

Structuring Gamified Participatory Public Space Design

Developing a Design Quality Evaluation System to Support Digital Co-Creation Processes

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Abstract. Participation and co-creation are increasingly used to incorporate end-users' demands and mitigate conflicts of interest. Digitalised games are introduced to better visualise design scenarios and invite multiplayer collaboration. A recurring problem is how much input and guidance are needed to achieve creative and feasible outcomes. This paper explores how guided forms of gameplay can lead to more informed negotiation and better game outcomes. The study focuses on public space design in a high-density housing estate, where widely varied resident demands put pressure on limited space. The methodology employed in this study involved the development of a design quality evaluation system to support participatory processes. To recruit study participants, design students were selected from the same course and randomly assigned into teams. These participants were then engaged in co-creation using a digital sandbox game that was designed to facilitate the process. Participants' co-creation outcomes were analysed through a combination of qualitative and quantitative methods. The original contribution of this study lies in the development of a user-activity-based toolkit for spatial configuration analysis. Preliminary results demonstrate how structuring collective design explorations around principles of activity complexity, sociability, environment comfort, adaptability, surveillance, and wayfinding can offer a more objective basis for collaboration. The implications of this approach can activate collective creativity in the age of digital production and contribute to the creation of more inclusive and user-centric public spaces.

Keywords: Digital Commons, Gamified Co-design, Quality of Public Space, Spatial Design Guideline, User-Activity Toolkit

1. Introduction

To improve the liveability of cities, a more in-depth understanding of human needs is required to guide collective work in design (Carmona, 2021; Mehta, 2013; Sheikh & van Ameijde, 2022). The role of digital and gamified platforms to challenge the formalities normally associated with community engagement had been increasingly tested in urban design (Ampatzidou 2018; Govada et al., 2017; Ng et al., 2023). Data-driven methods can help to understand the relationships between configuration and facilities in urban configurations and can incorporate spatial quality and community functions in dense urban environments (van Ameijde & Song, 2018). These emerging digital workflows offer the opportunity to incorporate community needs.

Planning standards originate in the ambition to provide improved quality of living conditions to all residents, for instance by ensuring access to daylight, ventilation,

public spaces and communal facilities. However, a universal approach and quantitative guidelines often prevent the creation of user-centric designs, as minimum standards become standardised practice. By reflecting on the Hong Kong Planning Standard Guidelines (HKPSG), this study explores a toolkit design to implement design rules and to explore design options, so participants can come together and find compromise within the existing planning constraints without reverting to standardised solutions.

The objectives are: 1) to summarise Hong Kong's public space conditions and international precedents of public space theory and cooperative design initiatives; 2) to formulate a design quality evaluation system to support participatory co-creation processes; and 3) to test and evaluate this in a user-activity-based toolkit for spatial configuration analysis.

2. Open Spaces in Hong Kong

In Hong Kong, public open space is critical to accommodate social activities due to limited domestic space per capita (HKHA, 2011). Challenged by a high-density planning context, HKPSG provides for basic needs, but does not consider up-to-date recreational activities desired by different communities (Yung et al., 2016). Averaging the needs of people can result in unresponsiveness to changes in social environments and individual specificities. What can be learnt from Hong Kong's development history and international public space theories to derive novel user-activity-environment toolkits that help to guide collective work in spatial design?

Public space is where social activities and civic interactions can occur (Mitchell, 1995). It is a place beyond the realms of home and work, providing the core setting of informal public life, where people come and visit regularly and voluntarily (Oldenburg, 1997). In 1950s Hong Kong, recreational and open spaces were not considered major issues in urban regeneration; but when living standards improved in the 1970s, facilities like swimming pools, badminton courts, and playgrounds began to emerge in public housing (HKHA, 2011). To systematise, HKPSG (2022) was compiled by the Planning Department in 1982, which pointed out the importance of environment design in housing and recreational activity for physical and mental health of individuals and the society. It also defined "core activities" that should be included in community design to ensure all citizens can enjoy basic recreational facilities (Chapter 4, Section 1.14). Accordingly, more high-quality spatial designs were developed in the 2000s; most public housing estates have unique decorations (i.e., artwork, stonework, fountains, etc.), but there was little advancement in facilities (HKHA, 2011). Also, public engagement was incorporated in housing planning; however, consultation generally occurs in late stages of the planning process (Ng, 2014; Yung et al., 2016). As the public did not participate in estate design, with limited chances to express ideas, it often resulted in poor user acceptance and adaptability (Ampatzidou et al., 2018).

