsure that you can trust them with your own food supplies. when you build a warehouse, your score will be

10 points. However, tribe B has unofficially promised that, should they construct the project, they would share all food supplies gathered. Letting tribe C construct the warehouse would probably lead to it being located close to your territory. This would allow you to access your food supplies quickly. In both cases, If tribe B or C construct, you will obtain 5 points.

7. **Improve crop yield** – Your tribe could save 2 unities of fertilizer. You believe that to replenish the lost food supplies from the storm and to prepare for future population growth, you urgently need to improve. If your tribe will realize this project, you get 10 points. Your tribe's elders have pointed out that letting the other tribes construct this project would not generate any additional benefits or harms for your tribe; if they take care of this project, you win nor lose any points.

Table 7a: Resources & scores Tribe A (confidential)

Project			**Score of A if a project assigned to:**		
Project	**Resource**	**Amount owned**	**A**	**B**	**C**
Observation point	Wood	6	10	-5	5
Wave breaker	Stones	2	10	0	5
Astronomy center	Lenses	6	10	5	0
Temple	Gold	6	10	5	0
Storm Shelter	Steel	2	10	0	0
Repair and improve homes	Clay	1	10	0	-5
Warehouse	Insulation	0	10	5	5
Improve crop yield	Fertilizer	2	10	0	0

Please make a photo of this screen to remember the resources you still have after the storm of and scores you can win if you are allowed to construct the projects. Remember: this information is confidential!

Because you are not certain how compatible your preferences are with the preferences of the

other tribes, you are prepared for a long and intensive negotiation. Regardless of what is discussed or agreed to during this negotiation, it cannot change your preferences described in the scoring table. The resources not used in any particular project cannot be used for completing other projects.

You are about to meet the leaders of the other tribes. It is clear to you that the damage from the storm has left you with insufficient resources to construct any of these projects alone. Thus, you need to trade your resources with the other tribes and jointly decide which tribe is best positioned to construct each project.

Your task therefore is to negotiation in the next period

- Develop a negotiation strategy within your own tribe
- Negotiate with the other tribes about which tribe will construct which project.
    - Remember: a project can be constructed by only one tribe and needs 10 items of a specific resource.
- Your objective is to negotiate the best possible outcome (the highest possible score) for your tribe.
- Report afterwards your results via the internet questionnaire.

Good luck!

Confidential Instructions for Tribe B

You are the elected leader of tribe B, the Beluga. In this video, you get more detailed information about the survival projects. This information is confidential: for your eyes only.

Your tribe lives in the northern part of Connor Paradise and is known for your outstanding technical skills. The people in your tribe are great logical thinkers and excellent construction workers. You and all members of your tribe have discussed the projects in great detail. Naturally, you want to be responsible to construct as many of the projects as possible in order to guarantee that your interests and values are incorporated. Here is the summary of your perspectives for each project, of the amount of resources you still have, and scores you get when you or one of the other tribes construct a certain project. After all 8 projects have been introduced, you have the opportunity to make a photo of this screen to remember the amount of resources and scores.

1. **Observation point –** You still possess 4 units of wood. Although the last storm was not accompanied by a tsunami, Connor Paradise has been affected by them in the past. Therefore, you would like to be prepared before the next tsunami hits the island. Consequently, your tribe has demanded the construction of an observation point. Due to the island's topography, however, an observation point constructed by tribe A, would not result in any benefits for you: you do not win or lose points. When you construct, your score will be 10 points. Although they believe that your tribe's tsunami experts could probably do it much better, they acknowledge that tribe C, is also capable of identifying tsunamis correctly. If tribe C constructs, you will gain 5 points.

2. **Wave breaker –** Your tribe still owns 6 stones. You agree that a wave breaker system would be very useful for your island, especially if it is constructed by your tribe and protects your houses. When you build a wave breaker, your score will be 10 points. Since your tribe is located in the northern part of Connor Paradise, it is not beneficial or harmful for you if tribe A or tribe C build it. Therefore, if they build the wave breaker, you win nor lose any points.

3. **Astronomy center –** Your tribe has still 2 lenses after the storm. An astronomical observatory would help forecast upcoming changes in weather conditions by analyzing the position and movement of astronomical bodies. You feel that your tribe has sufficient knowledge and experience to construct this project. If you construct, your score will be 10 points. The elders remember an old story that tribe A, based on their astronomical observation, once made a disastrous weather forecast and caused severe panic on the island. Although tribe A still regard themselves as astronomy experts, your tribe and tribe C longer believe that tribe A is competent in astronomy. If A constructs, you will lose 5 points. As far as you know, tribe C, has shown very little interest in astronomy. If C makes the observatory, you win nor lose any points.

4. **Temple –** Your tribe could save 5 unities of gold. As religion is an important part of your culture, you believe that a temple would help improve the spiritual connection with the god Connor and decrease the frequency of natural disasters. When you build a temple, your score will be 10 points. You have heard that tribe A, is also religious and practices a similar form of Connorism. If tribe B constructs, you will obtain 5 points. Tribe C, however worships Connor in

a completely different way, which Connor might not enjoy. Instead of pleasing Connor, letting tribe C, build the temple may actually anger Connor. This you fear. Therefore, if C builds the temple, you lose 5 points.

5. **Shelter** – You still possess 5 units of steel. Due to the disasters caused by last week's storm, it is imperative to build a shelter for the whole population of Connor Paradise so that all can find refuge during such disasters in the future. If your tribe is allowed to construct the shelter, you obtain 10 points. Since you expect that tribe A would build a shelter just for themselves, you would not benefit from it if they construct the project: you win nor lose any points. The leader of tribe C has informed you that they are thinking about sharing the shelter with you in case of an emergency. However, since it would take some time for your people to reach the tribe constructed shelter before a storm, the benefits from this would be smaller than were it to be your own construction. If C builds the shelter, you win 5 points.

6. **Repair and improve homes –** Your tribe still owns 4 clay. Housing is fundamental to the future wealth and happiness of each tribe. Your tribe has solid technical and construction skills, and therefore you strongly prefer and expect to gain agreement from the other tribes to construct this project. You believe that only your tribe can guarantee that the houses are repaired and improved properly. When your tribe is allowed to implement this project, your score will be 10 points. You fear that if tribe C, is assigned to this project, they might use it to improve only their own housing situation. You do not see this risk with tribe A: they are likely to help you repair and improve your homes quickly and efficiently. If A constructs, you will obtain 5 points, but if C repairs the houses, you lose 5 points.

7. **Warehouse –** Your tribe has still 3 isolation after the storm. Your tribe currently has sufficient food supplies. However, this is only the case because each member of your tribe routinely fasts for religious reasons and thus consumes less food. Despite this, you believe that you need to be better prepared for possible future storms by ensuring there is enough food when needed. Ideally, you would like your tribe to build and control the warehouse. Indeed, because you have no trading history with the other tribes, you are unsure that you can trust them with your own food supplies. When you build a warehouse, your score will be 10 points. However, tribe A, has unofficially promised that, should they construct the project, they would share all food supplies gathered. If tribe A builds a warehourse, you will obtain 5 points. You have no information whether tribe C, is capable of building a warehouse. Therefore, if C builds the warehouse, you win nor lose any points.

8. **Improve crop yield** – Your tribe could save 3 unities of fertilizer. You believe that to replenish the lost food supplies from the storm and to prepare for future population growth, you urgently need to improve crop yield. You gain 10 points if you realize this project. Your tribe's elders have pointed out that letting the other tribes construct this project would not generate any additional benefits for your tribe: resulting in no gains or losses for you.

Table 7b: Resources & scores Tribe B (confidential)

Project			**Score of B if a project assigned to:**		
	Resource	**Amount owned**	**B**	**A**	**C**
Observation point	Wood	4	10	0	5
Wave breaker	Stones	6	10	0	0
Astronomy center	Lenses	2	10	-5	0
Temple	Gold	5	10	5	-5
Storm Shelter	Steel	5	10	0	5
Repair and improve homes	Clay	4	10	5	-5
Warehouse	Insulation	3	10	5	0
Improve crop yield	Fertilizer	3	10	0	0

Please make a photo of this screen to remember the resources you still have after the storm of and scores you can win if you are allowed to construct the projects. Remember: this information is confidential!

Because you are not certain how compatible your preferences are with the preferences of the other tribes, you are prepared for a long and intensive negotiation. Regardless of what is discussed or agreed to during this negotiation, it cannot change your preferences described in the scoring table. The resources not used in any particular project cannot be used for completing other projects.

