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Coping with a Self-Induced Shock: The Heterarchic Organization of the London Olympic Games 2012

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Abstract: This paper starts from the assumption of a structural analogy between mega-events and large-scale disasters. Both imply forceful interruptions of everyday routines, and both involve imperatives for imminent action. Similar to the immovable deadline of an opening ceremony, a looming natural disaster triggers a complex set of precautions and preparations to cope with the inescapable forthcoming shock. In the case of mega-events, of course, this shock is self-induced. In fact, cities fiercely compete to host mega-events. In the face of the daunting challenges of hosting a mega-event—the immovable timeframe, the rigorous standards set by regulatory bodies, and the exceptional public visibility—the authorities and organizations in charge traditionally have resorted to strategies of a strict *adaptation* to the conditions imposed on them. Aligning all available resources and capabilities to match the foreseeable demands, however, undermines the *adaptability* to cope with unpredictable perturbations. This paper seeks to explore the strategies and practices to attain adaptability during the preparation, staging and implementation of legacy plans of a mega-event with an evidentially noteworthy record: the London Olympic Games 2012. The paper seeks to demonstrate that the project ecology in charge managed to enhance adaptability by implementing three key features of *heterarchy*: *ambiguity*, *redundancy* and *loose coupling*. By leveraging the principles of heterarchy, the project ecology was able to draw lessons from previous mega-events and both to anticipate and respond to unforeseen challenges.

Keywords: adaptability; heterarchy; project organizations; Olympic Games; London; high reliability; mega-events; urban development

1. Mega-Events as Self-Induced Shocks?

“Citius, altius, fortius”—faster, higher, stronger. Olympic Games afford the most prestigious arena for raising the bar in sporting competitions. The contest, however, is not restricted to the athletic tournament, but also involves cities that fiercely compete to host “the greatest show on earth”. Olympic Games appear as a unique opportunity that holds multiple promises (e.g., [1]). The euphoric celebrations in the cities that have been selected by the International Olympic Committee (IOC) seem to testify that Olympic Games are expected to boost (national) self-esteem, open up prospects of infrastructural improvements and economic benefits, and promise the excitement of staging an event for a truly global audience.

However, beyond the public effervescence and media frenzy, planners and organizers of major events are increasingly alert to a variety of demanding challenges and significant risks [2]. Whereas the public perception is focused on the single event, the involved practitioners are well aware that the record of mega-events has largely been written as a chronicle of planning failures, financial disasters, reputational damages and infrastructural ruins (e.g., [3]). The massive financial burden of staging a mega-event can even exacerbate national economic straits as the debt crises of Greece and Portugal in the aftermath of the 2004 Olympics and the 2004 European Football Championship, respectively, attest to (e.g., [4,5]). Olympic Games put not only capabilities of athletes to a test, but also pose formidable challenges for the host city (and nation).

In fact, the massive disruption, the intervention in the socioeconomic fabric and built environment and the potential long-term damages of mega-events bear resemblance to the impacts of major incidents like natural disasters (e.g., [6]). Similarly to the weather reports on an approaching hurricane, the immovable deadline of an opening ceremony in front of a global audience triggers a complex set of preparations and precautions to cope with the imminent incident. Moreover, mega-events like accidents and disasters are rare, if not singular occurrences for the host places that exhibit a massive shock on the affected cities (and nations). And, like disasters, mega-events turn into “brutal audits” ([7], p. 850) for the involved public authorities and private organizations. By turning “routines” and “response repertoires” of organizations “inside out” ([7], p. 850), these real life tests reveal both strengths and weaknesses in an unstinting fashion.

In the case of mega-events, of course, this shock is *self-induced*. Alluding to the deliberate massive disruptions, mega-event policies have even been likened to “shock and awe-strategies” ([8], p. 753). Unlike in its military origin, however, “the shock is largely not perceived as trauma but as festival and global media spectacle” ([8], p. 753). Organizers, sponsors and audiences expect ever more stunning and overwhelming shows that require ever more complex organizational designs: The Olympic mantra of “citius, altius, fortius” also pertains to the staging of the Olympic Games.

The increasing organizational complexity, however, generates new sources of vulnerability. The escalating complexity of the Olympic Games has by now led to “significant operational and organizational risks” ([9], p. 7). Planning and running the “critical infrastructures” [10] of mega-events resemble the operation of high-risk technologies [11]: tight coupling and non-linear interactions increase the likelihood for small incidents to unfold major accidents. In addition, the “hyperpoliticization” ([10], p. 165) of global events heightens the risk that even small disturbances cause lasting reputational damages.

Conventional approaches to planning and performing a mega-event like the Olympic Games discard rather than appreciate complexity ([12], p. 1991). The immovable timeframe, the rigorous standards and protocols set by regulatory bodies like the IOC which “has an extremely powerful grip on all aspects of the Games” ([13], p. 8)¹, and the exceptional public visibility and political attention traditionally have compelled the authorities and organizations in charge to resort to *hierarchical* approaches to assure a tight grip on involved agencies and stakeholders. Recourse on customary and allegedly proven hierarchical interventions frequently is reinforced by the “threat rigidity effects” [15] of the overwhelming task ahead that short-circuit the search for solutions by falling back on prior beliefs and other modes of “erratic learning” [16].

