

WPI

Improving the Closed Loop System Implemented at the 2022 Beijing Winter Olympics

WPI: Mary Barsoum, Mark Renzi, Kurt Lindenthal, Qui Nguyen

BUCT: Zilin Chen, Xiayue Zeng, Peng Zhe, Hanchi Wen

Sponsors (Tsinghua University): Professor Hui Zhang, Chenyang Wang, Luyao Kou



Project Background



2022 Beijing Winter Olympics

- February 4th-20th
- First city to host both editions of Olympic events
 - Prev. 2008 Summer Olympics
- The event consisted of:
 - 91 nations
 - 2,831 athletes
 - 18,196 volunteers (approx.)
- Highly successful event
 - Most gender-balanced Olympic Winter Game
 - Legacy planning for future events
- Societal and governmental concerns
 - Human rights
 - Environmental impact
 - **COVID-19**



Figure 1: Closing ceremony with each nation's flag displayed (NBC News, 2022)

Discovery of the Omicron Variant

- *Omicron* variant identified in late November 2021
 - Symptoms are mild compared to other variants
 - Spreads faster than previous variants
- Lockdowns ensue after *Omicron* discovered in Beijing
- Organizations began to withdraw, citing pandemic-related issues
 - National Hockey League (NHL)
 - National Hockey League Players Association (NHLPA)

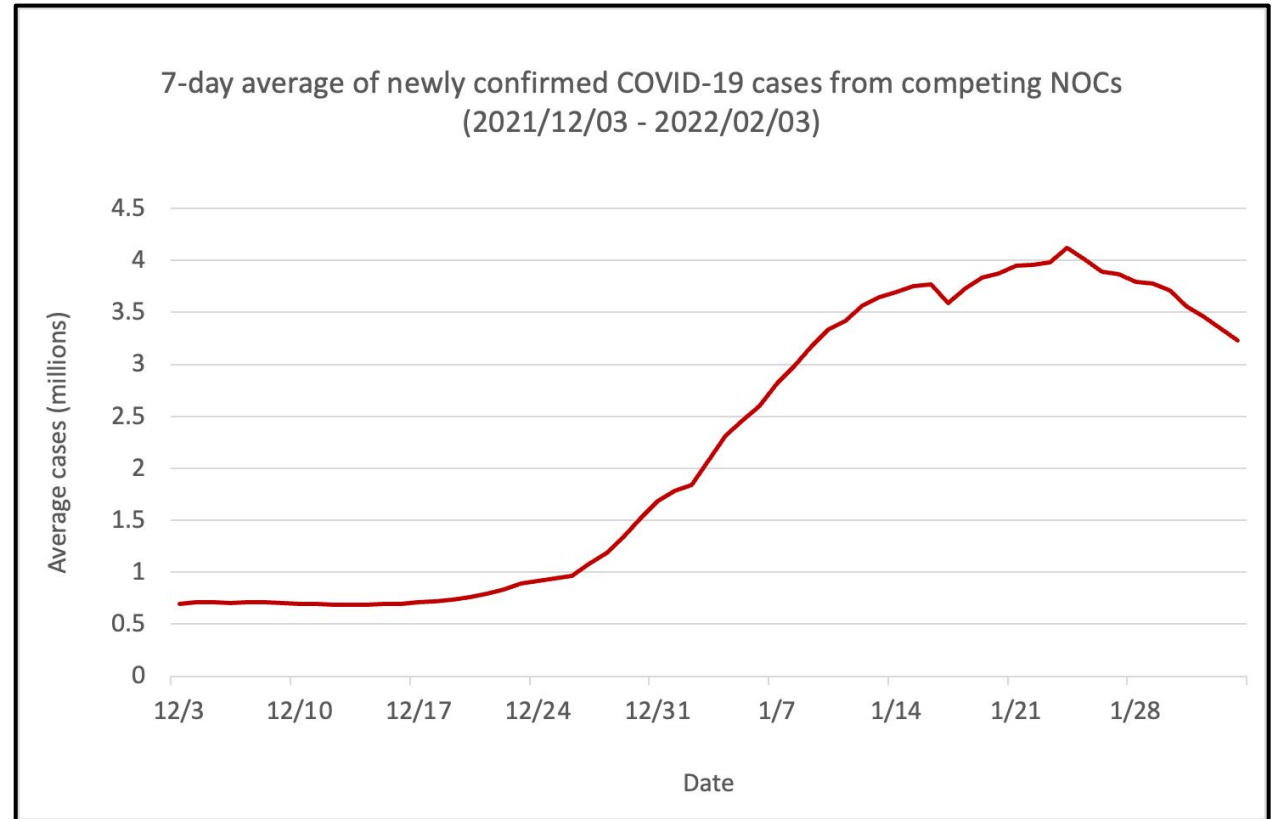


Figure 2: A graph depicting the change of the 7-day average of new COVID-19 cases from competing nations two months prior to the 2022 Beijing Winter Olympics (data: JHU, Our World in Data)

Closed Loop System (CLS)

- Confined individuals to a self-maintained, isolated environment
- Limited human-to-human interactions with automation
 - Transportation
 - Food services
 - Cleaning services
- Stringent safety & health protocols
 - Entry & exit procedures
 - Daily testing routines
 - Police patrolling