You are about to meet the leaders of the other tribes. It is clear to you that the damage from the storm has left you with insufficient resources to construct any of these projects alone. Thus, you need to trade your resources with the other tribes and jointly decide which tribe is best positioned to construct each project.

Your task therefore is to negotiation in the next period:

- Develop a negotiation strategy within your own tribe
- Negotiate with the other tribes about which tribe will construct which project.
- Remember: a project can be constructed by only one tribe and needs 10 items of a specific resource.
- Your objective is to negotiate the best possible outcome (the highest possible score) for your tribe.
- Report afterwards your results via the internet questionnaire.

Good luck!

Confidential Instructions for Tribe C

You are the elected leader of tribe C, the Cinatu. In this video, you get more detailed information about the survival projects. This information is confidential: for your eyes only.

Your tribe lives in the southern part of Connor Paradise and is known for its excellent cuisine and high food consumption. The people in your tribe possess a profound knowledge of storing and preparing food. Many are excellent cooks who highly value the quality of the ingredients. Therefore, over the years, your tribe has developed a mastery of agriculture.

You and all members of your tribe, have discussed the three projects in great detail Naturally, you want to be responsible to construct as many of the three projects as possible in order to guarantee that your interests and values are incorporated. Here is the summary of your perspectives for each project, of the amount of resources you still have, and scores you get when you or one of the other tribes construct a certain project. After all 8 projects have been introduced, you have the opportunity to make a photo of this screen to remember the amount of resources and scores.

1. **Observation point –** You still possess 1 unit of wood. Although the last storm was not accompanied by a tsunami, Connor Paradise has been affected by them in the past. Therefore, you would like to be prepared before the next tsunami hits the island. Consequently, your tribe has demanded the construction of an observation point. Due to the island's topography, an observation point constructed by tribe A would not result in any benefits for you: you do not win or lose points. An observation point constructed by tribe B, would undoubtedly be bad since your tribe B, believes that they do not have the necessary knowledge and experience to identify tsunamis correctly. At worst, this could lead to catastrophe for all and at best, lead to them raising numerous irritating false alarms. If tribe B constructs, you will lose 5 points. When your tribe constructs, your score will be10 points

2. **Wave breaker –** Your tribe still owns 5 stones. You agree that a wave breaker system would be very useful for your island to protect your houses, especially if it is constructed by your tribe. When you build a wave breaker, your score will be 10 points. As tribe A, is planning a wave breaker protecting only their own territory, it is not beneficial for you if they build it. Therefore, if A builds the wave breaker, you win nor lose any points. However, as tribe B, offered to build a wave breaker, which would also protect some of your houses, you would partially benefit from it. If tribe B construct, you will obtain 5 points.

3. **Astronomy center** – Your tribe has still 2 lenses after the storm. An astronomical observatory would help forecast upcoming changes in the weather conditions by analyzing the position and movement of major astronomical bodies. You feel that your tribe has sufficient knowledge and experience to construct this project. If you construct, your score will be 10 points. Although tribe A, still regard themselves as astronomy experts, this belief is not shared by your tribe or by tribe B. The elders remember an old story that tribe A once made a disastrous astronomical-based weather forecast and caused severe panic on the island. If A constructs, you will lose 5 points. Although you suspect that astronomy is not the top priority for tribe B

at the moment, you know that some of its members have dealt with it in the past. If B constructs, you will obtain 5 points.

4. **Temple –** Your tribe could save 1 unity of gold. As religion is an important part of your culture, you believe that a temple would help improve the spiritual connection with the god Connor and decrease the frequency of natural disasters. When you build a temple, your score will be 10 points. You have no information whether tribes A and B share your religious beliefs and whether they would even be interested in building a temple. Therefore, if tribe A or B build the temple, you win nor lose any points.

5. **Storm Shelter** – You possess 4 units of steel. Due to the disasters caused by last week's storm, it is imperative to build a shelter for the whole population of Connor Paradise so that all can find refuge during such disasters in the future. You suspect that tribe A is still using an old and inefficient steelmaking technology. Letting them construct the shelter could result in the waste of valuable resources and cause damage to the environment and you will lose 5 points. Since you expect that tribe B would build a shelter just for themselves, you would not benefit from it if they construct it. You won't gain or loss any points.

6. **Repair and improve homes –** Your tribe still owns 6 units of clay. Housing is fundamental to the future wealth and happiness of each tribe. Your tribe has solid technical and construction skills, and therefore you strongly prefer and expect to gain agreement from the other tribes to construct this project. You believe that only your tribe can guarantee that the houses are repaired and improved properly. When you repair and improve homes, your score will be 10 points. Should this project get assigned to tribe A, they are very likely to help you repair and improve your homes quickly and efficiently. If A constructs, you will obtain 5 points. Although you do not see these benefits if tribe B, the Beluga, constructs this project, you also do not expect any disadvantages either. If they repair and improve homes, you win nor lose any points.

7. **Warehouse –** Your tribe has still 7 pieces of isolation after the storm. Your tribe currently has sufficient food supplies. However, this is only the case because each member of your tribe routinely fasts for religious reasons and thus consumes less food. Despite this, you believe you need to be better prepared for possible future storms by ensuring there is enough food when needed. Ideally, you would like your tribe to build and control the warehouse. Indeed, because you have no trading history with the other tribes, you are unsure that you can trust them with your own food supplies. when you build a warehouse, your score will be 10 points. You have no information whether tribe A, is capable of building a warehouse. Therefore, if A builds the temple, you win nor lose any points. But you are concerned that letting tribe B construct the warehouse would lead to it being located at the farthest end of the island from your tribe. This would increase the distance and time it would take you to access your food supplies. If tribe B builds a warehouse, you will lose 5 points.

8. **Improve crop yield** – Your tribe could save 4 unities of fertilizer. You believe that to replenish the lost food supplies from the storm and to prepare for future population growth, you urgently need to improve crop yield. You gain 10 points if you realize this project. Your tribe's

elders have pointed out that letting the other tribes construct this project would not generate any additional benefits for your tribe: resulting in no gains or losses for you.

Table 7c: Resources & scores Tribe C (confidential)

Project			**Score of C if a project assigned to:**		
	Resource	Amount owned	**C**	**A**	**B**
Observation point	Wood	1	10	0	-5
Wave breaker	Stones	5	10	0	5
Astronomy center	Lenses	2	10	-5	5
Temple	Gold	1	10	0	0
Storm shelter	Steel	4	10	-5	0
Repair and improve homes	Clay	6	10	5	0
Warehouse	Insulation	7	10	0	-5
Improve crop yield	Fertilizer	4	10	0	0

Please make a photo of this screen to remember the resources you still have after the storm of and scores you can win if you are allowed to construct the projects. Remember: this information is confidential!

Because you are not certain how compatible your preferences are with the preferences of the other tribes, you are prepared for a long and intensive negotiation. Regardless of what is discussed or agreed to during this negotiation, it cannot change your preferences described in the scoring table. The resources not used in any particular project cannot be used for completing other projects.

You are about to meet the leaders of the other tribes. It is clear to you that the damage from the storm has left you with insufficient resources to construct any of these projects alone. Thus, you need to trade your resources with the other tribes and jointly decide which tribe is best positioned to construct each project.

Your task therefore is to negotiation in the next period

- Develop a negotiation strategy within your own tribe
- Negotiate with the other tribes about which tribe will construct which project.
- Remember: a project can be constructed by only one tribe and needs 10 items of a specific resource.
- Your objective is to negotiate the best possible outcome (the highest possible score) for your tribe.
- Report afterwards your results via the internet questionnaire.

Good luck!

3.3.4 Debriefing: solution of the multi-partner game

The given amount of resources for all tribes are summarized in Table 8.

Table 8: Resources to complete projects and their distribution among the tribes

Project	Resource	A	B	C
Observation point	Wood	6	4	1
Astronomy center	Lenses	6	2	2
Repair and improve homes	Clay	1	4	6
Temple	Gold	6	5	1
Warehouse	Insulation	0	3	7
Wave breaker	Stones	2	6	5
Shelter	Steel	2	5	4
Improve crop yield	Fertilizer	2	3	4

A look at the table quickly reveals that all projects except the last one, improving crop yield, can be completed. Here, the tribes have only nine units of fertilizer in total, which is less than the required 10. In all other cases, they must commit nearly all of their resources to complete the construction projects successfully. None of the parties has sufficient resources to complete a project on its own.

These benefits are quantified by the following scoring system:

- 10 points for the tribe that constructs a project
- 5 points for the tribe that benefits from the construction of a project by another tribe
- 0 points for the tribe in which the construction of a project by another yields no benefit.
- -5 points for the tribe that suffers from the project constructed by another tribe
- -3 points for all tribes, if a particular project cannot be constructed.