The almost habitual resort to adapting to daunting and inescapable circumstances in a hierarchical fashion, however, further spirals the vulnerability of the entire venture. By aligning all available resources and capabilities to match foreseeable demands, the public institutions and private organizations lose their ability to cope with unpredictable perturbations that most likely occur over the comparatively long project cycle of Olympic Games. Strict *adaptation* to given conditions, then, undermines *adaptability* to unforeseeable circumstances. Adaptability requires resources and capacities to generate and to perform alternative options in changing conditions ([17], pp. 14–18; [18], p. 534).

This paper seeks to explore the strategies and practices of the institutions and organizations in charge to attain adaptability during the preparation and staging of the London Olympic Games 2012 and the drafting and implementation of the plans for its legacies. The Summer Olympics in the UK capital makes for a pertinent case since they have been acknowledged as remarkably successful in terms of delivering a large-scale construction program, staging a major event and anticipating post-event requirements [19]. The persistent focus on adaptability right from the beginning, however, did not imply to discard hierarchy altogether. Rather, we argue that the entire enterprise was furnished as a *heterarchy* with multiple, tangled and shifting hierarchies ([20]; [21], p. 1120).

More specifically, we shall explore the heterarchic dimensions of the “project ecology” [22–24] of the London Olympic Games. The notion of the project ecology affords a contextualized perspective of this mega-event by extending the view from the temporary organizations that have been assigned the central responsibilities for the event and the legacy, respectively. The concept of the project ecology foregrounds the more permanent context of institutions, corporate ties and personal networks from which these dedicated organizations draw essential resources like legitimization, finance, expertise and control. By extending the focus from the focal project organizations to the project ecology, this contextualized perspective allows to appreciate the immense complexity of preparing and staging the event and implementing plans for the post-event legacies.

The paper proceeds in four steps. After briefly engaging with the origins, applications and key attributes of the notion of heterarchy in chapter 2, we shall examine the implementation of heterarchy in the London Games project ecology in chapter 3. In particular, we will scrutinize the realization of the three emblematic features of heterarchy: *ambiguity*, *redundancy* and *loose coupling* [17]. However, rather than praising heterarchy as yet another universally applicable master paradigm, we also reveal the

¹ At the same time, though, the IOC is confined to control “at a distance” which imposes also significant “limits of governing” [14].

limitations and trade-offs of heterarchic organizations in chapter 4. Finally, in chapter 5 we contemplate the question whether and to what extent the adaptability of the project ecology translates into an enhanced adaptability of the host city. In other words, did the self-induced shock therapy that aimed at reducing vulnerability by leveraging the action-generating capacities of a mega-event work?

The paper builds on a two-year research project (February 2012 to February 2014) on the strategies and practices of the project ecology of the London Games aimed at learning from past events and anticipating the post-event urban development². Thirty-five semi-structured interviews with senior managers and professional experts have been conducted. The majority of the interviews took place in the period directly before and after the event itself (April 2012 and September 2012). Questions explored both the specific features (e.g., structures, processes, tools, strategies) of the temporary dedicated project organizations that constituted the core of the project ecology as well as the longer term context of public institutions (e.g., local and national administrative authorities and sports associations), private organizations (e.g., construction and consultancy firms), personal networks and individual career trajectories that afforded key sources of legitimization, finance, expertise and control. The recorded interviews were transcribed verbatim. Together with the thorough examination of the publicly available policy documents, the content analysis of the transcripts provides the main empirical basis for the following pages.

2. Heterarchy: The Organization of Adaptability

2.1. Origins and Diffusion

While seemingly related concepts like “hierarchy”, “autarchy” or “anarchy” have long entered the standard lexicon of a broad spectrum of academic disciplines ([25], p. 64), the notion of heterarchy³ is a more recent addition to the vocabulary of the natural and social sciences. Heterarchy was first employed in a modern context in the neurological research of McCulloch (1945) [26]. He demonstrated that the brain, while reasonably ordered, is not organized as a hierarchy but as a “heterarchy of values determined by the topology of nervous nets” ([26], p. 89). The heterarchic organization is the source of the brain’s flexibility to re-order values as circumstances change and explains, for example, why SUV owners might greatly value nature while at the same time endangering it ([27], p. 42). These insights were taken up in research on artificial intelligence and in computer design [28] to denote an organization of computer sub-routines as heterarchical that can call one another. Subsequently, the notion of heterarchy has been taken up in mathematics [20] and cybernetics [21], and from there it fed back to the computational modeling of the brain ([29], p. 29).

More recently, the diffusion of the notion of heterarchy into ever more social science fields gained momentum. In archaeology, the notion has been employed to conceptualize urban settlements in which “relations between subgroups are those not of coercion and control but of separate but linked, overlapping yet competing spheres of authority” ([30], p. 22). The concept also proved useful to

² Funding of the research project by the German Research Foundation (DFG GR 1913/9–1) is gratefully acknowledged.