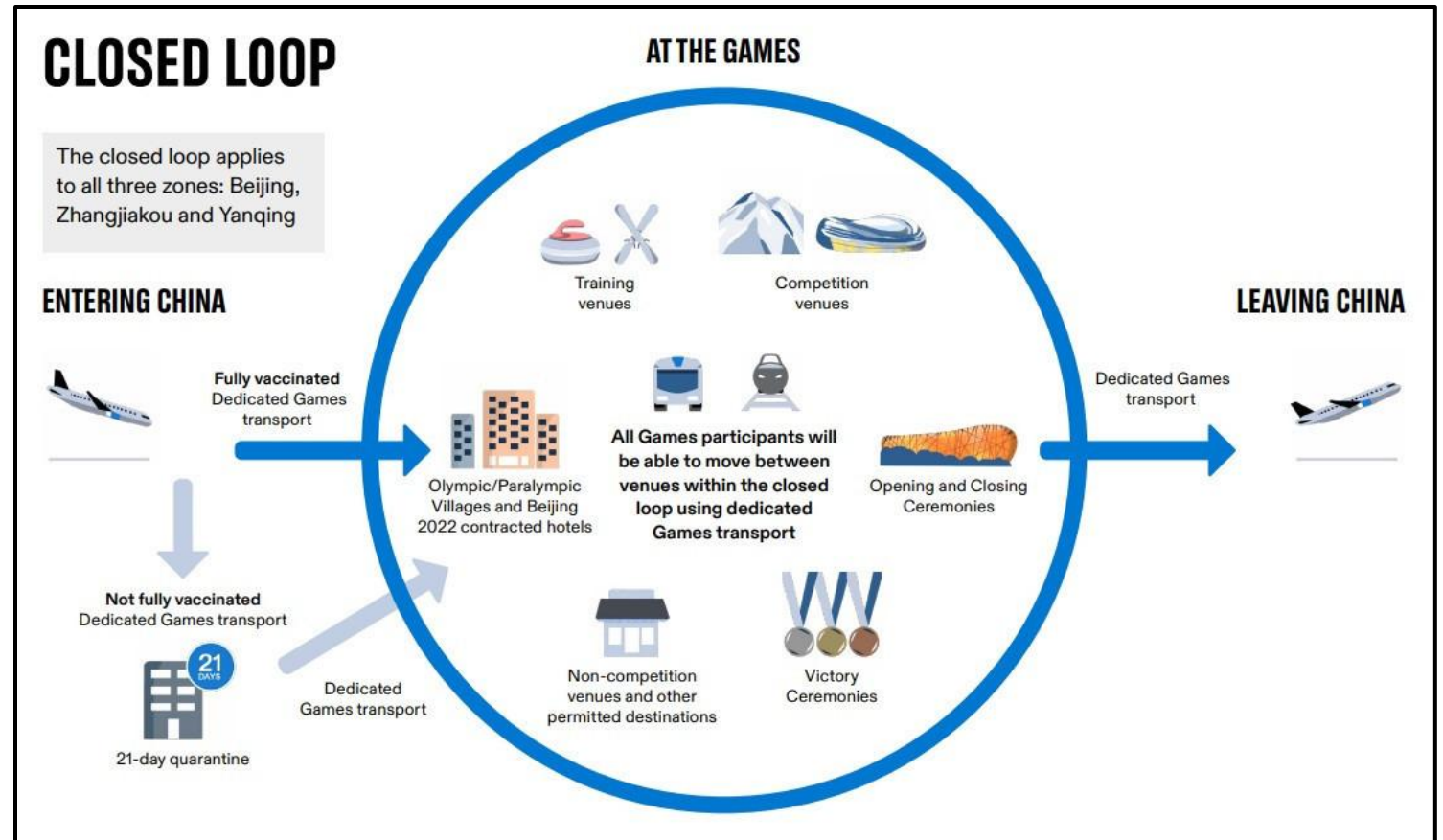


Figure 3: Official IOC infographic of the closed loop (IOC, 2022)

Tokyo's Implementation

- All participants were not allowed to leave living spaces or Olympic Venues
- Athletes could not leave living spaces or venues
 - Athletes breaking the rules were subject to disqualification
- Limiting athletes from the rest of Tokyo led to the system being referred to as the "bubble"

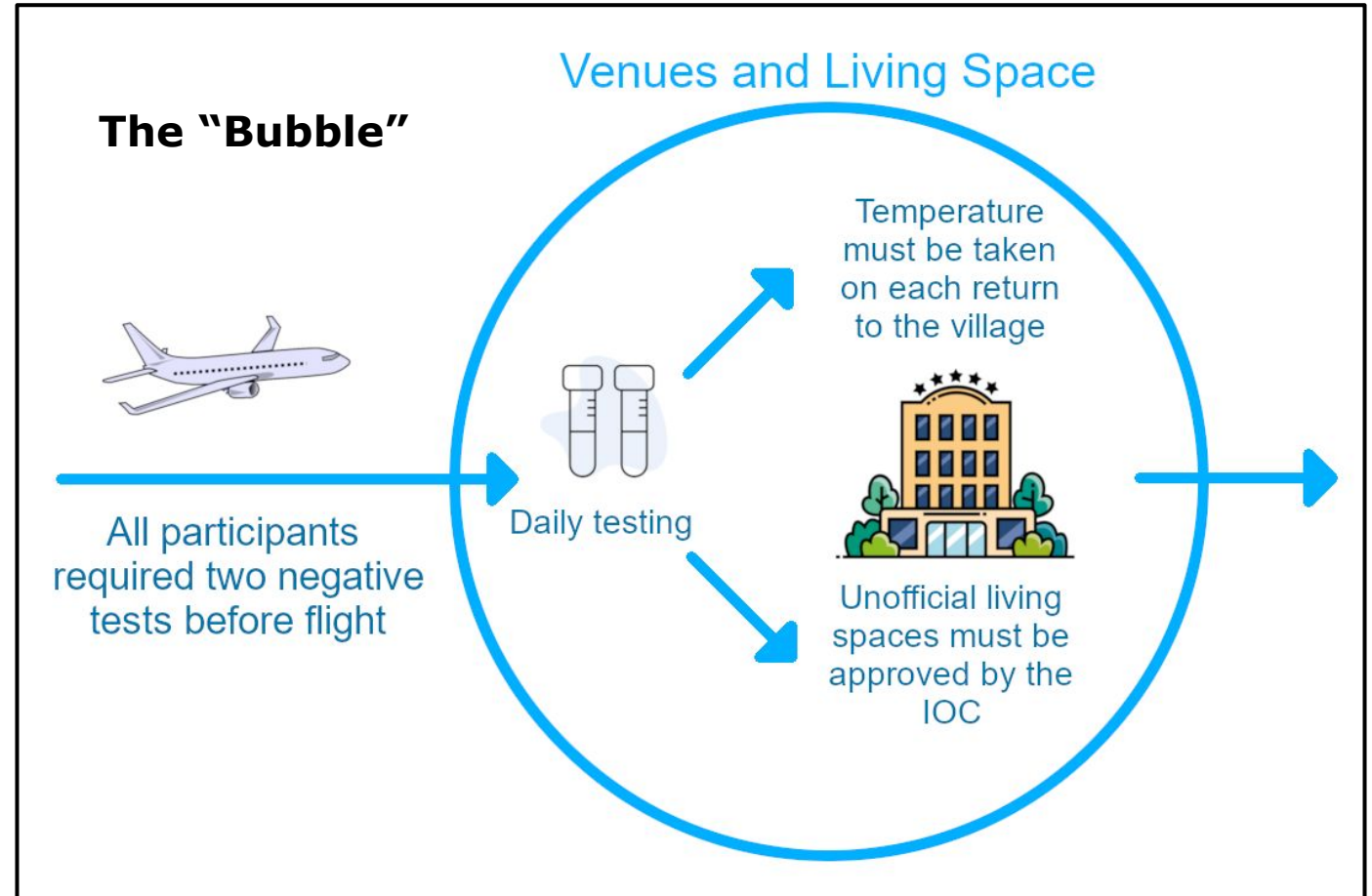
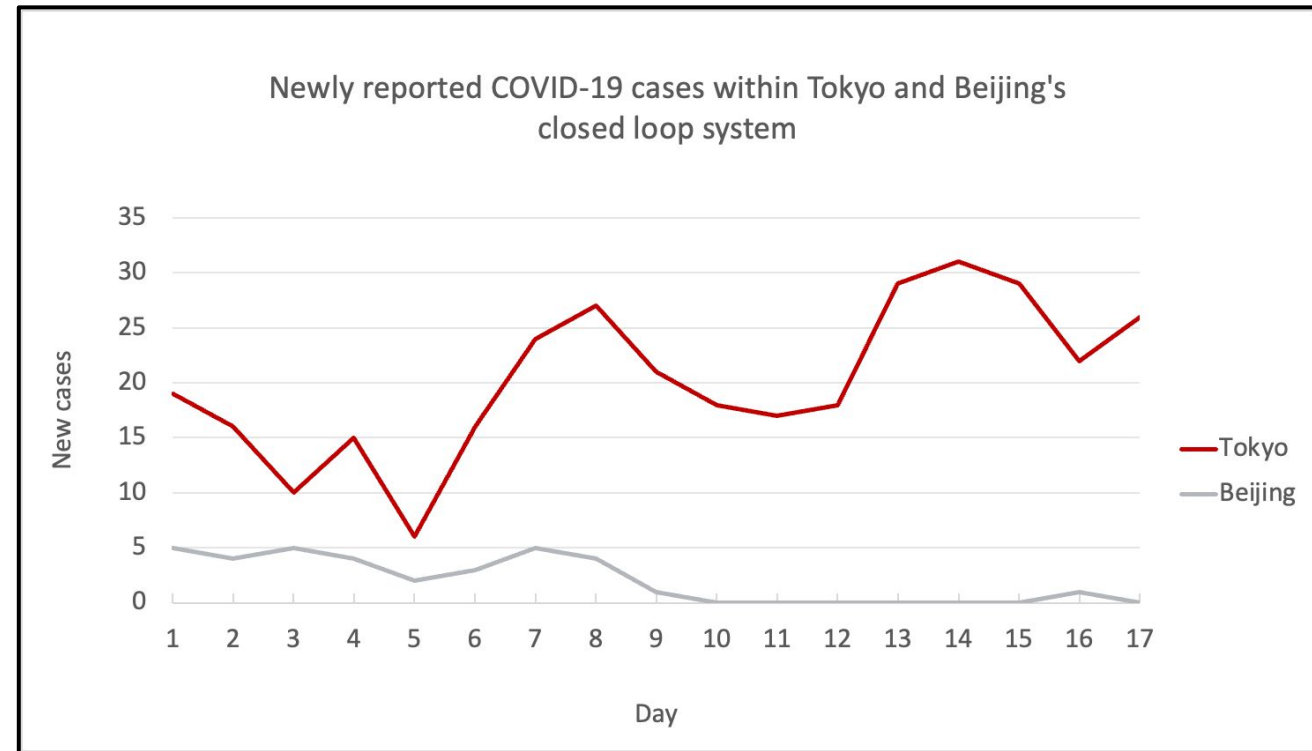