The confidential instructions for each negotiating party include the exact scores that it will receive depending on how the projects are distributed. Table 9 below summarizes these for all three parties and allows us to determine the scores of all parties, given a particular project assignment.

Not surprisingly, a Pareto efficient outcome can be achieved if every project is constructed by the tribe which most benefits all three tribes collectively. This information is summarized in Table 3, which allows us to easily identify a Pareto efficient allocation of projects (marked in bold for convenience):

Table 9: Optimal solutions of multipartner negotiation game

Item	needs to be allocated to …	will generate… points	A	B	C
Observation point	C	20 for all. This is more than the 10 or 0 that would result from allocating it to tribe A and B respectively	20	20	20
Wave breaker	B or C	15			
Astronomy center	B	20			
Temple	A or B	15			
Storm shelter	C	15			
Repair and improve homes	A	20			
Warehouse	A or C	15			
Improve crop yield	Not enough resources to complete the project	which means–-9 points	-3	-3	-3

In this allocation, the parties can collectively obtain 111 points. However, what is challenging for this roleplay is that to reach Pareto efficiency, each participant will have to cooperate with the other parties, retain a holistic perspective that maximizes benefits for all three teams by staying conscious of the connections between the issues and lastly, be flexible on the issues for which they feel they are particularly adept or have a natural advantage. For example, as illustrated in 9, the optimal allocation for any single project typically involves allocating it to a party that has very few resources necessary to complete it. However, intuition and ego can blind one from seeing this. Giving up a rather strong negotiation position to complete a project by agreeing to allocate it to a party with fewer resources seems like a poor decision. This is not always the case. To counter this risk, the negotiators must adopt a more open cooperative attitude and address the problem with a focus on how all can benefit. Indeed, this is especially important in this roleplay due to the strong mutual dependence on resources among the tribes and lack of an attractive BATNA (Best Alternative To a Negotiated Agreement).

Despite the importance of value creation as a driving force behind maximizing the Pareto efficiency, one cannot ignore the equal importance that value claiming plays on a strong points outcome for each team. That is, depending on the combination of the parties' value creation and claiming skills, a Pareto efficient outcome can lead tribe A to a score between 27 and 42 points, tribe B to 27-47 points, and tribe C to 32-42 points. In other words, Pareto efficiency itself does not guarantee a great outcome for each negotiator. As the sum of benefits increases for all three teams, each negotiator should insist on getting their fair share. That is, because the ultimate goal in multilateral negotiations is to maximize one's own benefits, teams differentiate themselves by augmenting value creation with that of value claiming. It is the combination of both skills that makes the winner.

The best substantive outcome obtained by negotiators that represented **tribe A** was 42 points (two separate teams), but the final project allocations were not Pareto efficient (total score of 96 and 101). On average, tribe A negotiators claimed 33 points and the lowest score was 22 points.

The best substantive outcome obtained by the negotiators that represented **tribe B** was 47

points, and the final project allocation was Pareto efficient. On average, tribe B negotiators claimed 34 points and the lowest score was 27 points.

Finally, the best substantive outcome obtained by the negotiators that represented tribe C was 42 points (two separate teams), and the final project allocations were Pareto efficient (111 points). On average, tribe C negotiators claimed 31 points and the lowest score was 22 points

As an endnote to this debriefing, it is now evident that the performance evaluation for this roleplay is based on a substantive outcome. This occurs by using a common valuation (benefit points) that quantifies preferences based on construction project allocation. Unfortunately, the substantive basis of this evaluation partly biases the roleplay toward a short-term perspective. However, since the tribes need to continue to live in peace together on their little island indefinitely and future cooperation might turn out necessary, a longer-term perspective would be more realistic. In this case, it would be instrumental also to measure the relational outcome for each party.

3.4 ASSESSMENT AND EVALUATION

3.4.1 Take aways dyadic games

We asked our participants to reflect upon main eye openers and what they would do differently in next negotiations. Based on the statements from 821 participants of our dyadic negotiation workshops, the following themes could be identified:

- pricing strategies
- information exchange
- win-win outcomes
- communication, relationship building and trust
- negotiation tactics and compromise / flexibility
- psychological aspects
- time management and patience

Pricing Strategies. Many participants noted the significance of setting the first price to leave room for negotiation *("The first price setting was important")*. Several statements highlighted the difficulty of negotiating prices, especially when lacking market information. *("It was difficult to negotiate without knowing the market price")*.

Information exchange. Participants realized how crucial it is to gather information about both the market and the counterpart, while some participants mentioned the strategic use of withholding or sharing information during negotiations. Participants frequently mentioned the importance of gathering more information about the product, market, or counterpart before negotiating. Some participants noted the importance of carefully controlling the information they

share during negotiations. *("Don't give away too much information too soon" ; "It is important to extract information from the other party" ; "Be careful about sharing information").*

Integrative (win/win) negotiations. Several comments mentioned the ease of achieving a win-win outcome when both parties understand each other's needs and some participants found value in balancing both parties' satisfaction during negotiation *("Win-win negotiations are easier"; "It was nice to have a win-win"; "Negotiation was smooth and benefited both parties").* Several participants wanted to work towards finding better compromises that satisfy both parties. *("Find a good compromise"; "Ensure mutual agreement")*. The concept of achieving a win-win solution was also mentioned as a goal for future negotiations.

Communication and trust. Many eye-openers centred on how effective communication and trust-building could improve negotiation performance. ("*Communication is important"; "Trust with the counterpart is important")*. Some participants reflected on how personal relationships or cultural differences influenced negotiations. *("Knowing the personality of the counter negotiator helps" ; "Having a small language barrier made negotiation difficult").* Participants noted the need to communicate more clearly, explain their needs better, or use persuasive language. ("*Communicate your hopes"; "Explain the merits of selling easily").*

Negotiation Tactics, compromise & flexibility. Participants noted the importance of being flexible and open to compromise in successful negotiations, while others expressed the desire to be more assertive, firm, or aggressive in their negotiations ("*Willingness to compromise is important"; "I want to become more assertive"; "I want to try to be tougher")* Some participants reflected on how they gave in too quickly and would resist compromising too early in future negotiations *("Don't compromise too much")*. Many participants reflected on their use of tactics like bluffing or exerting pressure to reach a favourable deal. ("*Bluffing helps"; "Using pressure and false budgets helped me get a better deal").* Some noted that negotiation tactics had to be adapted depending on the counterpart and the situation. *("The strategy depends on the person you are dealing with"; "I learned to adjust tactics when negotiating based on the opponent's behaviour")* Participants often discussed refining their negotiation techniques, such as emphasizing the value of their offer or using better arguments ("*Give more strong arguments"; "Emphasize the good points of the product").* The concept of haggling or bargaining for better deals was frequently mentioned. *("I want to haggle more"; "I want to try more bargaining").* Participants mentioned the need to be more adaptable in their future approach, depending on the counterpart or the situation. ("*I want to become more flexible"; "I have to be willing to change position")*

Psychological Aspects, building relationship and trust. Some participants became more aware of the psychological aspects involved in negotiations. *("Negotiations are psychological warfare")*. Some participants highlighted the importance of fostering trust and building better relationships with the counterpart ("*Build good relationships in the future"; "Have conversations that build trust").* Many participants emphasized the importance of being confident and not being pushed by the counterpart. ("*Don't be fooled by the opponent's push" ; "Stay confident in your price").*

Time Management and Patience: Some participants highlighted the importance of managing time effectively during negotiations. *("The amount of pressure put during the negotiation affects the outcome"; "Time limit played a big role").* In Western countries, time pressure was con-

sidered advantageous ("*Negotiations were easier when done quickly")* in contrast to Asian countries, which usually have a cultures, in which more context should be provided before people can decide. Patience was another frequently mentioned suggestion for future negotiations, with participants recognizing the need to wait for better opportunities during negotiation. *("Be more patient in selling the product"; "Don't rush negotiations")*

3.4.2 Take aways multipartner games

After the multi-partner negotiation games, participants gave their feedback via an online questionnaire. We asked our participants about the main eye openers in the games during the negotiation processes. Based on 99 responses, these can be grouped into themes of collaboration versus competition, negotiation strategy & dynamics, trust & distrust. These patterns of "eye-openers" reflect evolving perspectives on negotiation, collaboration, trust, and strategic behaviour, providing valuable lessons in diplomacy and teamwork.