³ Tracing the notion back to its etymological roots, the term heterarchy combines the Greek *archon* (ruler) with the prefix *hetero* (variety or the other) and refers to “multiple rule” [25].

differentiate ordering principles in international relations [25] as well as in law studies to tackle the apparent paradox that the absence of hierarchy of legal authority in the European Union, for example, does not result in chaos, but constitutes a system of order [31]. Management scholars have referred to heterarchy to apprehend the power struggles between corporate headquarters and subsidiary management in multinational corporations [32,33], and geographers along similar lines interpret global corporate networks in terms of heterarchy [34]. Despite the diverse range of applications, though, “definitions of heterarchy are remarkably consistent across disciplines” ([35], p. 468), converging towards the original understanding of heterarchy as a system with multiple, tangled and shifting hierarchies ([20]; [21], p. 1120).

2.2. Organizational Interpretations

Most instructive for exploring the project ecology of a mega-event like Olympic Games are applications of the concept on the level of concrete organizations. For Stark, heterarchy “represents an organizational form of distributed intelligence in which units are laterally accountable according to diverse principles of evaluation” ([29], p. 19). Heterarchic organizations “embark on radical decentralization” of responsibilities for innovation and change ([29], p. 21). By increasing “interdependencies between divisions, departments and work teams” ([29], p. 21), organizational heterarchy implicates the “rampant interactional complexity” ([36], p. 381) of richly networked structures. And yet, organizational heterarchy must not be conflated with “bottom-up” processes of self-organization, but typically evolves from the interrelation of “bottom-up” and “top-down” processes ([37], p. 23). Analogous to the heterarchy of values provided by the topology of nervous nets of the brain [26], the specific structural ordering principle of organizational heterarchy is based on multiple “performance criteria and [...] evaluative principles” ([29], p. 24) that account for the organizational flexibility to re-order values in response to changing circumstances. Heterarchy is not simply “what lies ‘between’ single-hierarchy and autarchy” but rather a “multidimensional” ([25], p. 70) “organized dissonance” ([29], p. 27).

Synthesizing key arguments of the reviewed debates, heterarchic organizations seem to feature three structural ordering principles [17,18,29,38]. First, the active rivalry of different performance criteria cultivates a tolerance of *ambiguity*, a most effective antidote against a tunnel vision that restricts the perception of warning signals of potential disturbances. By producing and preserving a “generative *redundancy* of difference” ([29], p. 27 emphasis added), heterarchic organizations, second, have an extensive pool for alternative options at their disposal. Finally, the *loose coupling* of the sub-units in organizational heterarchies prevents that minor incidents turn into major disasters and encourage decentralized learning (and forgetting). These features mark the difference between organizational capacities that enable *adaptation* to present circumstances and organizational resources and competencies that facilitate *adaptability* to unknown futures [17,39].

3. London Olympics 2012: Success through Heterarchy?

The public perception of the London Games was remarkably positive, concerning both the fact that venues and infrastructures were completed in time and under budget and the impeccable execution of the Olympic event itself. London, it seemed, had set a new benchmark in how to deliver Olympic

Games without the negative concomitants of exorbitant costs, abandoned venues or political protest. The Olympic Games' positive reputation even disguised the bad memories of earlier discussions that had taken place after the budget had increased in 2007 to almost four times of the estimated cost of the bid document [40].⁴ Even the publication of a prominent study at the eve of the Games that proclaimed the London Olympics were “on track to be the most costly Games ever” [41] could not spoil the feel-good atmosphere in London and the UK during and after the event.

One reason for the positive perception might simply have been relief, as the success was generally considered as a surprise. The record of failed major construction projects in the UK during the last decades, the near collapse of London's public transport during the Queen's Jubilee and the inability of the appointed security company to fulfill its contract, which made headlines just before the Olympic Games, added to the skepticism of the general public about how the city eventually would perform.

In the light of the record of disasters of previous mega-projects in the UK and all over the world, London's success therefore indeed was unlikely. Yet, this unlikely success story, we maintain, can also be written as the result of a deliberate process of learning from the disasters elsewhere and of systematically applying the results of this learning process in the strategies and practices of the London Games project ecology. In a more conceptual reading, then, the success of London Games can be ascribed to a conscious attempt to augment the adaptability of the project ecology by implementing the three core features of heterarchy—ambiguity, redundancy and loose coupling—during the entire project cycle.

3.1. Ambiguity: Dissonance as Resource

Major events, and particularly Olympic Games, are never realized just for their own sake. On the contrary, from the perspective of host cities, the prospect of exploiting the catalytic power of the event for other agendas constitutes one of the main motivations to bid. In addition, a broad spectrum of stakeholders, special interest groups, associations and lobbyists seek to leverage the public and political attention of the Olympic Games for their objectives, ranging from the marketing interests of global sponsors to the London Citizens' attempt to campaign for affordable housing [42].