Figure 4: Covid prevention system at the 2020 Tokyo Games

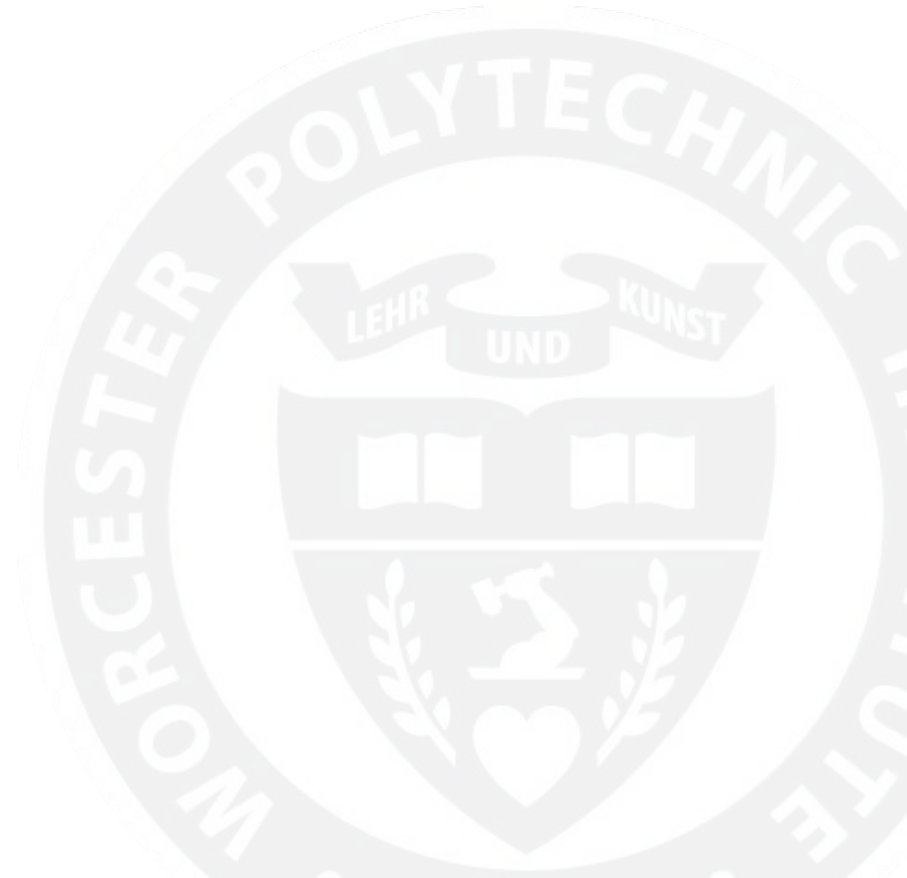
Tokyo vs. Beijing

- Total cases within prevention systems (reported through internal testing)
 - Tokyo: 344
 - Beijing: 34
- Both Games isolated athletes and attempted to prevent transmission of the virus into the games
- Tokyo allowed some leeway for participants while Beijing was very strict



Figures 5: Daily reported COVID-19 cases within their respective prevention systems (data: IOC & Beijing Organizing Committees)

Problem Statement



Our Objectives

1. Improve the closed-loop system implemented
 - ❑ What negative effects did it have?
 - ❑ How can we avoid this and apply the solution to future events?
2. Devise a new plan that:
 - ❑ Maintains integrity and efficiency of the original plan.
 - ❑ Improves on any shortcomings that have been identified.
3. Create suggestions to mitigate any negative effects caused by extensive precautions taken

Methodology



Interviews

- Three categories for interviewees
 - P: Professionals
 - V: Volunteers
 - C: Facilities and Managerial Staff
- Interviews from each zone:
 - Beijing: 6
 - Zhangjiakou: 2
 - Yanqing: 2
- Question sets:
 - P-level: focused on design of system in addition to experience
 - V & C-level: focused on their experience in the system