Collaboration and Cooperation versus Competition. Participants recognized that working together could lead to better results for everyone. *("All tribes came to a conclusion very fast, and everybody left the negotiation seemingly happy with the terms,"; "we managed to come to the best possible outcome very quickly and efficiently").* An integrative negotiation approach increased the inclination to compromise and treat the counterparts with greater fairness; some participants were surprised how easily or unexpectedly people are willing to compromise or accommodate each other's needs. ("*How easily each leader was willing to concede for the overall benefit of the group,"; "tribe C is very good at negotiating and getting the result they wanted but still being fair towards other tribes").* Participants were unexpectedly honest or transparent, which helped build trust. *("Everyone was honest and open about what they believed," ; "the people calculating the totals had the potential to lie for personal gain, but they didn't"*). Some participants learned that more transparency could make negotiation easier. *("How much easier negotiating was when we had more information on each other,"; "transparency is important in negotiation").* A contrast in behaviours was identified: some tribes were more competitive while others prioritized fairness. ("The lead tribe of A was so competitive,"; "tribe C is very good at negotiating and getting the result they wanted but still being fair").

Negotiation Strategies and Dynamics. Some participants used playing "hard to get" or withholding information as a strategy. *("I'm playing hard to get at first - so in the second negotiation they'll be focusing on me,"; "I want to build my tribe perfectly by make my tribe image 'poor' as I can"*). Some reflected upon the impact of taking the first initiative, they recognized the power of making the first move in negotiations. *("I think others will listen to you more if you are the one that makes the first move"*). Sometimes, it was easy to reach to agreements, some decisions were made quickly, others slowly. The process of reaching consensus varied substantially. ("*How easy it was to come to an agreement," versus "how hard it was to come for an agreement").* Some notices surprising outcomes due to effective teamwork and coordination. ("*The group tries to find win-win situations, even though it's a very long process," ; "we all had to come to agreement on the best*

possible outcome and thus we shared more info"). Some participants distinguished different negotiation styles or approaches based on culture, roles, or personalities. *("How they understand each other and decided to be like 'I think it's alright, just deal with it").*

Trust & Distrust. Some had surprising realizations about distrust or suspicion in the process. *("How quick we are to distrust,"; "I feel more suspicious of other people's hidden motives and intentions than I thought I would be")*. Others mentioned shifting trust dynamics: trust can be built over time through shared goals and cooperation. *("Everyone maintained trust and continued with our original compromises," ; "My suspicions were put to the side this time as we were purely playing for a shared goal").*

Multi-partner evaluation of the Connor Paradise game in general

See for a full description of the Connor Paradise Appendix 3a (general instruction to all participants) and 3b (confidential tribe specific instructions). Connor Paradise presents several challenges for the negotiators. First, adding more parties, as in any multiparty negotiation, makes the negotiation process more complicated. The negotiators must build enough trust to share sensitive information with extra people, which complicates identifying possible negotiation options. This is especially hard in a competitive environment, where the focus might shift from trying to claim more value for themselves (a distributive setting) to creating value together Integrative negotiations).

Each project will require ten units of specific resources for successful completion. The confidential instructions for each respective tribe disclose the resources that only they possess and are less than the required minimal amount. Thus, cooperation is necessary to create value for all tribes. Although the resources are shared, each project can be constructed by only one tribe. Thus, each of the tribes has strategic interests in winning responsibility for constructing as many projects as possible since self-constructed projects have the highest benefit. Should a project be constructed by another tribe, the benefits will vary: sometimes there are shared benefits, sometimes it is negative for a tribe.

In the first phase, this roleplay is a distributive, zero sum negotiation. This might incline the negotiators to apply positional bargaining strategies in order to claim the biggest share of a supposedly fixed amount of resources. Indeed, it is certainly possible to conduct this negotiation with such a strategy, but it would result in leaving a significant amount of value not used by any of the tribes. Such negotiations would certainly result in lower scores than those achieved by negotiators exploring the integrative potential of this roleplay.

Therefore, in the second phase, the negotiators explore the interests of each other, followed by a joint search for value-maximizing options. By doing so, negotiators would discover that the allocation of the projects can be linked and that mutual gain can be created by being flexible on initial positions. This integrative strategy may result in higher results for all.

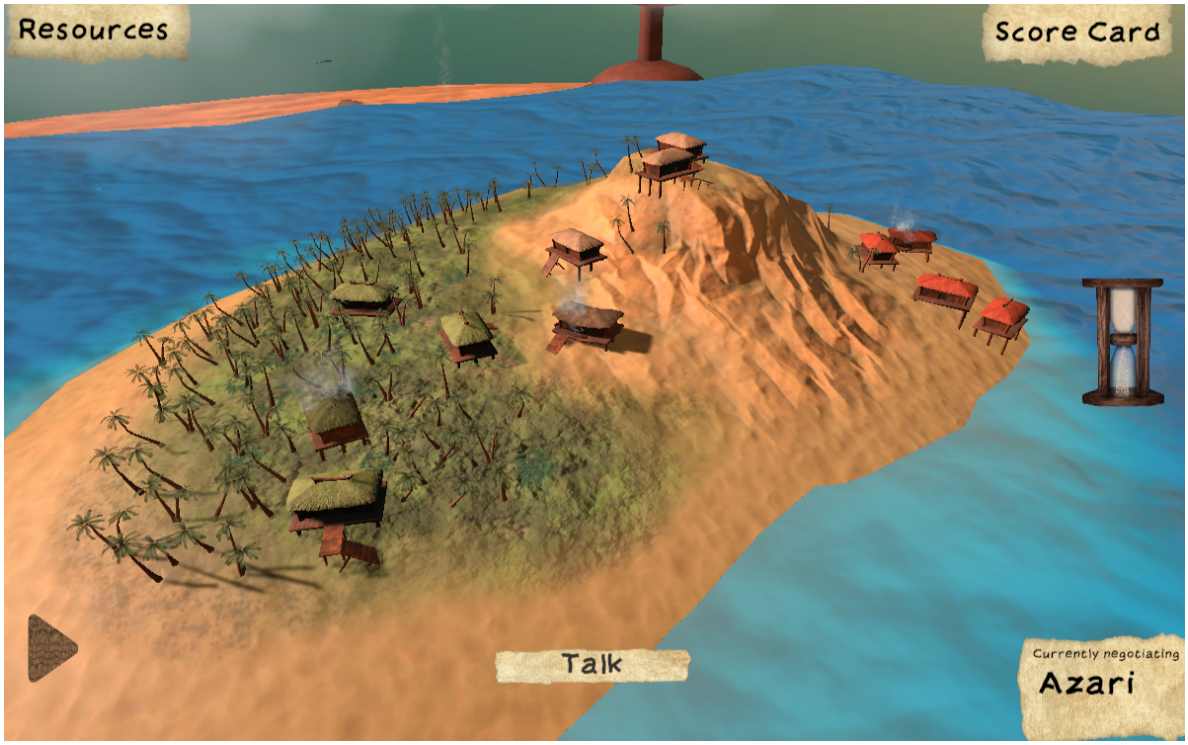
An interesting aspect needed for this is the awareness of trust: each party has to have the ability to build relationships and create trust. However, in relationship building and trust development, one must remain conscious of the risk that exists for deception. This element should be covered in the evaluation phase after playing the game. In negotiations like Connor Paradise, imperfect knowledge of each other's preferences and resources poses a temptation to manipulate information as a mean to claim additional value. This adds additional complexity to an already complex (multi-party and multi-issue) scenario. Should this occur and be uncovered, relationships

would most certainly be damaged. Moreover, not only would it have profound negative consequences in real life negotiation, but it might also produce a suboptimal outcome in this roleplay.

3.4.3 AI-aided negotiation games

In 2024, students from Windesheim University of Applied Sciences in the Netherlands, developed and tested a tool to train negotiation skills as part of their ICT-design course. The target groups of the tools were students and entrepreneurs. Based on a specific case (our Connor's paradise case), the tool generated responses of an AI negotiation counterpart avatar voice. Negotiators can give their negotiation offer to the training tool in their own language. The AI-avatar is responding in the same language. The students developed a project plan and executed this, including all technical and creative aspects. The made a deliberate choice between a 2D or 3D-design, illustrated in Figure 7, and an advice for future actions

Figure 7: Design of the Negotiation trainer tool



They made several analyses, discussed pros and cons of LLM-programs, and choose to program in CICERO, a program language, their tool. They developed detailed game scripts and a user manual. The result was a working prototype, tested at students of the Scottish Glasgow Caledonian University. Based on their feedback, the training tool was further developed. Afterward, some of the Scottish students participated in the full-term "Future of Healthcare challenge". Based on their experiences, we have a clearer view of the practicalities when using AI in serious games and other educational formats.

The demo can be found here.