HKPSG set numerical standards that help city planning, for example, 2m² per capita of public space should be provisioned (Chapter 4). Nonetheless, the standard had not advanced for fifteen years, and Lai (2017) criticised the "2030+ Planning Vision and Strategy" for only increasing 0.5m², compared to cities like Singapore (~7m²). The total land area of Hong Kong is ca. 1,110 km² with 7 million population, HKPSG recommended 24% of land as built-up or developable areas. One of the reference indicators provisioned by UN-Habitat (2018) recommends allocating 15-20% of urban land for open public spaces. In the case of Hong Kong, that would be ca. 40-53 km²,






resulting in a per capita public space area of 5.5-7.1 m². This indicates a gap between Hong Kong's public space planning and the current international standard and demonstrates potential problems in using minimum requirements as a standard.

HKPSG categories open spaces as local, district, and regional, which varies in size and purpose. For the purpose of this research, the first two would be studied. Five open spaces built in different decades were assessed by their similarities and differences in terms of function, facility arrangement, and spatial configuration. These include open spaces of public housing estates, a community garden, a city park, and a waterfront promenade. However, they were all functionally similar, containing playgrounds, fitness zones, and sports facilities. More centralised area contains minor variations. For instance, Tsim Sha Tsui (TST) Harborfront incorporates some stores, whereas Victoria Park offers a wider range of sports facilities (Chan, 2020; LCSD, 2022).

The latest developed open spaces pay more attention to spatial experience. Yi Pei Square Rest Garden used innovative materials to create colourful surfaces and incorporated intergenerational and inclusive play equipment (Design Trust, 2021). On Tai and Jat Min Chuen Estate, respectively completed in 2016 and 1980s, showed differences in spatial layout. The former utilised unique decorations to tell the history of its development for aesthetics and functionality (HKGBC, n.d.; HKHS, n.d.).

In addition, public participation became a statutory process in 2016 (Govada et al., 2017). For instance, the TST Harborfront was built after public consultation on site position; On Tai public spaces were decorated by residents; Rest Garden interviewed citizens to understand their needs during site research phases (LCSD, 2015; HKGBC, n.d.; Design Trust, 2021). However, public participation should occur throughout the project, from research to design and implementation (UN-Habitat, 2022).

Table 1. Selected Hong Kong local and district open spaces.

Year	Local Open Space			District Open Space	
	1981/1982	2016	2021	2002 (Refurbished)	2016 (End of Revitalization Program)
Site	Jat Min Chuen	On Tai Estate	Yi Pei Square	Victoria Park	TST Harborfront
Scope of Facility Provision	1. Playground 2. Fitness Zone 3. Central Plaza 4. Elevated Walkway 5. Swimming Pool 6. Badminton Court 7. Skating Rink	1. Playground 2. Fitness Garden 3. Learning Area 4. Small Farm 5. Basketball 6. Badminton 7. Table Tennis	1. Play Zone 2. Elderly Equipment 3. Activities Zone 4. Leisure Zone	1. Playground 2. Bowling Green 3. Soccer Pitches 4. Basketball 5. Jogging Trail 6. Tennis Courts 7. Pool 8. Table Tennis 9. Volleyball 10. Skating Rinks 11. Bandstand 12. Central Lawn	1. Playground 2. Stores 3. Cultural Facilities 4. Leisure Facilities 5. Promenade 6. Podium Garden
Elements	Seats, Playground, Fitness, Jogging Trail, Lighting	Seats, Playground, Fitness, Art / Stone work, Lighting	Seats, Playground, Pavilion, Fitness, Lighting	Seats, Playground, Sport Facilities, Jogging Trail, Trail, Stores, Lighting	Seats, Pavilion, Running Trail, Stores, Lighting
Innovation	Swimming Pool	Stonework	Intergeneration Play Equipment	The Largest Park in Hong Kong Island	Integrating Commercial and Cultural Elements
Public Participation	N/A	Late Stage of Program	Early Stage of Program	N/A	Consultation: Early Stage of Program
Photo of Sampled Playground					
Initiator	HKHS	HKHA	Design Trust	LCSD	LCSD