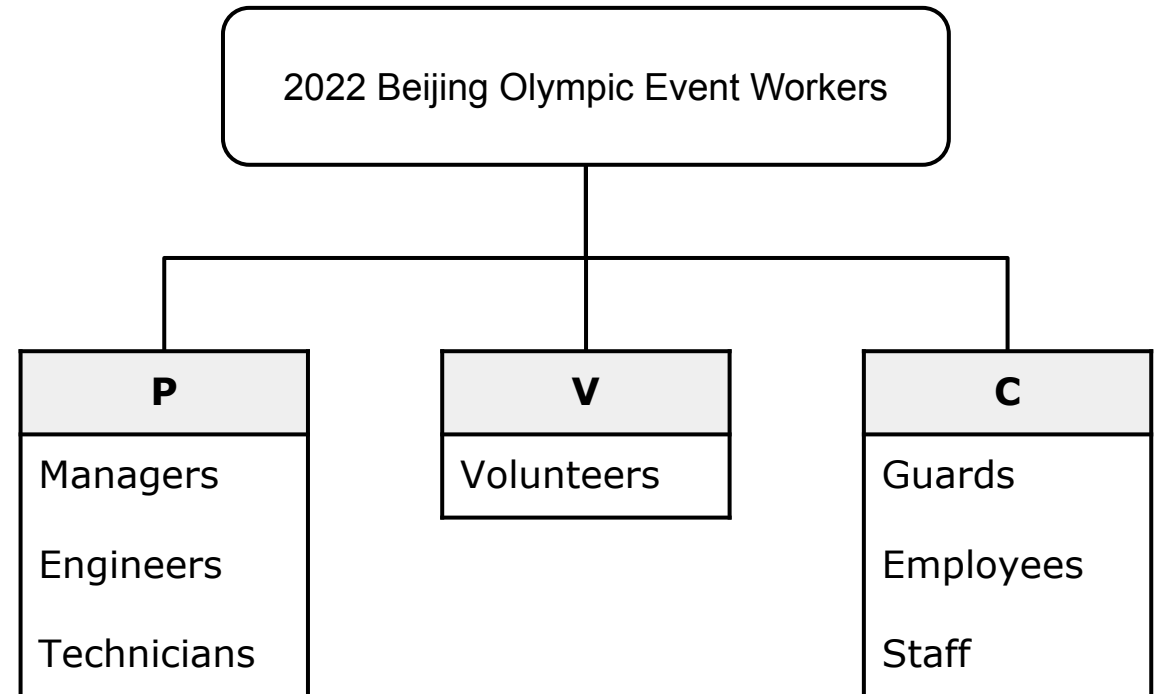


Figure 6: Break down of 2022 Beijing Olympic Event workers using the acronym PVC

Interview Process

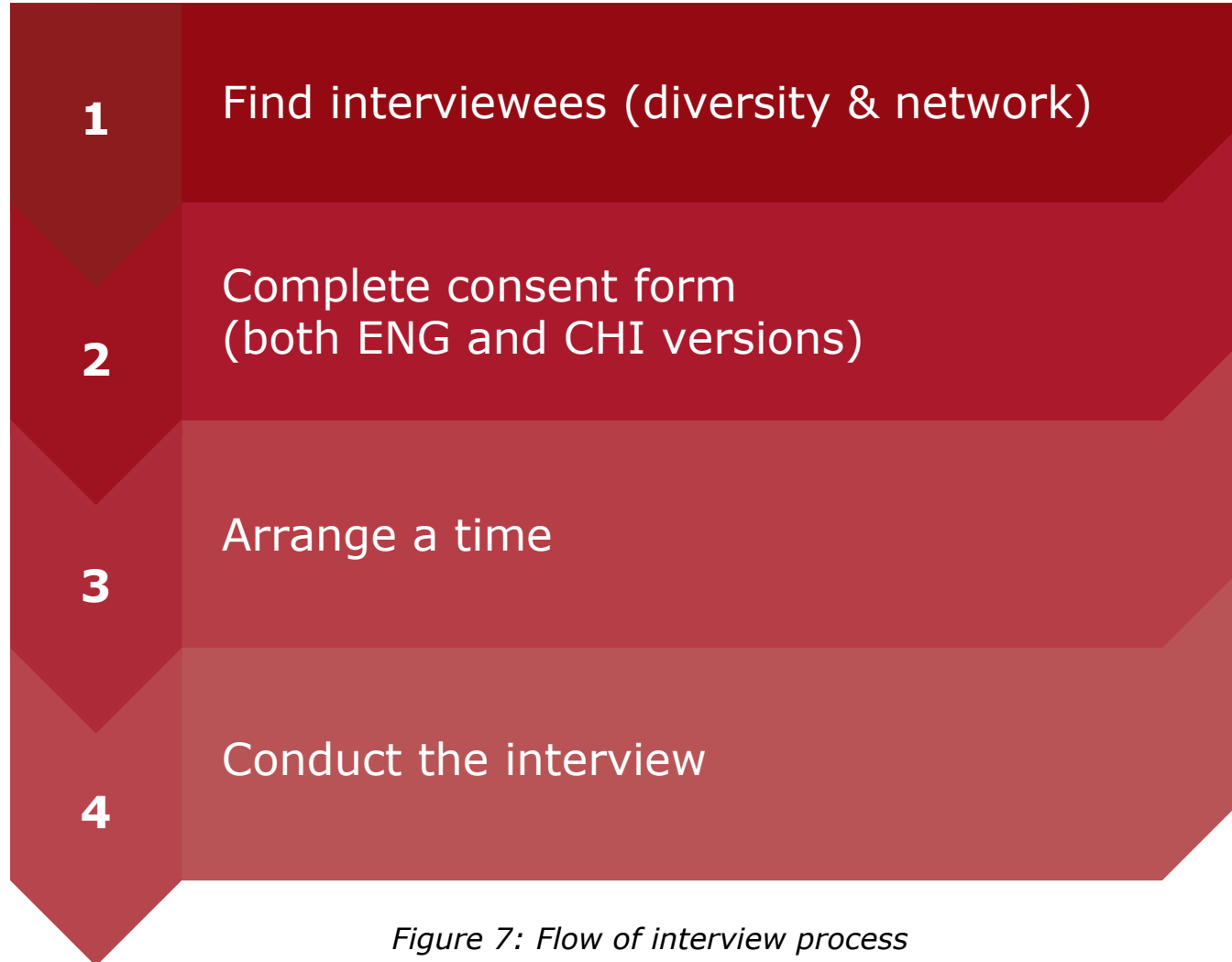


Figure 7: Flow of interview process

- Meeting platforms:
 - Zoom
 - Tencent Meeting
- Roles:
 - WPI: Interview host
 - BUCT: Interpreter/translator