The end product was demonstrated at the WINNOVATION Fair of their University, on which occasion, 50 student teams presented their ICT-solutions.

The teams were awarded with the innovation award 2024, see attached link.

The integration of AI was the most crucial aspect of this project. The greatest advantage of AI integration is its customizability. Almost every aspect of the AI's behavior can be controlled through prompts. This feature was used to give each tribe a unique way of speaking, making conversations feel more human. If further developed, this customization could also be used to integrate multiple languages, enhancing the game's accessibility and appeal.

However during the AI integration, we encountered several challenges as well. The most significant issue was that large language models like ChatGPT are not adept at making decisions: they do not think about decisions as a human would; instead, they predict the expected words. To address this, the students implemented an algorithm to make decisions, while ChatGPT generated the dialogue for the trades. However, this solution resulted in a very invariable trading experience. Once the algorithm determined a trade was unfavorable, there was no way to persuade it otherwise, unlike with a human opponent.

Connor's paradise is a game that already existed in a non-digital form. The game has a story, and this story is also incorporated in the digital game with some changes. The story of the game gives the player a good reason to try and trade with the other tribes, it also adds immersion to the game, and it helped guide the art direction of the game. The game allows for both distributive and integrative negotiation, therefore teaching or exercising with both approaches.

To make Connor's Paradise a more engaging serious game, it could be enhanced. For instance, its playability can be improved beyond merely digitalizing conversations with AI. While the primary focus of a serious game is educational, the gameplay "fun" can be increased.

3.4.4 The digital way ahead

Some developments could be involved if the project would be continued, as they could significantly enhance the game's performance and accessibility. During this project, several developments in AI could guide the project towards more suitable and cost-effective solutions. First, ChatGPT-4o can directly process audio input, eliminating the need for a separate speech-to-text system and being cheaper than the original ChatGPT-4 (Hello GPT-4.0, 2024)[4]. Second, another promising feature is the ability to run AI models offline, making the game playable without an internet connection. While running most AI models requires substantial hardware power, advancements like Gemini Nano are enabling lightweight AI models to run on lower-end

[4]Source: https://openai.com/index/hello-gpt-4o/

hardware, such as the latest phones from Google (Google DeepMind 2024) [5]. One future development is to run the serious game with locally available AI, eliminating the need for API[6] requests to the OpenAI API. AI is very rapidly evolving, even during the student project. For instance, models like Gemini Nano have been developed (Google DeepMind, 2024). These models not only run efficiently on lower-end hardware, such as the latest smartphones but also have the capability to understand speech. This advancement could enhance the speech recognition input for the game. Exploring and integrating these local AI models could greatly improve the game's accessibility and performance by making it less dependent on internet connectivity and external APIs. Therefore, it would be advantageous exploring whether the game can be redesigned to run offline on all devices without requiring internet access.

3.4.5 Further game development

Apart from the educational aspect, in our serious games we collect data for scientific research concerning the possible relations between personality characteristics, cultures and negotiation performance. In 2025, we will continue our development of multipartner negotiation games in The Netherlands and in Japan. In this research we will juxtapose the outcomes of negotiations in Europe with Japan (and possibly between Europe and Japan). The data in Europe have mostly been collected in the C4I-project period, the data in Japan will be collected in 2025. In an academic paper, we aim to relate the negotiation objective scores and subjective scores (Subjective Value Indicator, c.f. Curhan, Elfenbein et al., 2006, 2009, 2010) to cultures and personality traits.

3.4.6 International, digital and sustainable aspects

All games had a highly international, virtual and sustainability component. Participants had various nationalities: they had a Belgian, Brazilian, British, Bulgarian, Costa Rican, Czech, Dutch, Egyptian, German, Greek, Hungarian, Indonesian, Iranian, Japanese, Latvian, Nigerian, Norwegian, Romanian, Russian, South African, Thai, or Turkish country of birth.

In all our negotiation games, either dyadic or multi-partner, we juxtaposed Trumpian distributive “zero-sum” negotiations with more long-term focused integrative negotiations in which negotiators are trained to seek “benefit-for-all” solutions. In the evaluations after having played the negotiation games, we discussed with the participants the advantages of integrative negotiations. These discussions increased the awareness and skills of partnering, necessary to successfully implement ‘wicked’ sustainable problems like climate change, pollution or waste reduction.

We have digitalized our negotiation games in order to increase the scalability and transferability. In the future, we intent to organize more cross-cultural negotiation games, in which

[5] Source: https://deepmind.google/technologies/gemini/nano/

[6] API = Artificial Intelligence Application Programming Interface." It is a set of predefined rules, protocols, and tools that allow developers to integrate artificial intelligence capabilities into their applications, websites, or software products without building AI algorithms from scratch.

participants from different continents virtually negotiate to train their cross-cultural multi-partner negotiation skills.

4 Cross-cultural games

4.1 INTRODUCTION

4.1.1 Conceptual background

Cooperating effectively in multicultural teams is becoming increasingly important because of ongoing globalization. However, cooperating effectively with people from different cultural background is complex. Therefore, a number of international assignments evolves unsuccessful. Although training is an important aspect of preparing for assignments abroad, the rate of training before international deployment is low (Ernst and Young, 2015). Particular research questions that remain unanswered with regard to the development of cross cultural competences (3C): How are the individual facets of 3C related to each other? Which 3C facets are most important for intercultural effective collaboration? How is 3C developed? (Ott and Michailova, 2018). In this paper, we aim to answer these questions.

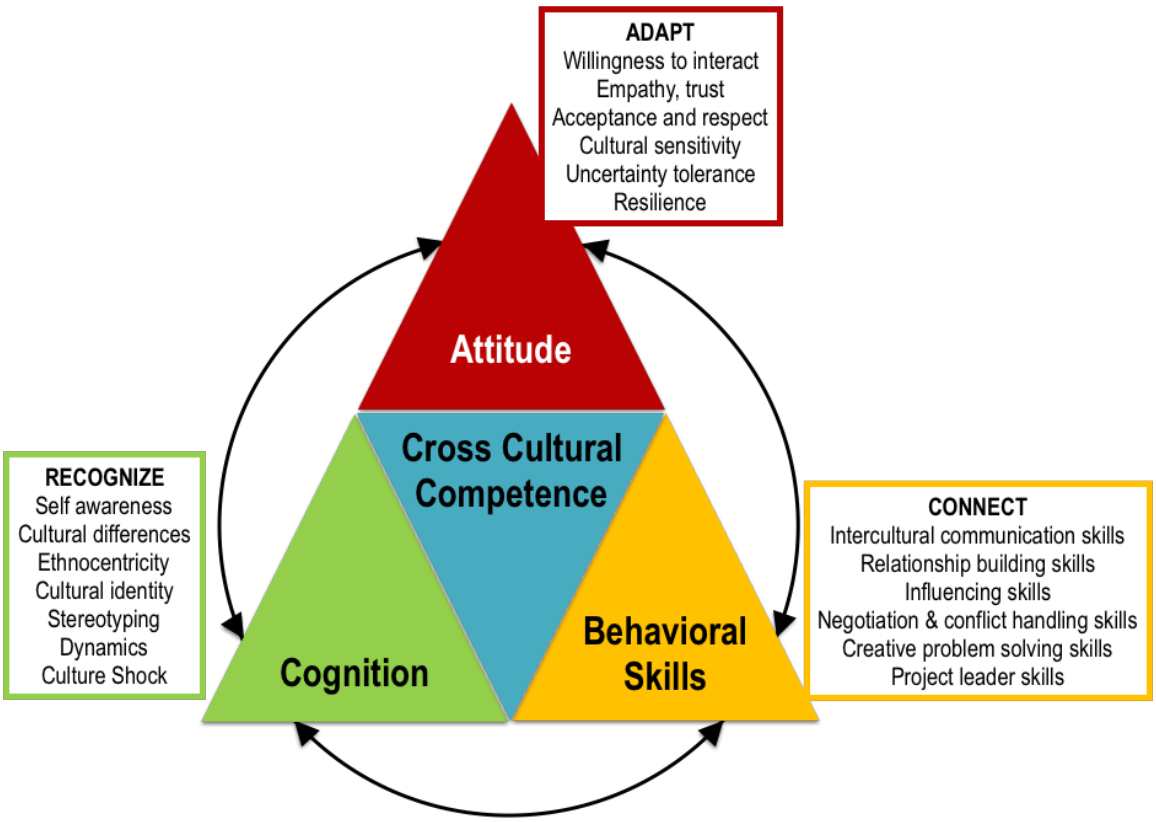
Culture is defined as a collective programming of the mind which distinguishes the members of one group or category from another (Hofstede, 1989). It consists of shared values and behaviours. Like an onion, it has several layers, some more profound and more difficult to adapt (values and basic assumptions) and other more superficial (practices or behaviours). Our paper is structured as follows. First, we summarize the current state of understanding regarding 3C in a comprehensive model. Then, we describe our research model and 3C training tool. Last, we discuss our findings and conclude with the theoretical and practical contributions. Our paper differs from extant literature on the following aspects: (1) rather than focusing on identification of 3C, we concentrate on the development of 3C; and (2) our intervention technique is a skills class built on a serious game training tool.