3.1.1. Goal Ambiguity

Since Barcelona successfully instrumentalized the Olympic Games of 1992 to boost its ambitious urban regeneration plans, comprehensive urban development objectives have become chief ingredients of bidding and hosting strategies. This turn was also supported by a reorientation of IOC policies that placed a stronger emphasis on the positive “legacy” Olympic Games should leave behind in the host cities [43].

However, the double objective of staging a (temporary) event and achieving (lasting) urban regeneration naturally involves conflicting imperatives. Host cities so far have tended to solve the inherent contradictions by proceeding on the assumption of the catalytic potential of mega-events and taking the legacy, quasi as an automatic by-product, for granted. Yet, in practice, the short-term

⁴ It was the adjusted budget, of course, that later became the benchmark for the positive appraisal of the Olympic Games.

urgencies of the event, particularly the need to mitigate “reputational risks” [2] caused by delays in venue and infrastructure construction or failure in meeting IOC standards, for example, tended to dominate all other agendas ([44,45]; [46], p. 6; [47], p. 3). Legacy plans thereby often expressed hardly more than wishful thinking and, in the post-Games period, not only had to start again from scratch but also were severely limited in scope by the massive ‘sunk costs’ the Olympic venues had already incurred [48].

The strategy for the London Games fundamentally differed from this routine and systematically sought to keep the conflicting objectives in balance. The political rhetoric in the run-up to the Olympic Games as well as the language of the design strategy for the Olympic Park even symbolically prioritized the regeneration agenda with the maxim “Design for the legacy, adapt for the Games” ([49], p. 9). Still, the organizational make-up reflected an institutionalization of the conflicting imperatives on several levels: In terms of *organization* two separate bodies were set up, the Olympic Delivery Authority (ODA) in 2006, in charge of the Olympics construction program, and the Olympic Park Legacy Company (OPLC), later the London Legacy Development Corporation (LLDC), the landowner responsible for the development and commercialization of the site after the Olympic Games.

Regarding the *process*, ODA’s master planning for the Olympic Park in Stratford started in 2007 with three plan documents, one implementing the Games imperatives, a second that anticipated the transformation of the site after the Olympic Games, and a third one that provided an “indicative legacy” delineating the “maximum capacities” for the long term legacy use (PRL3)⁵. As soon as the OPLC had been established it began to draft the subsequent master plan that would outline the framework for the long-term development, including the detailed street layout and building typologies.

In the phase of *implementation*, the construction during the run-up to the Olympic Games already considered the capacities of the indicative legacy for public utilities. In turn, all facilities solely needed during the period of the Olympic Games were set up on a temporary base: Avoiding “white elephants” became a chief mantra⁶. Planning and building the Olympic Park for the London Games, then, was a simultaneous enterprise to stage an event and to make provisions for an enduring legacy, and the possible disputes were managed within the structures and practices of the involved organizations.

However, even if all reasonable precautions have been taken to keep the conflicting goals through a respective organizational layout, planning process and material implementation in balance, it remains to be seen if both aims eventually will be achieved. For one, event and legacy involve different types of accountabilities. While successful Olympic Games can be attributed to a clearly definable group of actors, the long-term development of an extended urban area is shaped by a plethora of individuals, groups, organizations and institutions with different interests. Moreover, incentives for both policymakers and managers favor short-term success (e.g., [50]), and the fickleness of public attention [51] suggests that public pressure for a long-term project most likely will dwindle.

⁵ For the interview code, please see appendix.

⁶ This mantra was enacted, amongst others, in the numerous public presentations of members of the ODA and the OPLC that regularly started with a picture of the derelict swimming pool of the Athens Olympic Games 2004.

3.1.2. Multiplicity of Evaluative Principles

The simultaneous pursuit of delivering a successful mega-event and achieving lasting transformation of the East of London presumably was the principle instance for balancing rather than suppressing ambiguity in the London Olympics Construction Programme. Tolerance of ambiguity, however, pervaded the entire enterprise. Performance within the program itself, for example, was not only evaluated according to the standard key performance indicators (KPIs) of project management—time, cost and quality—but also to six additional “priority themes” [52]:

- health and safety;
- sustainability;
- equality and inclusion;
- employment and skills;
- legacy;
- design and accessibility.

For each of these themes the ODA devised a strategy, set target values and also assigned responsibilities and structured processes. The targets were non-negotiable and even shaped the procurement process [53]. However, it was up to the contractors to decide *how* to achieve the set targets ([19], p. 6). The goals of the six priority themes, in general, were accomplished.