Literature Analysis

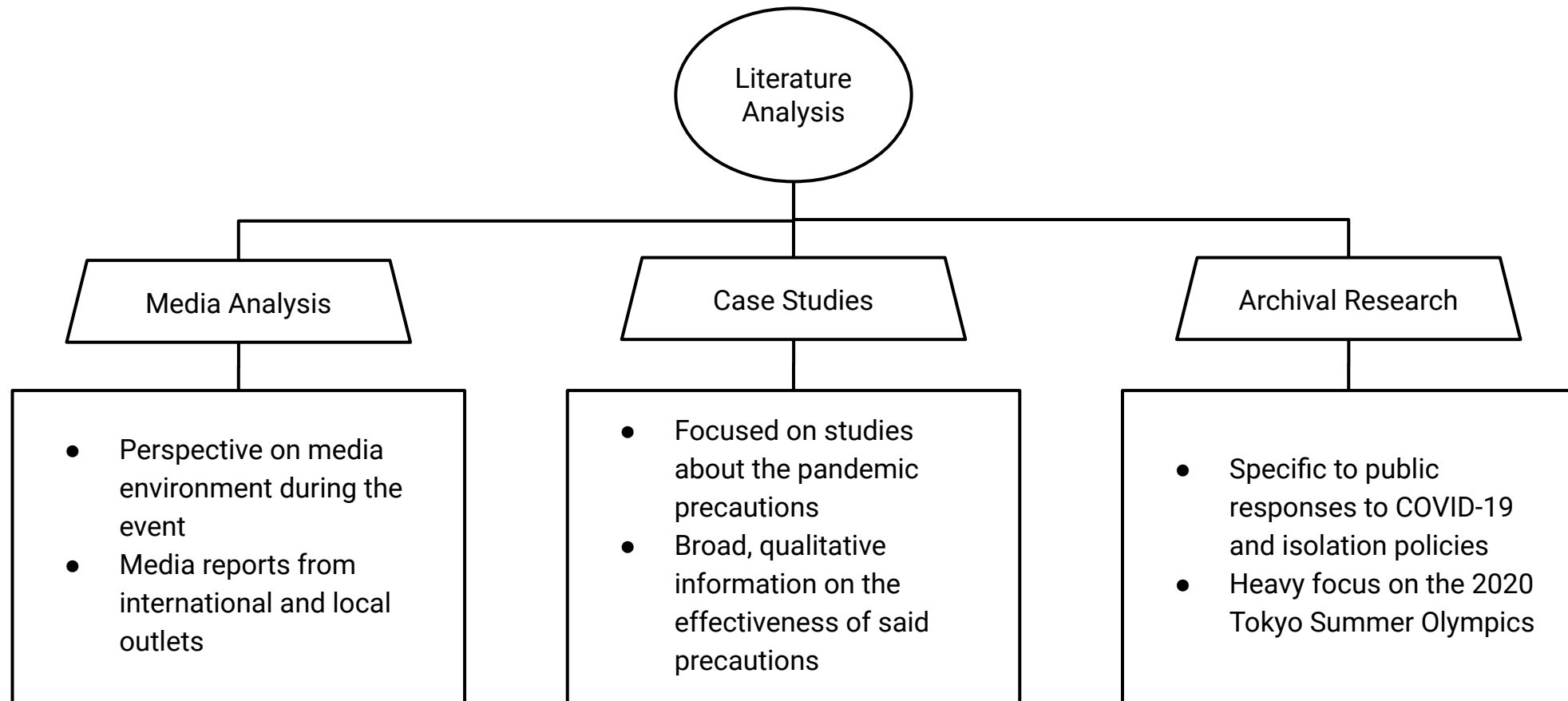


Figure 8: Breakdown of information to be gathered using case studies and archival data

Methodology Workflow

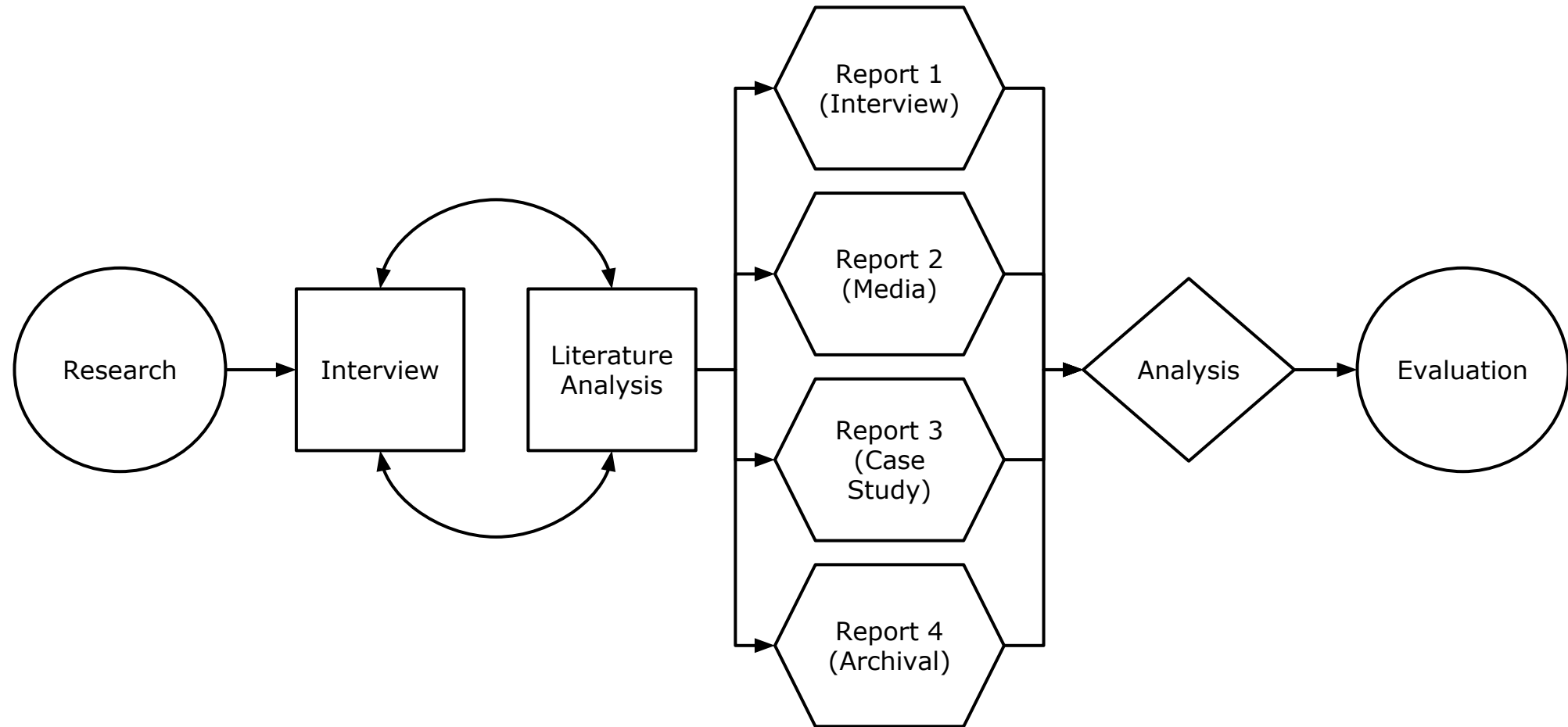
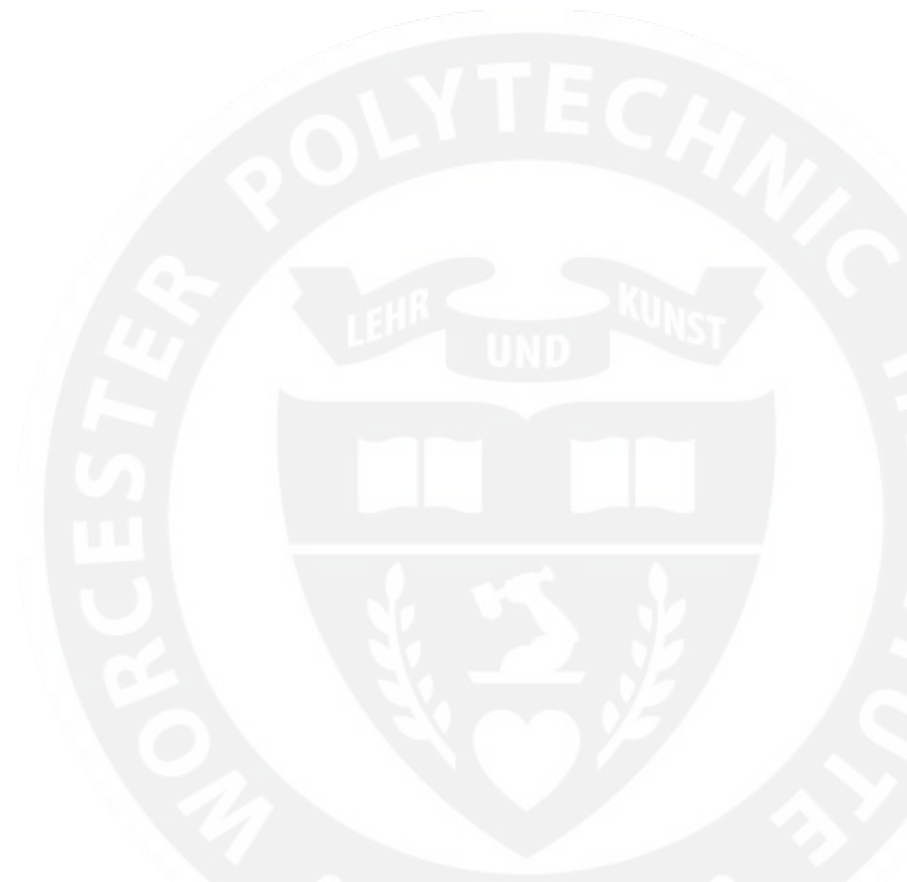