In order to be able to communicate effectively, specific knowledge, skills, abilities, competencies, and personality characteristics are required. For effective communication, understanding of values, either shared or different, is essential. Cross cultural cooperation requires specific education and training.

Substantial research has been conducted concerning defining, measuring, developing and predicting individual capabilities of cross-cultural cooperation (Ott and Michailova, 2018). Effective cross-cultural cooperation requires cultural intelligence (CQ), defined as "a person's capability for successful adaptation to new cultural settings, that is, for unfamiliar settings attributable to cultural context" (Earley and Ang 2003: 9). Just as Emotional Intelligence (EQ) complements cognitive intelligence or IQ, CQ is another complimentary form of intelligence that explains performance in coping with diversity and functioning in new cultural settings (Ang and Van Dyne, 2008). Individuals with high CQ are considered to be culturally competent: they have a

repertoire of three types of competences: Attitudinal, Behavioral, and Cognitive (ABC) competences to recognize-adapt-connect effectively with members of different cultures, as is illustrated in 8. The facets of CQ cannot be separated because they are influencing one another (see arrows in Figure 8):

Fig. 8: ABC factors of developing cross cultural competences



Adapted from: Ott and Michailova, 2018; Earley and Ang, 2003; Thomas et al., 2008.

First, cognition comprises of general knowledge about similarities and differences between cultural values, beliefs and norms, and how cultures influence behaviour. People recognize their own cultural identity, have self -awareness of potential ethnocentricity ("my culture is the best!"), have understanding of the limitations of stereotypes of cultures (not all people in a country act uniformly), have understanding of the dynamics of cultural cooperation and of concepts like e. g. culture shock. Cultural knowledge includes (1) culture specific knowledge about values, beliefs and behaviours in general; (2) individual values and beliefs of someone, and (3) knowledge about processes used to evaluate cross-cultural differences and interactions (Earley and Ang, 2003; Thomas et al, 2008; Van der Zee and van Oudenhoven, 2013). It is important to recognize someone's own social identity before adapting to and connecting with others. Second, attitudinal aspects involve the willingness or motivation to adapt to others; this cultural metacognition plays a central role at CQ. Elements are e. g. empathy, trust, acceptance and respect, cultural sensitivity,

uncertainty tolerance, and resilience. Part of this adapting is a delay of judgment of different cultures (Brislin et al. 2006; Thomas et al., 2008). Last, behavioural skills make it possible to connect to people with a different cultural background. These skills involve intercultural communication skills, relationship building, influencing, negotiation and conflict handling, creative problem-solving, and project leader skills. Cross-cultural skills include: (1) perceptual skills about interpretations of behavior of others; (2) relational skills about how someone develops and maintains relationships with others; and (3) adaptive skills about the abilities to adjust someone's social interaction to new situations (Thomas et al.,2008).

At higher education institutions, much attention is given towards transfer of cognitive knowledge. Although knowledge transfer is an essential stepping stone, cultural awareness is not enough to develop CQ skills. We propose a more balanced approach that includes attitudinal and behavioral training as well (Brislin and Horvath, 1997). Emotional intelligence is strongly and positively related to CQ (Elfenbein, 2006; Herremans and Murch, 2003; Nelis, et al., 2009; Ward, et al., 2009). Experiential training programs with a contact component may significantly develop CQ, especially concerning attitudinal and behavioral facets (MacNab & Worthley, 2012).

In order to improve the performance of cooperation in multicultural teams, we aim to develop cross cultural competences through serious 'learning by doing' games.

4.1.2 Method: the Ecotonos game

In order to develop cross cultural competencies, we use the Ecotonos game, a well-known tool to train cross cultural competences. The Ecotonos game is developed in 1993 and widely used since then (Fowler and Pusch, 2010). Ecotonos involves all ABC-aspects: cognitive elements as well as attitudinal and behavioural aspects using a simulation of different imaginary cultures. The use of non-existing cultures prevents from stereotyping; the game is not about debating cultural characteristics of different groups but about collaboration across differences. In the first phase of the game, participants have to execute a joint task with team members that are instructed to behave according to the same specific imaginary culture rules (see Appendix 4). Later, participants are mixed with participants that are used to behave in a different way because they are representatives from other 'created' cultures. In doing so, we simulate a multicultural co-operation in life-like social situations. In both phases of the game, participants experience the differences between monocultural and multicultural interaction. The cross-cultural role-playing of Ecotonos is classified as experiential training (Bucker and Korzilius, 2015). Besides executing a joint task, participants observe their own behavior and the behavior of others while making decisions and solving problems. Practicing behaviors of collaboration across cultures results in a better understanding of each other, experiencing emotions involved in working together in multicultural teams, developing and experimenting which behaviors are effective in multicultural teamwork and enjoying interacting with people of different cultural backgrounds. Consequently, with Ecotonos, cross-cultural competences can be developed. After the simulation the facilitator reflects with the participants upon the experiences: the most important stage of the educational game. They discuss strategies and team processes of effectively working together across differences.

4.1.3 Key parameters

The Table below summarizes the main aspects of the cross-cultural games. Teachers can use it to promote this game to students, students can use this table to decide whether to participate.

Table 10: key parameters Cross-cultural games

Educational aims:	to develop 21st century skills using Challenge-based learning: cross-industry & cross-cultural collaboration.
Elements:	• serious challenge game, learning by doing, interactive lecture • before the game: participants fill in an ex-ante questionnaire concerning personal traits and values. • During the game: (1) game instruction. (2) co-operation in monoculture groups ; (3) co-operation in multi-culture groups; (4) evaluation. • After the game: participants fill in an ex-post questionnaire concerning team performance and reflect about their learnings.
Why participate	• Gain a better understanding of the impact of culture on collaboration. • Experience emotions involved in working in multicultural groups. • Practice multicultural teamwork through awareness of global attitude and behavior. • Strengthen your behavioral tool kit: adapt without losing your identity
Who participate?	Business, technical, and design students from various countries
Duration:	2 hours
Practicalities:	• Number of students: max. 24x per workshop (= 8 teams of 3 people • This event will be held on campus. • We create a virtual community and a way to communicate with team chats or personal messages via social media and interactive tools. • Participant will obtain a certificate of participation afterwards.

4.2 PLAYBOOK

4.2.1 Overview of activities

All participants followed the same scenario and were grouped in a standardized manner, with equal group sizes. Ecotonos has three phases: a monocultural, a multicultural, and an evaluation phase. In the monocultural phase, participants were instructed to behave according to the same specific imaginary culture rules (see Table 11) and execute a joint task, building a bridge with a minimum of resources, just paper, paper clips and wooden sticks. In the multicultural phase, cross-cultural cooperation was simulated: participants were mixed with representatives from other created cultures and continued to build the bridge. As such, participants experienced the differences between monocultural and multicultural interaction. They, both literally and figuratively, had to bridge cultural differences to accomplish the task at hand. In the evaluation phase, the facilitator challenged the participants upon their experiences and discussed possible strategies and team processes of effectively working together across cultural differences.

4.2.2 Detailed script

We followed the following script, see Table 11, and explaining text below.