Planning standards designed decades ago can no longer satisfy the diverse, changing lifestyles of urban populations. HKPSG is largely quantitative-based and can meet the basic common needs of citizens (e.g., a 400 m² playground is required for a neighbourhood of 5000, etc.). However, it also led to generic and highly similar open space designs and functions. Above all, the older population in Hong Kong has doubled in the past thirty years and open space should be designed for the future of living security, health maintenance, and social participation (Cheng et al., 2013; Chan, 2013). Although HKPSG mentioned activities should be designed intergenerationally, little specification had been provided. The lack of guidance over design quality leaves little room to signal and/or limit spatial possibilities.

Table 2. SWOT Analysis of Hong Kong Public Open Space

Origin	Helpful	Harmful
Internal	<p>Strength</p> <ul style="list-style-type: none"> ● Equal opportunities to access to public space ● Ensure the physical health of residents ● Provide a standard for planning 	<p>Weakness</p> <ul style="list-style-type: none"> ● Averaging user needs with generic designs ● Outdated facilities ● Lack of focus on spatial quality
External	<p>Opportunities</p> <ul style="list-style-type: none"> ● High quality designers and talents ● Diverse cultural backgrounds ● Large-scale infrastructural resources 	<p>Threat</p> <ul style="list-style-type: none"> ● Uncooperative design process ● Lack of communication and exchange ● Undermine importance of human-scale

3. Public Space Theories

Based on literature review (table 9, appendix), this study compiled a set of indicators that can guide and evaluate spatial designs. Although scholars have varying opinions over what defines a good public space, general consensus are sociability, meaningful activities, comfort, attractiveness, inclusiveness, safety, access & linkages.

Sociability - is considered a prime prerequisite for physical and mental health (Gehl, 1971). It is important for a sense of identity / responsibility: social interactions can build neighbourhood connections, maintain friendships, and gain valuable information on surrounding environments (Oldenburg, 1997). Criteria to promote social effectiveness are activities, comfort, safety, and accessibility (Dempsey, 2008).

Meaningful activities - The most frequently used plazas are those that can provide a wide variety of flexible and optional activities for different generations (Mehta, 2014). Gehl (1971) suggested how the occurrence of optional and social activities can reflect the quality of public spaces and people tend to conduct activities in lively streets with higher visibility. Intergenerational activities offer the possibility to assemble and exchange, promote social integration among age groups, enhance social networks and form a community of support for a lifetime (Stafford & Baldwin, 2015).

Comfort & Attractiveness - The feeling of comfort in public spaces is determined by environmental factors like temperature, sunlight and shade, as well as physical

elements like seating and greenery (CABE, 2007). For instance, seating should run between 6-10% of the total area (Whyte, 1980). For active open space, HKPSG (2022) specified 20% of soft landscaping, half of which for planting trees; for passive open space, 70% soft landscaping. The connection between comfort and attractiveness can be identified through user activities to improve sociability.

Inclusiveness - Public spaces are flexible and adaptable community-gathering spaces that accommodate a variety of activities and social behaviours, where people can join or leave any time (Jacobs, 1961). People can invent new activities or appropriate space according to their needs (Frank & Stevens, 2007). Although certain groups may not engage in real-life communities, the criteria of inclusiveness are worth exploring as an ideal form of space: whether activities of different social groups can be supported, and changes in needs can be met over time.

Safety, Access & Linkages - Lighting, activation, passive surveillance, and visibility of pathways can affect safeness. The openness of the public space leads to the continuous presence of people, promotes mutual supervision, forms ‘eyes on the street’ that can reduce the occurrence of dangerous and violent activities (Houlstan-Hasaerts et al., 2012). Traffic safety is another important factor, the visibility of roads at night and barrier-free design can cater for the needs of differently-abled and ensure pedestrian safety (HKPSG, 2022). Path permeability can enhance accessibility. For instance, the entrances should be unobstructed and easily identified, paths should create direct linkages to adjacent buildings. Public space should be welcoming and accessible for all gender, age, and differently-abled (CABE, 2007).