Figure 9: flowchart of anticipated workflow and methodology for project

Findings



Interviews: P (Professional)

1	Effectiveness	<ul style="list-style-type: none">• The amount of entering and exiting personnel was closely controlled and monitored.• The system was effective and infections stopped entirely over the course of the games.
2	Psychological Risk	<ul style="list-style-type: none">• Psychological effects were a concern of the planning committee.• IOC rejected a <i>mental release</i> outing plan.• Negative psychological outcomes were less common than expected.
3	Logistics	<ul style="list-style-type: none">• Facilities were located in the surrounding mountains, allowing easy control of movement.• System modeled with risk analysis data based on Tokyo's closed loop system.
4	Communication	<ul style="list-style-type: none">• Extensive communication was conducted between events.• Administrators communicated information to volunteers regarding instructions and future plans.
5	Future Implementations	<ul style="list-style-type: none">• The system required extensive funding and policing which is not always available to local governments.• Location is important for maintaining the system.

Figure 10: Thematic findings through volunteer interviews

Interviews: V (Volunteers)

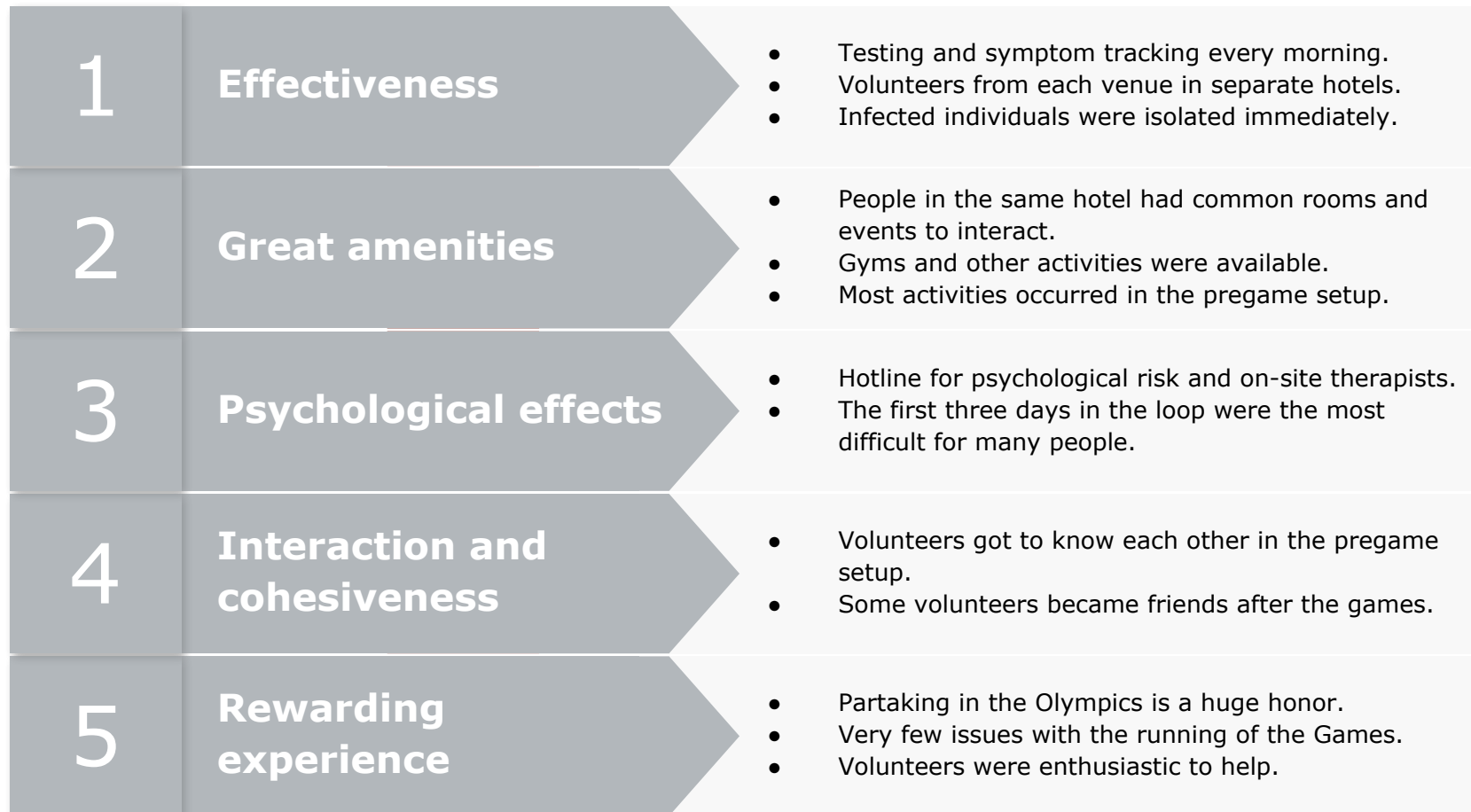


Figure 11: Thematic findings through volunteer interviews

Interviews: C (General Worker)