Table 11: Script Cross-Cultural Games

#	Start time	End time	duration	Activities	Plenary / Sub-group	Material & location:
1	…	…	0:10	Introduction of program ; check availability of students & team composition (Aquila – facilitator 1; Delphenius: facilitator 2; Zante : facilitator 3)	P	…
2	…	…	0:20	Ecotonos explanation of cultural rules: acculturation -> developing cultural myth. REGISTRATION TEAM MEMBERS	S	…
3	…	…	0:20	Monocultural assignment -> build bridge >1 m as solid and feasionable as possible transportable to another room, use rules of your culture	S	…
4	…	…	0:20	Multicultural assignment. REGISTRATION TEAM MEMBERS	S	…
5	…	…	0:10	Ex post questionnaires Multicultural part	S	…
6	…	…	0:45	Final evaluation. Explain the myths of the cultures. Groups; Joint ventures, minority/ majority / diverse group. Eye openers. Will be concluded in follow up session: explanation of ABC model, Erin Meyer, draw process of decision-making	P	…

Facilitator instructions (confidential – not to be disclosed to the participants)

#2 ACCULTURATION & MYTH CREATION (ca. 20')

Acculturation involves allowing participants to become familiar with their new cultures. While acculturation is normally a lifelong process, in this simulation it is condensed into in a limited time. Read your cultural characteristics, learn them by heart and act from now on accordingly. Groups should take five minutes or so to discuss the rules, make sure everyone understands the cards' meaning, and agree on how they will enact the rules. Sometimes there will be disagreement about what the rules actually mean or how they will be translated into behavior. Such individual or sub-cultural variances are normal in any culture. They should be permitted in the simulation and debriefed as appropriate. Participants should begin observing the rules for their culture as soon as they have finished discussing them. Following the rules for their "culture", participants next create a myth symbolizing their culture. Most often the myth will be a legend regarding how the culture was created. The stories created by participants are often amazing and making the teams emphasize with fun. Facilitators should stress the purpose of myth creation: to practice the cultural rules. As a facilitator, encourage your participants to use their rules, but do not worry if participants seem uncomfortable or appear awkward during this stage of the simulation. Ask each group to choose a representative to explain their rules and myth to the other participants later, during the debriefing at the end of the simulation.

Facilitators give each particpant a badge with a cultural name (Aguila, Delphenius, or Zante).

Facilitator asks questions - Acculturation phase:
1. Why did your people become this way?
2. Make your culture's myth and visualize your myth on a flip-over
3. Appoint a leader to present (later) the cultural story

ECOTONOS TASK 1: WHAT IS YOUR CULTURE?
1. Read your cultural rules, learn them by heart and act from no on accordingly
2. What is the origin of your culture? Visualize your cultural myth on a flip over chart.
3. Appoint a leader to explain your cultural myth (later)

#3 MONOCULTURAL GROUP TASK (ca. 20')

All groups will now begin work on an identical task. Facilitators explain the assignment to each and make sure that all participants have an understanding of the task. A common understanding and vocabulary among participants are crucial. Each group should begin working on it or discussing it. Participants should observe the rules of their culture to the best of their ability while working to accomplish their task. Check with your co-facilitators to ensure that all groups are proceeding according to schedule, and give each group five minute, two-minute, and one-minute signals before stopping their work. Try to stop the groups while they are still actively working-when they appear to be about halfway finished, after participants have become comfortable with their cultures and involved in the task to be completed.

Facilitator asks questions - Monocultural phase:

1. Working in your small group, build a bridge that spans 1 meter without any other support
2. Use only the materials that you have been given.
3. Your bridge should be strong and beautiful, strong enough to transport to the plenary room
4. **REMEMBER TO USE YOUR CULTURAL RULES AS YOU WORK**
5. You have ca. 15' to complete your bridge

ECOTONOS TASK 2: BUILD A BRIDGE

- Minimum spanning size: 1 meter – the longer, stronger and nicer the better
- The bridge should be transportable
- At least a hand can be placed under the bridge
- Use only the give materials:
    - 10 sheets of paper
    - 30 small paperclips
    - 5 big paper clips
    - 6 wooden sate sticks

#4 MULTICULTURAL GROUP TASK (ca. 20')

In this phase, certain members of each culture will switch groups. The easiest way is to mix participants fairly evenly. However, you can form majority / minority, joint venture, or diverse multicultural groups. Diverse groups result in a maximum of multicultural dynamics during the debriefing. Switching cultures can be a tricky process; make it as easy as possible by asking the group to designate a certain number of their "culture" to other groups, for example, "Four Aguilans should stay where they are, two other Aguilans should move to Delphenius, and three Aguilans should move to Zante". as is indicated in Table 12:

Table 12: Example of mixing 'Econonos' cultures in a workshop of 20 participants

From Aquila (7p. in monocultural phase)	2 persons stay	2 persons -> Delphenius	3 persons -> Zante
***From* Delphenius** (7p. in monocultural phase)	2 persons stay	3 persons -> *Aquila*	2 persons ->Zante
***From* Zante** (6p. in monocultural phase)	2persons stay	2 persons -> *Aquila*	2 persons -> Delphenius
***Total** in Multicultural phase*	7 persons in ***Aquila***	6 persons in **Delphenius**	7 persons in **Zante**

NB1: Disclose ONLY AFTER this period: **some people move to other cultures**

NB2: *groups decide self who will stay and who will move*

After participants have switched cultures, instruct the new groups to continue working on their case studies or tasks. Many facilitators like to encourage people to work together in their new groups by giving them a case study or task-appropriate reason. For example, "You have been joined by members of the organization(s) that is (are) funding the building of your bridge. Work together to mutually design and build the bridge – improve the design, construction, and appearance of it. Please preserve your identities and collaborate effectively across cultures". This prevents participants from blaming the facilitator when they fail to work together. Participants may ask facilitators whose rules they should follow in their mixed groups. *Do not provide any instruction;* group members should decide on their own how to proceed. When participants need more structure, tell them to preserve their original cultural identities while attempting to collaborate effectively across cultures. Usually, participants really enjoy this part of the simulation. Permit and encourage them to do so.

Many groups, however, will have so much fun that they will fail to practice cross-cultural collaboration skills.

For that reason, you may want to let the multicultural groups work on their tasks for about ten minutes, and then interrupt them. The room will be noisy, with lots of activity. Tell participants you are happy they are enjoying themselves, as that is one of the purposes of the simulation. Encourage them to reflect on how well they are preserving their own culture and how effectively they are collaborating across difference. Check with your co-facilitators to make sure all groups are proceeding according to schedule, and warn the group when time for ending their work is near. Average total time to permit each group to work on its task is twenty minutes. If participants have not yet finished their task, do not force them to do so. Just stop the groups so that you can proceed with the debriefing.

Facilitator asks questions - Multicultural phase:

1. You have now been joined by members from other cultures
2. JOINTLY **you develop your bridge further** to strengthen it and make it more beautiful
3. You may use the existing bridge and modify it or you may start all over
4. **REMEMBER TO PRESERVE YOUR CULTURAL IDENTITIES AS YOU WORK**
5. You have ca. 20' to complete your bridge

Supporting material: The Ecotonos facilitator set consists of: **(1)** 1. Script (confidential); (2) Facilitator instructions (confidential) – disclose per phase to participants; (3) Cultural norms (for participants); (4) 4. Tasks (for participants); (5)
6. Game materials

4.3 SUPPORTING MATERIAL

4.3.1 Ecotonos Multicultural case

In Table 13, we summarize an example of key characteristics of cultures to be used in the Ecotonos game. These can be varied, according to the purpose of a game (Saphiere, 2016).

Table 13: Example of imaginary cultures used in Ecotonos

Cultural aspect	Profile culture Aguila	Profile culture Delphenius	Profile culture Zante
Non verbal communication – Proximity	In discussions you are most comfortable when standing or sitting at least an arm's length away from other people. Touching is extremely uncomfortable for you.	You are most comfortable when you are physically close but not touching someone else. Therefore, you stand or sit near others but are careful in your movements.	You like to touch people to make them comfortable. You gesture profusely while you are talking to help others understand you, and to involve them in your topic.
Listening – direct/indirect communication and problem solving	In order to understand completely what someone is saying, you interrupt, clarify, and summarize often.	You demonstrate that you have been listening carefully, you explain an opposing viewpoint to what just have been said.	You listen without interrupting, and then rephrase and/or agree with the other persons comments.
Explanation, speaking style Individualist vs collectivist	You very much respect the strengths and independence of all people. You believe that each person can take care of themself.	You value harmony in the group and want to ensure that everybody is comfortable. You are caring and attentive to others.	You believe that working or playing together will naturally produce good feelings and teamwork. You do not like to speak directly about feelings.
Dealing with differences Disagreement / conflict styles Harmony-confrontational	You see differences of opinion as positive and creative. Therefore, in conversation, you often disagree with others, and enthusiastically welcome others disagreeing with you.	You believe that differences can be resolved through impersonal, calm, rational analysis. You often speak, or write in outline form and conduct discussions in the thorough, step by step fashion.	You do not like disagreement and or embarrassment. Therefore, you never directly disagree with anyone, and you never point out mistakes.
[Problem solving] Logical reasoning	You feel that there is usually one best and most logical answer to every problem. You state your opinions firmly and supports them with logical reasoning	You feel that there are benefits and disadvantages to every situation, and rarely only one correct answer. You like to generate alternative solutions.	You feel that a solution to a problem can never be forced. You examine issues from all perspectives and wait for the solution to emerge.