4. Constructing a User-Activity-Environment Based Toolkit

Based on the literature review, a graphic language of the design toolkit had been developed to guide and evaluate collective work in spatial design. Quantitatively, a site can be discretized by a grid for counting (e.g., if a 500m² plaza is divided into 20 grids, then each grid equals to a score of 5 out of 100). Then, one can count how many grids are occupied by design elements and benchmark accordingly.

Table 3. User-activity-environment based toolkit for public open space

Criteria	Indicators	Parameters	Evaluation
Meaningful activities	1. Complexity of activities	Activity types	Counting
		Types of space sizes	
Sociability	2. Sociability	The number of potential users	Configuration analysis
		Distance between different activities	
		Facing	
Comfort & attractiveness	3. Environment comfort	Ratio of greenery, seating, shade	Counting
Inclusiveness	4. Adaptability	Size of free space	
Safety	5. Surveillance	Straight line of sight: from 1.3-1.9m	Configuration analysis
Access & linkages	6. Wayfinding	The width of the pathway	

4.1. Complexity of Activities & Sociability

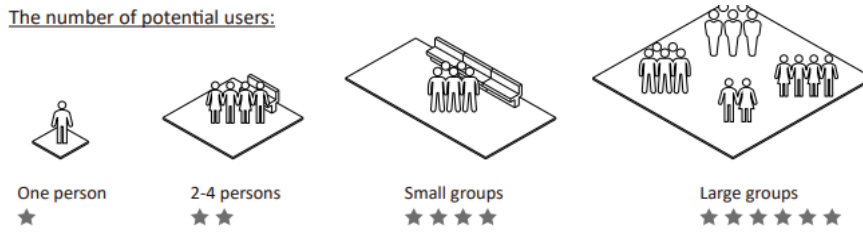
A good-quality space should accommodate activity and spatial variation for different user groups. The larger the site, the more activity types, the more spatial variations. Socialisation relates to the quantity and quality of interspatial connections that support user interactions. According to activity types and number of users, configuration analysis can be used to evaluate distance between facilities and facing (figure 1).

Table 4. a) Complexity of activities checklist. b) Sociability checklist.

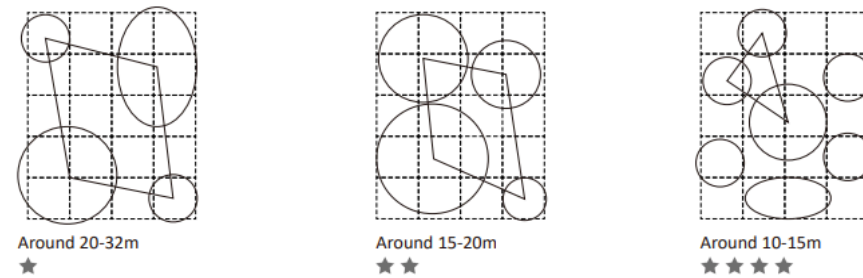
Size	Activity	Presence (✓)	Types of space sizes	Presence (✓)
XL: ≥11 grids	5-6 types		4 Sizes	
L: 6-10 grids	3-4 types		3 Sizes	
M: 3-5 grids	1-2 types		1-2 Sizes	
S: 1-2 grids				

No. of users	Presence (✓)	Activity distance	Presence (✓)	Facing	Presence (✓)
Large group		Less than 10m		Introverted	
Small group		Around 10-15m		Semi-open	
2-4 persons		Around 15-20m		Extroverted	
One person		Around 20-32m			

The number of potential users:



Distance between different activities:



Facing

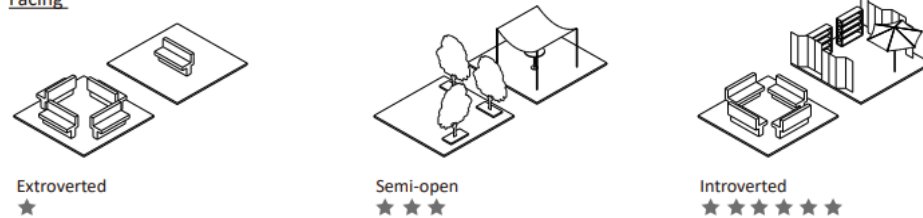


Figure 1. Spatial configuration analysis of sociability.