Although the standard project management literature glorifies the virtues of lucid and unequivocal targets and responsibilities as preconditions for project success, the multiplicity of evaluative principles did not undermine the traditional performance indicators. Rather to the contrary, the goal ambiguity benefitted the adaptability of the entire project ecology for three reasons: First, the multiplicity of targets created new arenas for rivalry between projects and thereby also multiplied the stimuli for the ambition of project teams, for example, “to be the first major venue built on site” or to create “a standing award winning venue” (PL1). Second, goal ambiguity induced positive feedback loops between different principles that in a standard goal hierarchy would have remained undetected and unexplored. The target of recycling and re-using more than 90% of the demolition material on site, to name just one example, yielded unexpected cost and time saving effects (EC2). In a sense, then, the ambiguity of evaluative principles produced “generative friction” [29] that enhanced the search for novel solutions. Third, and on a rather general level, the appreciation of ambiguities and paradoxes strengthened the “immune system” ([54], p. 185) of the entire venture: divergent perspectives afforded a broader set of assumptions and sensitized to a greater variety of options ([55], p. 42), and contradictory signals were not suppressed in favor of consistent but misleading interpretations ([18], p. 538).

3.2. Redundancy: *The Merits of Waste*

The creation of redundancy, in a sense, is a standard response to increasing risks and uncertainty. The provision of additional just-in-case resources and capacities amplifies the adaptability to unexpected disturbances. The project ecology of the London Games, we maintain, also incorporated implementations of redundancies beyond the standard engineering approach to provide for excess resources [17].

3.2.1. Cognitive Redundancy

Adaptability requires a mindset that evades a tunneling of the course of action into a narrow cognitive frame, but is sensitive to alternative options ([12], p. 1995). In the London case, this openness to variation was a *leitmotif* of the organizational culture, despite the definite time frame and budget restrictions. More specifically, a built-in skepticism, a widely shared “acceptance that things can go wrong” (PRL4), permeated the entire project ecology. This sense of “preparedness” [56,57] resonates with the “preoccupation with failure” that Weick *et al.* [55] regard as a key cognitive predisposition in high-reliability organizations. The skeptical attitude and “prideful wariness” [55] was reinforced by a “no-surprise” (PRL2) and “no-blame-culture” (EL3). Commitment to “put the issues on the table” (PRL4) was rewarded and accelerated individual advancement within the organization [55]. The use of a particular contract format (NEC)⁷ that involved an “early warning” scheme (PRL4, EL3) helped to disseminate this “open and collaborative approach” throughout the entire endeavor ([19], p. 8).

Alternative options were also actively explored throughout the entire construction program. Whenever specific solutions or more general changes of the course of action were required, “time was taken to identify, explore and evaluate options so as to work towards a ‘best solution’”. This “optioneering” ([19], p. 4) was particularly relevant in the so-called “dig, demolish, design” period between 2006 and 2008. During that time the work process resembled the idea of “simultaneous engineering” [58]: internal processes were developed; the program baseline was written, along with the final cost calculation; the design strategy and master plan were drafted; the operational time frames were conceived by the Organization Committee (LOCOG); and the preparatory works started. Each of these activities produced new information that cascaded as new constraints and preconditions onto the other activities, potentially opening up a range of new options (PRL2). Even during the design and construction of single projects new solutions arose, for example for the roof construction of the Velodrome. Although a cable structure initially had been dismissed as too expensive, it eventually has been given preference to a steel-concrete construction since it proved to save time reducing, in turn, overall costs (PRL1).

Optioneering also took place pre-emptively by means of “artificial learning” schemes ([50], p. 237). When the financial crisis hit the construction program in 2008, members of the contract and risk management team of the ODA and the private delivery partner CLM⁸ undertook “a kind of war game simulation” by posing questions of the sort: “If Monday morning your main steel work supplier would have gone insolvent, [...] what would you gonna do?” (PRL4). The result of this exercise was the creation of an insolvency management strategy for the entire program.

Cognitive redundancy also involves a phenomenon that Weick *et al.* refer to as “conceptual slack”, that is, “a divergence in analytical perspectives among members of an organization” ([55], p. 42). The Olympic Games risk management was based on a highly sophisticated program monitoring process with regular reporting on all organizational levels and the provision of uniform and reliable

⁷ NEC stands for “New Engineering Contract”.

⁸ CLM was established as a temporary joint venture of a construction company (Laing O’Rourke), a project management consultant (Mace), and a global program management firm (CH2M Hill).

information for executive management and external stakeholders. For senior management, however, this elaborate scheme was not the exclusive base for decisions: “You never rely a hundred percent on that. I rely maybe fifty percent on that. The other fifty percent is your antenna” (EL3). Senior management also routinely trusted in their “management-by-instinct” (EL1) and used their informal networks with contractors and consultants to obtain different views and gauge different options. Risk management, then, was based on a recurring triangulation of deductive algorithmic approaches with inductive heuristic guestimates on-site.

3.2.2. Organizational Redundancy

“Conceptual slack” was also institutionalized in the management processes of the ODA with the Programme Assurance Framework based on a “three lines of defense-model”: the first line involved the ODA senior management team that was directly overseeing the projects; the second line comprised ODA’s program oversight that both supported and controlled the effectiveness of the first line; the third line in turn reviewed and assured this control framework through an audit process internal to the ODA and externally supported by the consultancy Ernst & Young [52]. Hence, the skepticism and prideful wariness were inscribed in the overall organizational make-up of the Olympic Games in order to avoid the pitfalls of trust.