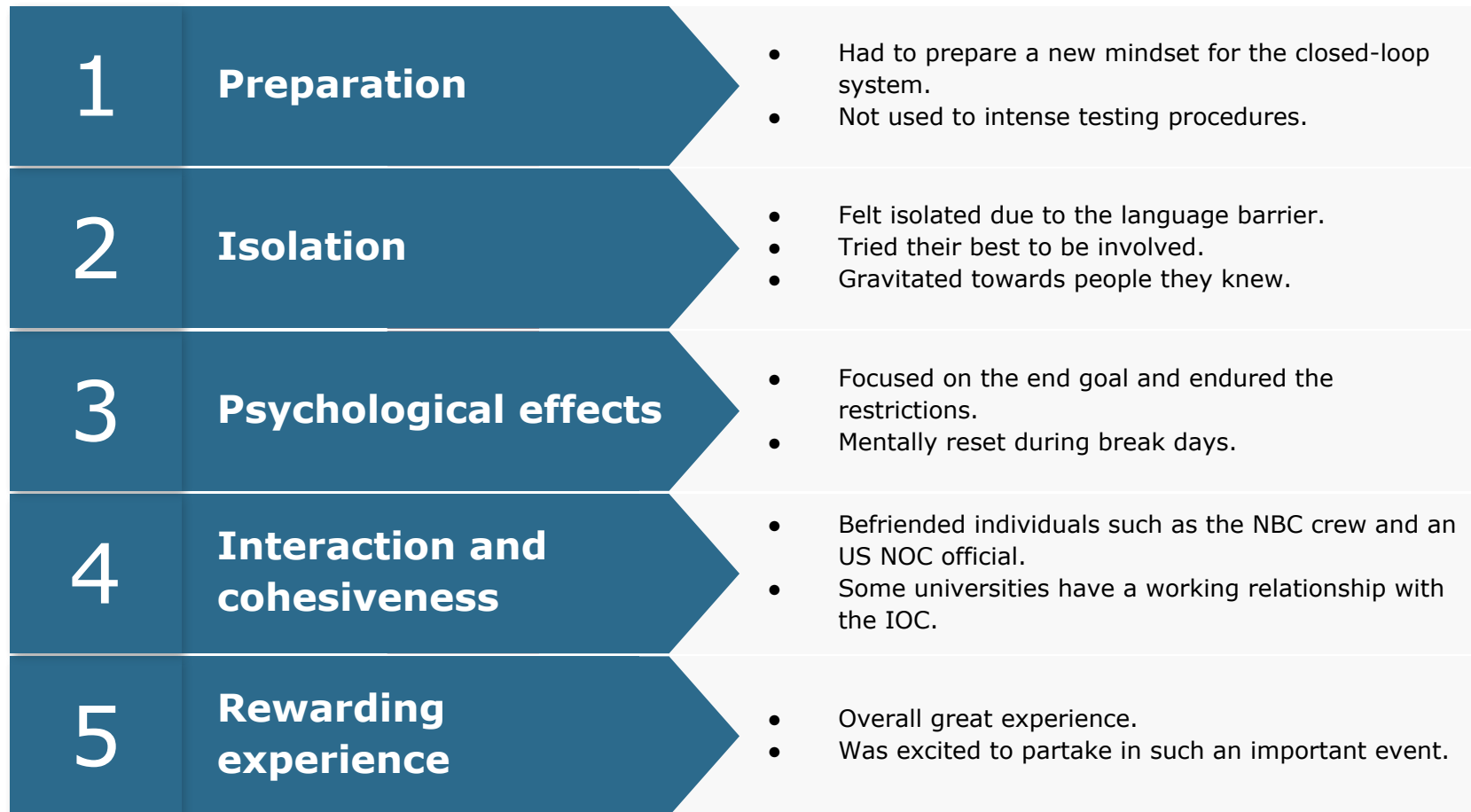


Figure 12: Thematic findings through an international worker

Interview Analysis

- Five major themes were revealed
 - Personal satisfaction
 - Cultural involvement
 - Community involvement
 - Psychological effects
 - Possible improvements
- Interviewee distribution (PVC):
 - P (Professional): 2
 - V (Volunteer): 7
 - C (General worker): 1

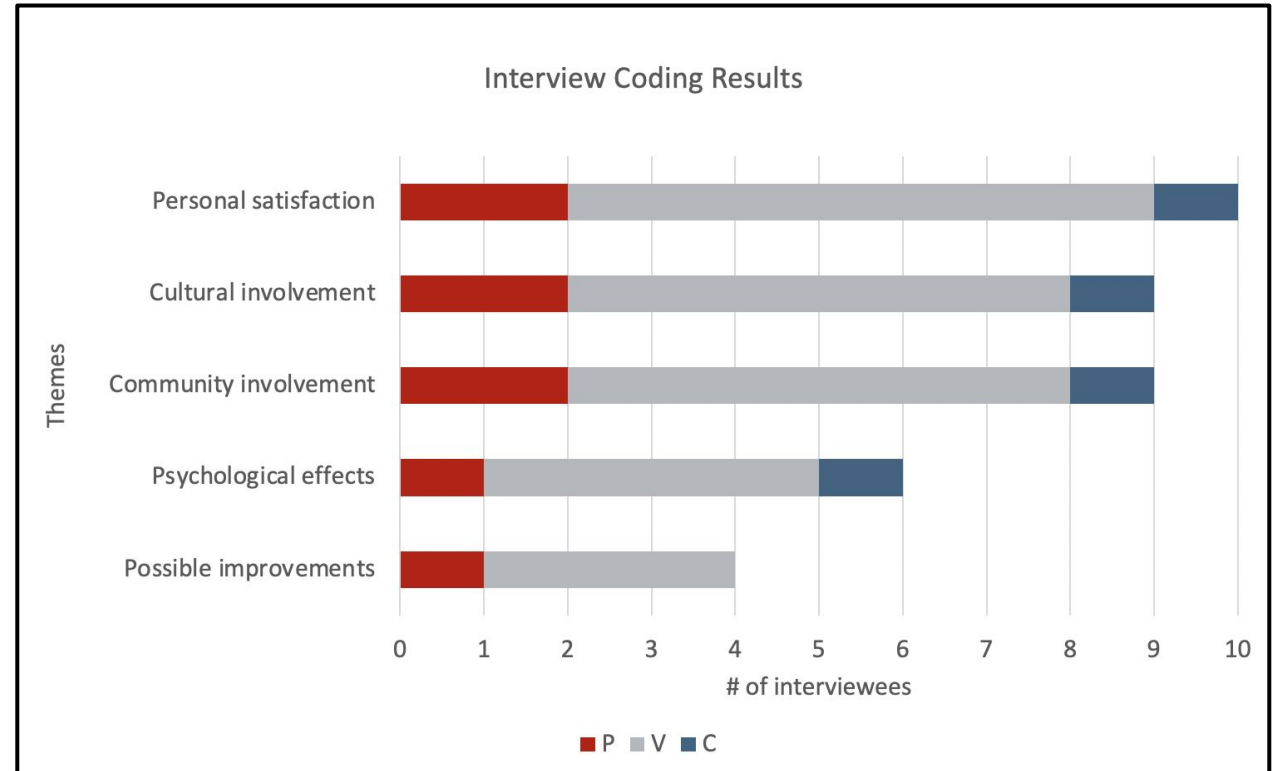


Figure 13: Five main themes were discovered through the interviews

Literature Analysis

- A heartfelt interaction between a volunteer and athlete made news headlines
- Tessa Maud, a US snowboarder, was greeted warmly by Sun Zeyu of Tsinghua University
 - They expressed their gratitude to each other through Instagram and TikTok
 - Zeyu invited Maud to China when the pandemic was over
- The video garnered nearly 400,000 views



Figure 14: Screenshots of the interaction on TikTok
(source: @tessamaud_ on TikTok)

Literature Analysis (cont.)