4.2. Comfort, Adaptability, Surveillance & Wayfinding

Environmental comfort enhances the attractiveness of public spaces, attracting more social and optional activities to occur. To assess, this study proposes >20% greenery and >10% seating. Through counting grid numbers, the environment comfort of the design can be evaluated by the proportion of greenery, trees, seating, and shades.

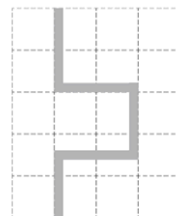
Adaptability of space can improve the level of inclusion and relates to the amount and size of free spaces. In which, passive surveillance can ensure safety through a straight line-of-sight. An average person has a line-of-sight range of 1.3-1.9m, and there should be no obstruction within this range. It can be standardised into degrees of obstruction: $\geq 50\%$, 20%, and no occlusion (figure 2). The smaller the value, the higher the degree to which the site promotes "eyes on the street". Accessibility and connectivity of a site contributes to wayfinding. To analyse the ease of wayfinding, width and twists & turns of a path can be measured (figure 3).

Straight line of sight: from 1.3m to 1.9m

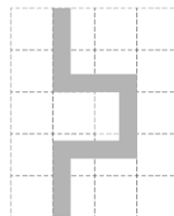


Figure 2. Spatial configuration analysis of surveillance.

The width of the pathway



0-1.5m



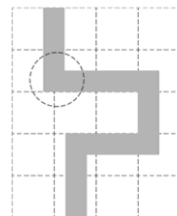
1.5-3m



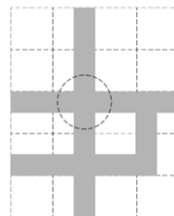
≥3m



The twists and turns of the pathway



≥3



1-2



0



Figure 3. Configuration analysis criteria of "wayfinding".

Table 5. Environment comfort checklist.

Greenery (✓)	Trees (✓)	Seating (✓)	Shades (✓)
≥11 grids	≥6 grids	≥7 grids	≥4 grids
7-10 grids	4-5 grids	5-6 grids	3 grids
3-6 grids	2-3 grids	2-4 grids	2 grids
1-2 grids	1 grid	1-2 grids	1 grid

Table 6. Adaptability & surveillance checklist.

Size of free space	Presence (✓)	Straight line of sight: 1.3-1.9m	Presence (✓)
≥7 grids		Unobstructed	
4-6 grids		20%	
1-3 grids		≥50%	

Table 7. Wayfinding checklist.

width of pathway	Presence (✓)	twists & turns of pathway	Presence (✓)
≥3m		0	
1.5-3m		1-2	
0-1.5m		≥3	

5. Preliminary Testing: Applying the Toolkit

A test was held with 15 design students working in four teams in shared VR spaces (Figure 4). After identifying common design goals, students cooperated through a division of tasks to place elements in VR. Researchers analysed results by comparing hand drawings, thematic content analysis of presentations, and VR outcomes. Based on which, four open space designs were proposed, evaluated by the toolkit (figure 5).

“Complexity of activities” performed best, scoring an average of 71% from all designs, followed by adaptability (63%), sociability (55%), wayfinding (54%), environment comfort and surveillance (50%). All designs had at least six types of activities except for design D, most of which covered 1-2 grids. When trying to enhance other criteria, activity complexity would decrease; for instance, design D scored highest in “environment comfort” and “sociability” with high percentages of greenery and alfresco seating, resulting in lowest score in “complexity of activities. These mutual-constrain indicators presented players with an exercise of spatial trade-off.

Overall, proposal B scored highest with 43/64 (67%), followed by C & D (55%), and A (45%). Especially for adaptivity, surveillance and wayfinding, B designed with fewer elements to support more flexible common spaces, wider and straighter pathways, whereas A had low accessibility with semi-open activity designs. Although B was a better design solution quantitatively, graphically, it can be seen how A facilitates better environment comfort by putting most activities under shades of adjacent buildings in the west, and better surveillance by putting alfresco in the east next to existing ground floor shops (figure 6).



Figure 4. Students worked in teams within networked VR scenes.