The principle of organizational redundancy was also effectuated in the emblematic form of providing for buffers. Most prominently, the 9.3 billion GBP Public Sector Funding Package included a contingency fund of 2.75 billion GBP [40]. In the course of the financial crisis in 2008, for instance, the private developer of the Olympic Village was denied bank loans for this project. The ODA, however, took the development project into public ownership and renegotiated the contract with the developer who continued to act on a commission base (EL1). This rather radical step remained an exception though. The contingency fund was broken down for all 120 projects and the conditions of use were specified in every single contract by clearly distinguishing risks that had to be covered by the contractor and those for which the contingency could be used (CC1).

Buffers were also crucial in the scheduling of the program. Given the tight coupling of 120 highly interdependent projects as well as the strict schedule and the spatially constricted construction site, delays in one small job could ripple through the entire program (PL3, PL2). In order to cope with this risk, integration management had to “re-sequence the succession of projects” (PL3) according to the calculations of risk assessment by building time buffers into the schedule and paying attention to particularly critical tasks. Partially this re-sequencing simply implied to commence projects earlier than actually planned in order to create buffers for unexpected events (PL3; PRL2); partially it entailed to “overmanage” (PL1) problems for a certain time, that is, to concentrate resources on a sensitive issue until it was resolved (PL2).

3.2.3. Relational Redundancy

The overarching goal of adaptability also imposes specific requirements on the relational structures of organizations ([17], p. 28). Above all, adaptability is enhanced by informal relational structures that in crisis situations are able to function outside the formal hierarchy and “allow for rapid pooling of cognitive knowledge to handle events that were impossible to anticipate” ([55], p. 47). Whereas formal

relations are governed by the bureaucratic authority of *fiat*, informal relations depend on trust that “enlarges the pool of inputs before actions occur” ([59], p. 117). Weick *et al.* ([55], p. 47) describe such relational structures as “epistemic networks” that unfold *ad hoc* “when events get outside of normal operational boundaries [...] and dissolve when normalcy returns”, then continuing to exist in a “latent” status.

The existence of trust among the players within the Olympics construction program was in part produced by the open and collaborative “no blame” culture. In addition, trust was systematically enacted by organizational structures that distributed and decentralized responsibilities: “The power was not all held at the top. We all had very good delegation rights. Which meant we could keep things going very quickly. We worked very closely as a team very openly so we were really honest with each other, which was great” (PRL3).

The management also tried to leverage robust networks that had been established and proved reliable before the Olympic Games. In the early stages, for example, trustful relations that had been established during previous projects, above all on the Greenwich peninsula (PRL3, CC1), have been factored in the selection of consultancy firms for design and preparatory projects. The preference for already tried and tested relations, in fact, shaped the practice of employing contractors throughout the entire value chain. Even though this practice conflicted with EU procurement rules, the “relationship argument” strongly impinged upon the selection of contractors [19].

The entire enterprise, of course, could not be performed by relying exclusively on already proven relations. To forge new informal relations and to build rapport systematic opportunities for face-to-face encounters had to be provided for ([59], p. 117). On the program level, for instance, the co-location of different players in the project, including the LOCOG that liaised with the IOC and the sports associations, facilitated the process of optioneering in all phases of the program. During the design and planning phase, for instance, the ODA stroke a deal with the ExCeL Exhibition and Convention Centre located in the Docklands to relocate some sports activities there, in turn subsidizing the necessary extension of the ExCeL premises. This bargain was only feasible because LOCOG managed to easily adapt the operational planning for the Olympic Games and to negotiate the change with the affected sports associations (PRL3).

On the level of individual projects, co-location went beyond the boundaries of the organizational core and included contractors and consultancy firms as soon as the work on site had started. Joint offices for project teams were established either in the Olympic Park or in close vicinity. In the case of the preparatory projects, even the responsible regulatory authority, the Environmental Agency, co-located on site (EC2). The main purpose of co-location here was “to make sure that we could make quick decisions because there are inevitably things that change when you are on site” (PL1). Management, hence, deliberately adhered to the principle of co-location to enhance the project ecology’s preparedness to inescapable disturbances within such a huge and complex program⁹.

⁹ The principle of co-location was only suspended when a separate location helped to underpin the institutional autonomy of an authorizing agency (like in the case of the Planning Decision Team) or the importance of the legacy goal (as in the case of the OPLC/LLDC).

The various dimensions of redundancy inscribed in the formal structures and enacted in informal practices provided the cognitive, organizational and relational preconditions for dealing with contingencies. The longer-term impacts of redundancy, however, were not limited to enhancing the passive responsiveness of the project ecology to external shocks. Rather the temporal and spatial overlaps, the shifting boundaries around projects and networks and distributed authority afforded a permanent reinterpretation of information and the generation of new knowledge [60]. Redundancy, in this sense, was generative. It increased the variance of potentially available courses of action ([61], p. 26ff), and created “an organizational space open to the perpetual redefinition of what might constitute an option” ([62], p. 1935).