4.4 ASSESSMENT AND EVALUATION

After the cross-cultural games, 209 participants gave their feedback via online questionnaires in 411 statements. To assess and increase the effectiveness of the workshops, we asked the participants to reflect upon their eye-openers regarding developing cross-cultural competencies.

They commented on listening and understanding, benefits of cultural diversity, the importance of open-mindedness and flexibility dealing with cultural adaptation, teamwork and group dynamics across cultures. They became aware that adapting to cultural differences is difficult.

4.4.1 Take aways

Their main eye openers were:

Listening and Understanding - the Role of Cultural Norms and Values: Participants emphasized the importance of actively listening to others from different cultures. *("you need to listen and understand each other"*, although "*People from other cultures don't always say what they mean"*). Participants realized how deeply cultural norms influence behaviour and decision-making. ("*Cultural values and norms can be very strong*" ;"I noticed the cultural differences in *decision making*"). Some participants realized that cultural behaviours are often shaped by historical and societal factors. *("how a culture behaves has to do with the associated history" ;"You have to think about the history behind different cultures*").

Benefits of Diversity, **the Importance of Open-mindedness and Flexibility.** Several participants recognized the value of diverse perspectives in teamwork: "*working together with different cultures can be effective*" ;"*I learned from the different points of view from different cultures*". Several participants emphasized being open to new cultural perspectives and willing to adapt: "*Be open to other cultures and learn from them*" ; "*You have to open yourself to working with different cultures*"). Some participants acknowledged the importance of flexibility when dealing with different cultural expectations: "*You have to adapt to other cultures to make things work*"; "*Being open to opinions from other cultures is crucial*". Regarding breaking stereotypes, some participants learned that preconceived notions about other cultures can be misleading: "*What is weird to you doesn't have to be weird to others*".

Teamwork and Group Dynamics across Cultures: Many participants highlighted the importance of teamwork when working within diverse groups: "*Teamwork with different cultures leads to better results*" And "*Working together is very important to achieve your goals*".

Difficulty in Adapting to Cultural Differences: Many participants found it difficult to adapt to different cultural rules and behaviors: "*It is difficult to act outside your own culture*"; "*It is very hard to not behave like your own culture*" ; "*Communication with different cultures can be difficult*". Some struggled with understanding or explaining values across cultures: "*It is hard to explain your values to others*". However, one participant stated: "*People behave differently but there is still a possibility for cooperation".* Differences in communication styles, such as directness or indirectness, were highlighted: "*It is harder to communicate when your culture is less direct*". Some noted the difficulties in achieving harmony and cooperation across cultures. Many struggled with adapting to new cultural norms in a short amount of time: "*It is difficult to adapt to another culture*

in one go" ; "*Hard to behave according to new cultural rules*". Some noted that dominant cultures or personalities can overshadow others: "*Some cultures are more dominant" ;* "*Dominant cultures dominate, meaning the added value of others does not emerge*". Some struggled with maintaining cohesion and balancing cultural differences in a team: *"Keeping the same cultural basis is difficult in a multicultural group*" And "*It is difficult to work together when everyone disagrees*".

Missed items and suggestions for improvement

We asked our participants what they missed in the workshops as well as their suggestions for improvement. Although a substantial number of remarks can be summarized with "*no remarks, I don't know, I did not miss anything etc".* The following clusters highlight areas for improvement, such as better a structure, more real-life application, more focus on creativity, teamwork and communication. This feedback assists us in the process to refine future workshops to better meet participants' needs.

Structure and Organization, Guidance and Support. Some participants mentioned that the instructions and overall purpose of the activities were unclear. Some felt that more time was needed for tasks, brainstorming, and completing activities: "*I missed clear explanation about what we needed to do" ; "I missed time to complete the tasks properly*". Several participants noted the need for better structuring, especially when groups or cultures collided. Some participants wanted more details about the cultures involved, including their history, values, and languages, other participants felt the cultural rules were not realistic or lacked depth, making it hard to fully engage: "*I had to act as if it was real, but the culture rules were all a little weird".* Because of this, some participants felt that not all team members were fully engaged and suggested more emphasis on collaboration. Some noted that not everyone had a chance to voice their opinions or participate actively. Participants mentioned the need for more support from supervisors or facilitators during the activities: "*I missed a supervisor to ensure the cultural rules were followed"*. Some participants wanted feedback to ensure they were on the right track. Some participants mentioned needing additional tools, materials, and resources to complete tasks effectively.

Practical Application and Real-Life Examples: Participants wanted more concrete, real-world examples to help them understand cultural differences better. Some noted that comparisons with actual cultures and practices were missing. Some participants felt a stronger connection to real-world cultural dynamics would make the workshops more meaningful.

Room for Creativity: Participants expressed a desire for more opportunities to be creative, rather than strictly following rules. Some wanted to engage more freely without rigid guidelines: "I missed room for creativity instead of following the given cultural rules".

Teamwork and Communication. Many participants mentioned the importance of teamwork and felt that more emphasis should be placed on working together. Several participants felt communication between members could be improved, both in terms of clarity and inclusiveness

("I missed listening to others"). Participants wanted to see a wider range of cultures and perspectives in the activities.

4.4.2 Lessons learned: suggested improvements

To make the cross-cultural workshops more effective and engaging, we propose the following improvements:

We intend to provide **more clarity** in instructions and objectives including clearer roles and expectations for participants during the consecutive activities.

In addition, we will increase the **time** budget of these games: more time for completing the tasks and reflecting on the exercises, adding time to evaluate or discuss the tasks. More evaluation time enables deeper cultural understanding: several participants suggested incorporating more detailed discussions about cultural differences and their impact on teamwork to enhance the depth and realism of the cultural roles assigned to the participants.

Furthermore, we will make the tasks **more realistic**, complex and varied, moving beyond certain repetitive exercises: tasks that reflect real-world cross-cultural challenges. We have to reconsider the use real-life cultures instead of fantasy cultures given by the general rules as defined by the Ecotonos game (see Appendix 5) by making the tasks more engaging and "*less childish"*. Some suggested including more real-life conflicts or challenges to make the experience more authentic

4.4.3 The way forward

Based on our quantitative academic research (Stel & America, 2018), when developing cross cultural competences through the Ecotonos game, one should focus on awareness of aspects of agreeableness and conscientiousness: stimulating the first while avoiding the latter. Viewing the qualitative feedback from the participants, we conclude that the Ecoconos serious game is a useful tool to experience and consequently increase confidence in cross cultural collaboration. It is a useful stepping stone, however for permanent higher level of 3C, a more extensive and longer-lasting training program is required.

We conclude that some personality characteristics may facilitate or complicate cross-cultural collaboration: extraversion and agreeableness facilitate, while conscientiousness may complicate. and Extraversion has just a small and slightly significant effect[7].

Reported key learnings are of the Ecotonos game are: *improved listening skills, and more*

[7] An earlier version of the game is published in: Stel, F., & America, D. (2018). Developing cross-cultural competences using the Ecotonos serious game. European Conference on Games Based Learning (pp. 643-652).

awareness of assumptions and implicit team norms of others. Ecotonos contributes to self-awareness and understanding of other cultures. Listening skills include the capacity to comprehend what someone else is trying to communicate; being more aware of e nonverbal behaviors, showing empathy and support. Awareness of intended purposes and assumptions involves reviewing assumptions used in reaching a conclusion. Awareness of a balancing of task and process in a team means attention to both the completion of the task and the manner in which the task is completed. Awareness of implicit group norms *of* communication and decision-making behaviours include the style of communication, ways of agreeing and disagreeing, of supporting and encouraging another person. Increased mutual respect involves beliefs that other team members have valuable insights, Knowledge of self and others includes an understanding of the habits or tendencies of all group members, including their strengths and weaknesses. Knowledge of self and others, combined with mutual respect, allows team members to feel safe, accepted for who they are, and willing to take the risks needed to develop new abilities and find creative solutions. (Saphiere, 2016).

4.4.4 International, virtual and sustainable aspects

Several formats of Ecotonos games were tested. All games had a highly international, and sustainability component. Participants had various nationalities: they had a Chinese, Dutch, German, Indian, Indonesian, Iranian, Italian, Mauritian, Mexican, Portuguese, Romanian, Russian, Saudi Arabian, Singaporean, or a Surinam nationality. We gained experience with virtual aspects of cross-cultural competences games when training participants in our full-term SBSC-program (see handbook of PR4). The sustainability aspect was covered in our wrap-up evaluations at the end of the serious games; we highlighted the necessity to take diverse viewpoints when solving 'wicked' sustainable problems like climate change, pollution or water reduction.

APPENDIX 1: REFERENCES

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