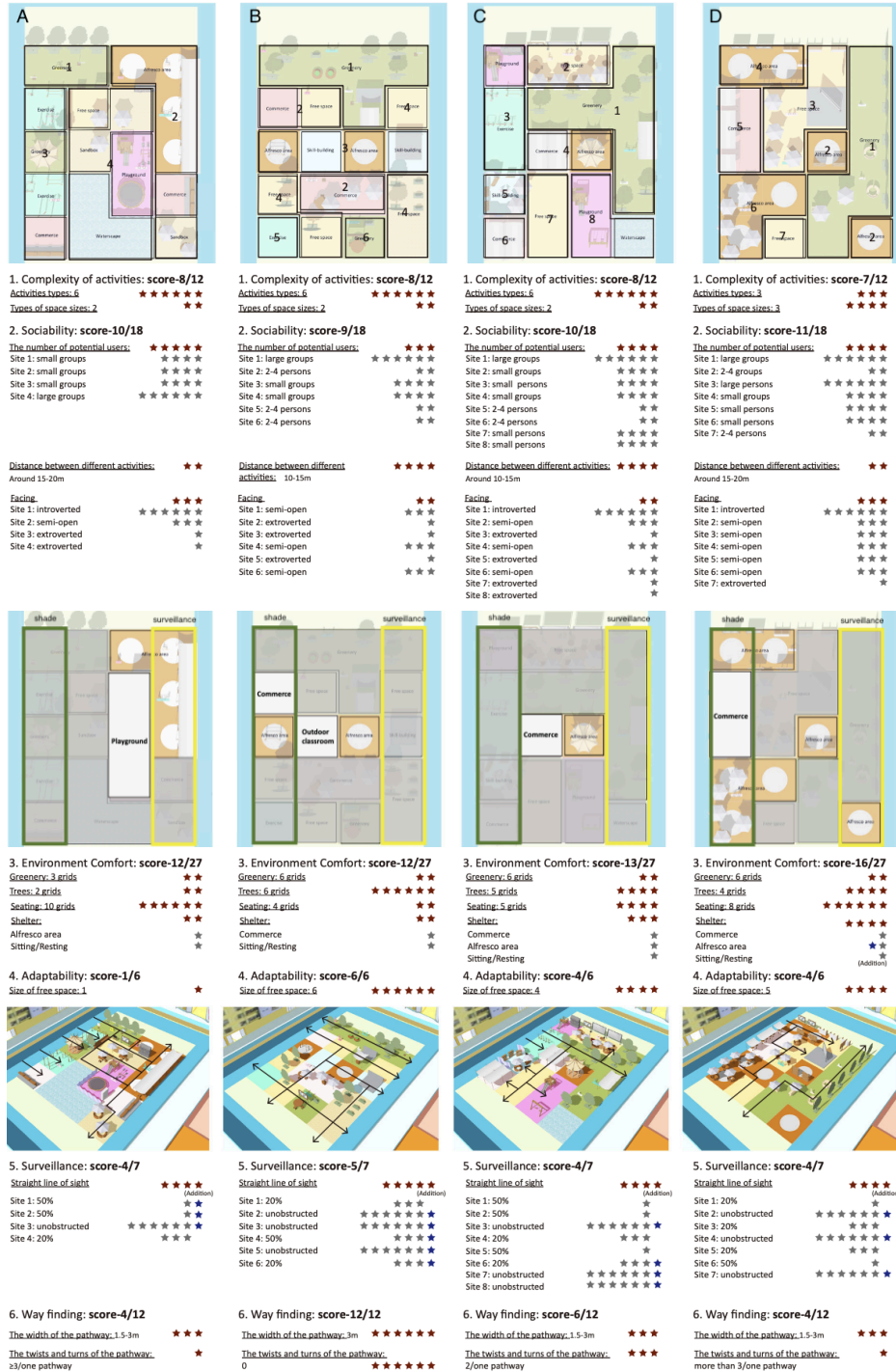


Figure 5. Combinatorial analysis of collaborative design outcomes using the proposed toolkit.

The combinatorial evaluation method showed how graphical analysis can complement quantitative scoring to provide a more comprehensive assessment of spatial quality and serve as guidance for players with design-educational significance.