3.3. Loose Coupling: Synergies through Separateness?

Mega-events are complex systems, and the managing organizations have to match the systems' complexity in their own organizational set-up in order to cope with it [59]. Loose coupling provides an organizational answer to the demands of this law of “requisite variety” [63]. A system is loosely coupled if its elements share few variables or if common variables are weak relative to other factors influencing the elements [64]. Loose coupling in organizational terms implies that the various organizational units are relatively independent and can adjust to changing circumstances in different ways and at varying rates [60].

3.3.1. Distributed and Shifting Control

The responsibility for the London Games lay not with a single organizational body. On the level of macro-governance, this reflected the classic division of labor for Olympic Games [65]. On the one hand, the ODA was in charge of delivering the stage for the event, while London and UK authorities provided the funding for this task and oversaw its accomplishment. On the other hand, the LOCOG held the responsibility for the actual staging.

However, even within the construction program for the stage itself the ODA, a 300 staff public body, did not bear the sole responsibility, but was involved in a complex division of labor with CLM, the private sector delivery partner. CLM employed up to 600 staff at peak time, and during the entire venture approximately 2000 individuals had worked with CLM for shorter or longer periods of time (PRL2). This division of labor between ODA and CLM manifested the separation between an “upwards orientation” to government, stakeholders and the public sphere in general and a “downwards orientation” to delivery through the ecology of contractors that were freed from public representation and accounting ([19], p. 8). Moreover, this distribution of tasks allowed exploiting the flexibility of a private sector firm backed by three major founding companies (and three further strategic partners) that could more easily adapt to the fluctuating demands for labor than a public agency (PRL2).

Resonating with a paradigmatic feature of a heterarchy, the project ecology was not controlled by a single center, but control and responsibilities was distributed and shifted over time ([21], p. 1120). The entire program entailed a sequence of responsibilities shouldered by different bodies: ODA was in charge of venues and infrastructures, LOCOG was responsible for the Games, and OPLC/LLDC for its legacy. Although all three organizations were simultaneously dealing with the same object, the Olympic Park, both the site for the Games and for post-Games urban development, the prime

responsibility for park operations migrated: from ODA to LOCOG seven months before the Games, and from LOCOG to the LLDC three months after the end of the Paralympics (ST1, LM1).

3.3.2. “Loose-Tight Approach”

The complex interdependencies within the construction program required rigor in terms of conforming to the reporting rules and meeting deadlines and quality targets. Within this framework of deadlines and targets, however, the individual project teams were largely independent in how to achieve the overall goal. Moreover, program management responded highly flexible when major changes in single projects occurred. This “loose-tight approach” ([19], p. 6) was coordinated both on the program level through a rigorous temporal timeframe and on the ground level by means of a thorough integration management that particularly focused on the interfaces between different projects (PL3, PL2).

3.3.3. Identity and Separateness

The loose coupling on the project level not only enhanced responsiveness and flexibility on the operational level. The conscious renunciation of a standard approach to implement tight integration in the entire project ecology preserved the identities, cultures and organizational routines of the various involved companies and their management, at least to some extent. Loose coupling facilitated the coexistence of a diverse set of practices and perspectives that had been developed in a range of different project, corporate and industrial contexts before the Olympic Games. Loose coupling thus allowed leveraging experience and learning sources from “outside” ([19], p. 12). Specific features of the program could even be attributed to key individuals and their previous career, e.g.:

- the culture of collaboration to the CEO of ODA, David Higgins;
- the proactive optioneering to Mark Reynolds (MACE);
- the health and safety standards to Ian Galloway, the CLM program director, drawing on his experience in the oil and gas business of Bechtel;
- the rigorous program assurance to Richard Rook (Laing O’Rourke) [19].

Loose coupling, taken together, enhanced the responsiveness of the project ecology in at least three ways ([18], p. 538). First, the loosely coupled ecology yielded many independent sensing elements, and therefore “knew” its environment better. Loose coupling, second, reduced the risk of cumulative mistakes reinforced by positive feedback-loops through decentralized learning [66] and facilitated the abandonment of practices and rules that have become dysfunctional under new circumstances [67]. Third, loose coupling implied a degree of “compartmentalization” that preserved the identity and separateness of the companies and organizations that were involved in the enterprise. Cultures, routines and practices, phrased differently, that would have been streamlined and homogenized in a tightly coupled system could contribute to the overall pool of available problem perceptions and solutions. The pool, crucially, not only increased in terms of size but also in terms of variety which, in turn, enhanced the likelihood of novel “mutations” of practices and perceptions [61]. The critical value of loose coupling, again, resided in its generative capacities.