- Some athletes shared their negative experiences on social media
- Kim Meylemans, German Skeleton Racer
 - Tested positive for COVID-19 while in the village
 - Was put in multiple isolation facilities for days at a time, outside the village
 - Felt extremely isolated and broke down in social media video
- Valeria Vasnetsova, Russian Biathlete
 - Was suffering the effects of malnutrition from eating the same little portions every day
 - Lost weight
 - Pale
 - Described loss in strength and inability to get out of bed
 - Described crying every day and “wanting this all to end”
- Multiple coaches described their athletes as unable to get enough food.

Literature Analysis (cont.)

- There were large amounts of media coverage on the negative effects of these circumstances
 - There were solutions to these cases in time, but these gained less coverage, and it is clear that this situation must be avoided
 - This not only hurts the image of the Games overall, but if the rules require athletes to be separated from society to be able to recover for the competition, then there should be rules in place preventing issues that cause degradation in performance or mental health.
- If athletes cannot get their own food or means of training, then that which is provided must be “Olympic” quality
- Especially when the media has a large concern for mental health (Carpenter)

Literature Analysis (cont.)

- Another large negative media focus was on the lack of attendees
 - Often times the empty stands found in many of the venues during the Beijing Games were cited to be depressing and “embarrassing” (Kelso)
 - This is bad for public appearance, but spectators also make the viewing experience more impressive, and encourage athletes to perform better
 - Keeping spectators maintains tradition of the Games
- There must be a plan implemented to ensure spectators are not spreading COVID-19, and could possibly follow a new sector of the closed-loop system

Recommendations



The Mental Release Plan

Logistical

- Allow athlete-age individuals on the Olympic planning committee
 - Better insight on amenities that fit the younger demographic of competitors
- Provide more resources for international workers
 - Translation technology (real time translation)

Cultural Competency

- Customized cultural experiences for different countries
 - Survey individuals before the Games and allow them to choose a selection of food, activities, etc.
- Provide holiday-related activities for those that celebrate them

The Mental Release Plan (cont.)

Destress

- Monitored, post-competition destress event (sightseeing, activities, etc.)
- Optional post-game celebration and events
- “Happy hour” period for destress activities
 - Virtual or in-person hotel/venue book club
- Stress-free competitions between hotels
 - Remote activities
 - Low-stake rewards such as food
- Therapy animals (dogs)

Isolation

- Most of the recommendations above be applied to individuals in isolation
- Provide their preferred food with the adequate nutrients for competition

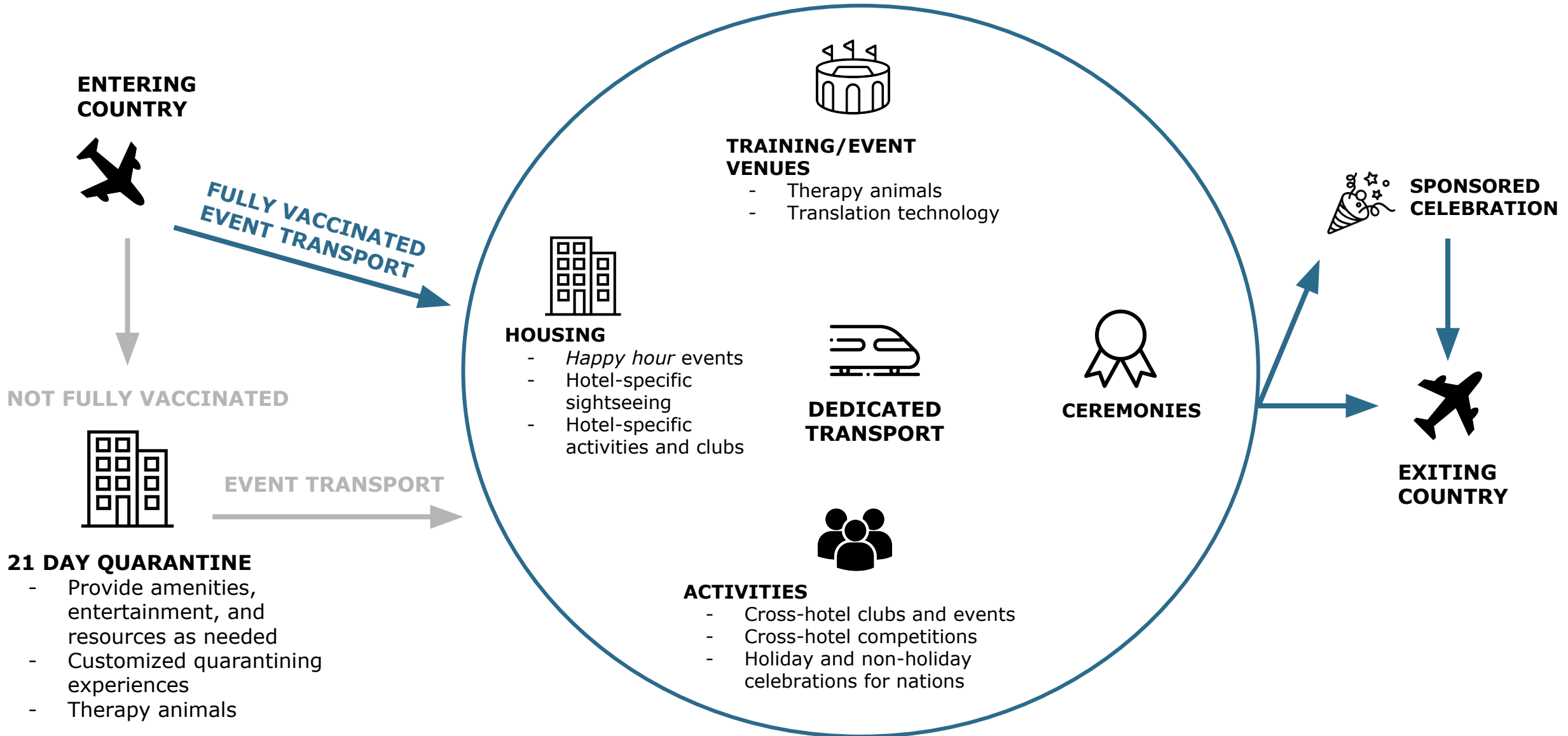


Figure 15: Draft of a closed loop system with our suggestions

NOTE: Icons from Flaticon

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The background features a large, faint, circular logo for Morbuster Polytechnic Institute. The logo contains a central shield with a heart, flanked by laurel branches. Above the shield is a banner with the text 'LEHR UND KUNST'. The outer ring of the logo contains the text 'MORBUSTER POLYTECHNIC INSTITUTE' at the top and '1865' at the bottom.

Questions?