6. Conclusions

This paper investigated a means to guide and evaluate collective work in public open space design, driven by digital gamified co-design methods. From Hong Kong's open space development history, it can be learnt how high-density cities are prospective grounds to lead international dialogues on the potential to utilise infrastructural capital in enhancing diversity, equality, and inclusivity of spatial design.

Public space is one of such urban infrastructures that support social and civic exchanges in strengthening a city's resilience and community-building. The idea that public space should provide for basic common needs was the aspiration of the past; today, we have the knowledge to aim much higher on spatial resources design using shared digital tools. Public space theories provided insights to how limited space can still facilitate high-quality spatial designs through criteria of activity complexity, sociability, comfort, safety, adaptability, and accessibility. Spatial design guidelines expanding on such criteria are inevitable innovations to implement such goals.

The proposed user-activity-environment based toolkit is a first step to communicate a larger vision on how a graphical means in designing spatial guidelines can better support collective decision-making. The preliminary test demonstrated how quantitative and qualitative spatial configuration analysis may be bridged using a combinatorial assessment method. In this way, the universality of the toolkit can compensate for the gaps between planning and spatial experience design.

In guiding collective work in design, mutual-constrain indicators help to signal and limit design opportunities while embedding varied community needs. In the game-based process, the scoring system helped participants to develop an awareness of the need to respect differences and compromise for consensus within a community. Our future work will further evaluate the feasibility of the proposed toolkit by inviting citizens and other experts to join the collaborative design process.

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References

- van Ameijde, J., & Song, Y. (2018, May). Data-driven urban porosity: incorporating parameters of public space into a generative urban design Process. In *Learning, Adapting and Prototyping—Proceedings of the 23rd International Conference on Computer-Aided Architectural Design Research in Asia*, Vol. 1, 173-82.
https://papers.cumincad.org/data/works/att/caadria2018_332.pdf
- Ampatzidou, C., et al. (2018). All Work and No Play? Facilitating Serious Games and Gamified Applications in Participatory Urban Planning and Governance. *Urban Planning*, 3(1), 34–46.
<https://doi.org/10.17645/up.v3i1.1261>
- CABE. (2007). *Spaceshaper: A user's guide*. London, Commission for Architecture and the Built Environment.
- Carmona, M. (2021). *Public places urban spaces: The dimensions of urban design*. Routledge.
- Chan, C.M.A., Liang, J.S.E. (2013). Active Aging: Policy Framework and Applications to Promote Older Adult Participation in Hong Kong. *Ageing Int* 38, 28–42.
<https://doi.org/10.1007/s12126-012-9166-z>
- Chan, E. (2020). Public space as commodity: social production of the Hong Kong waterfront. *Proceedings of the Institution of Civil Engineers - Urban Design and Planning*, 173:4, 146-155.
- Cheng, S.-T., Lum, T., Lam, L. C. W., & Fung, H. H. (2013). Hong Kong: embracing a fast ageing society with limited welfare. *The Gerontologist*, 53(4), 527–533.
<https://doi.org/10.1093/geront/gnt017>
- Civic Exchange. (2018). *Open Space Handbook – A guide for journalists in Hong Kong*. Civic Exchange.
- Dempsey, N. (2008). Quality of the Built Environment in Urban Neighbourhoods. *Planning, Practice & Research*, 23(2), 249–264. <https://doi.org/10.1080/02697450802327198>
- Design Trust. (2021). *Yi Pei Square Playground opens to the public*. Design Trust Futures Studio.
- Frank, K., & Stevens, Q. (2007). *Loose Space: Possibility and Diversity in Urban Life*. New York: Routledge
- Gehl, J. (1971). *Livet Mellem Husene: Life between Buildings: Using Public Space*.
- Gehl, J. (2010). *Cities for People*. Island Press.
- Govada, S. S., Wong, F., Rodgers, T., Chow, H. Y. C., & Busa, K. (2017). E-Engagement in Hong Kong. In *E-Democracy for Smart Cities*. Springer Singapore, 143-180.
https://doi.org/10.1007/978-981-10-4035-1_5
- HKGBC. (n.d.). *Public Rental Housing Development at Anderson Road Sites A and B (on Tai estate)*. Hong Kong Green Building Council: BEAM Plus Online Exhibition.
<https://greenbuilding.hkgbc.org.hk/projects/view/26>
- HKHA. (2011). *Planning, Design, and Delivery of Quality Public Housing in the New Millennium*. Publication Archive. Hong Kong Housing Authority.
[https://www.housingauthority.gov.hk/en/common/pdf/about-us/publications-and-statistics/publication-archive/HA_DCD_Booklet_\(%202011\)_1.pdf](https://www.housingauthority.gov.hk/en/common/pdf/about-us/publications-and-statistics/publication-archive/HA_DCD_Booklet_(%202011)_1.pdf)
- HKHS. (n.d.). *Jat Min Chuen*. Hong Kong Housing Society.
https://www.hkhs.com/en/housing_archive/id/16
- HKPH. (n.d.). *On Tai Estate*. Federation of Public Housing Estates. <http://hkph.org/estates/ontai/>
- Houlstan-Hasaerts, R., Tominc, M., Nikšič, M., and Goličnik Marušić, B. (2012). *Civil Society Reclaims Public Space: Cross Perspectives Based On Research*. Digital Publication, URBANI IZZIV PUBLIKACIJE. <https://www.uirs.si/pub/humancities2012.pdf>
- Jacobs, J. (1961). *The death and life of great American cities*. Vintage Books.
- Lai, C. (2017). *Unopened Space: Mapping Equitable Availability of Open Space in HK*. Civic Exchange.
https://civic-exchange.org/wp-content/uploads/2017/04/20170224POSreport_FINAL.pdf
- LCSD. (2015). *LCSD enhances public engagement on Tsim Sha Tsui waterfront design*.
- LCSD. (2022). *Victoria Park: Outdoor Facilities*.

- <https://www.lcsd.gov.hk/en/parks/vp/facilities/outdoor.html>
- Mehta, V. (2014). Evaluating Public Space, *Journal of Urban Design*, 19:1, 53-88.
<https://doi.org/10.1080/13574809.2013.854698>
- Mehta, V., & Bosson, J. K. (2010). Third Places and the Social Life of Streets. *Environment and Behavior*, 42(6), 779-805. <https://doi.org/10.1177/0013916509344677>
- Mitchell, D. (1995). The End of Public Space? People's Park, Definitions of the Public, and Democracy. *Annals of the Association of American Geographers*, 85(1), 108-133.
<https://doi.org/10.1111/j.1467-8306.1995.tb01797.xa>
- Ng, M. K. (2014). Researching Community Engagement in Post-1997 Hong Kong. In *The Routledge Handbook of Planning Research Methods*. Routledge, 157-168.
- Ng, P., Li, Y., Zhu, S., Xu, B., & van Ameijde, J. (2023). Digital common (s): the role of digital gamification in participatory design for the planning of high-density housing estates. *Frontiers in Virtual Reality*, 3, 184. <https://doi.org/10.3389/frvir.2022.1062336>
- Oldenburg, R. (1997). The great good place: cafes, coffee shops, community centers, beauty parlors, general stores, bars, hangouts and how they get you through the day.
- Planning Department. (2022). *Hong Kong Planning Standards and Guidelines*, chapter 4.
- PPS. (n.d.) What makes a successful place? The Project for Public Spaces.
<https://www.pps.org/article/grplacefeat>
- Sheikh, W. T., & van Ameijde, J. (2022). Promoting livability through urban planning: A comprehensive framework based on the "theory of human needs". *Cities*, 131, 103972.
<https://doi.org/10.1016/j.cities.2022.103972>
- Stafford, L., & Baldwin, C. (2015). Planning neighbourhoods for all ages and abilities: A multi-generational perspective. *State of Australian Cities Research Network*, Australia, 1-16.
<https://eprints.qut.edu.au/93600/>
- UN-Habitat (2018). *SDG Indicator 11.7.1 Training Module: Public Space*. United Nations Human Settlement Programme (UN-Habitat), Nairobi.
- Whyte, W. H. (1980). *The social life of small urban spaces*. Conservation Foundation.
- Yung, E. H. K., Conejos, S., & Chan, E. H. W. (2016). Public open spaces planning for the elderly: The case of dense urban renewal districts in Hong Kong. *Land Use Policy*, 59, 1-11.
<https://doi.org/10.1016/j.landusepol.2016.08.022>