4. When Solutions Turn to Problems: The Risks of Heterarchies

The intention of this paper, however, is not to praise heterarchy as a new master-paradigm offering nothing short of a universally applicable blueprint for coping with all sorts of contingencies, disruptions and shocks. Heterarchy, as we sought to substantiate, enhances adaptability to unforeseen challenges, but it is not an organizational recipe for absolute immunity against internal and external disturbances. The definition of heterarchies as complex systems with multiple, tangled and shifting hierarchies ([21], p. 1120) elucidates its ever-changing and evolving nature. In fact, this very nature makes for the adaptability of heterarchies. Yet, at the same time these key features also incur costs and risk [17].

Tolerance of *ambiguity*, to start with, affords a broader set of assumptions and sensitizes to a greater variety of options ([55], p. 42). The generation and preservation of different perspectives adds to the adaptability of the project ecology, at the same time, however, ambiguity can undermine its strategic action capacity. To make a decision literally means to cut through, and once the decision has been made, rival perspectives have to be put in parenthesis, at least temporarily ([17], p. 40). What is more, ambiguous demands run the risk of undermining accountability. As “multiple values” can be played off against each other, ambiguity tends to create incentives for opportunistic behavior [68]. By assigning the responsibilities for short-term (the event) and long-term (the legacy) objectives to different organizations, the temptation to externalize the costs of the own activities to other organizations arises. In London, for example, the massive public spending prior to the Olympic Games through the ODA had to be partly recovered by a different organization, the LLDC, charged with generating as much revenue as possible from selling the land on the Olympic site (LM1).

Regarding *redundancy* the major challenge consists in calculating an “optimum” of additional just-in case resources. A simple “the more, the better” does not work since an excess of redundancies might cause internal disturbances of their own. Calculation of an “optimal” amount of redundancy is further compounded by the fact that the costs of providing just-in-case resources might be calculated exactly while their opportunity costs remain unclear [17]. In any case, redundancies cost. In the London case, for example, the financial buffer of the contingency fund alone added up to 2.75 billion GBP (PL5). Also, the elaborate and complex program management costs amounted to 10 per cent of the total management costs, which is twice the level generally calculated ([19], p. 8). Critical voices consider therefore the public-private make-up of the program simply as an attempt of creating profit opportunities for private companies [13].

In the case of cognitive redundancies the “built-in skepticism” can turn into an excessive preoccupation with potential disturbances. Headlines like “more troops (in London) than at war in Afghanistan” and “£59,000 of public money to secure each competitor” [69] alluded to an apparent overemphasis on security, and not only created the impression of a “lockdown London” ([69], pp. 446–47; [70]), but also implied a significant cost increase.

The provision of organizational redundancies poses a further challenge: buffer capacities and extra abilities tend to degenerate during periods in which they are not employed and lie idle [17]. In the London case, the close interplay between temporary project organizations and the sponsoring parent firms mitigated this dilemma. Capabilities temporarily not needed, for instance, could be employed in other divisions of the CLM parent firms (PRL2) and later be reemployed at the Olympic Games in

case needed. Another risk of organizational redundancies is “social shirking” ([50], p. 235): the awareness of redundancies can encourage individual organizational units not to attend to problems assuming that some other units will eventually deal with them. In other words, the anticipation of multiple checks and balances can instigate collective irresponsibility. Provisions for organizational adaptability hence, paradoxically, can undermine it.

Very much like redundancy, *loose coupling* provides benefits—at extra costs. The multi-layered organizational fabric of a loosely coupled project ecology multiplies the number of interfaces and thus escalates transaction costs [17]. Relations must be regulated through complex contracts that specify the conditions, for example for risk ownership and performance assessment, in detail. Also, the control of contract fulfillment is a costly undertaking that could be performed more easily in a single, tightly integrated organizational body. Moreover, loose coupling can hamper cross-organizational learning since knowledge might be lost in the transfer across multiple interfaces and through weak ties. In the London case, this learning challenge is clearly evident in the process of shifting responsibilities for Olympic Park operations. The handover from one organization to another constituted a complex endeavor, including working side by side over a period of several months as well as mutual seconding of staff in order to transfer embodied knowledge as completely as possible across organizational interfaces (ST1).

Finally, compartmentalization in loosely coupled ecologies induces additional risks. Extensive compartmentalization might compromise systemic perspectives on the entire project ecology. Loose coupling could confine risk assessment, for example, to single organizational units and thereby fail to reveal the potentially systemic consequences of a single local incident. In addition, compartmentalization is prone to aggravate loyalty conflicts emblematic for complex project ecologies [71]. In the perspective of individual professionals, the Olympic Games episode is an important stepping stone within their careers. This ambition of individual advancement tends to create loyalty conflicts with the general objectives of the overall venture. For the pre-event period, the convergence of individual and project objectives are likely since career perspectives of every project participant is tied to the success of the Olympic Games [19]. When it comes to post-event times, however, professionals intend to capitalize on the overall success of the event. However, rather than remaining loyal to the legacy agenda of the Olympic Games, and engaging in the tiresome process of *local* regeneration of a deprived area, professionals seek to leverage the success of the event for a career in *national* or *global* public institutions and companies.

5. Conclusions: From Organizational to Urban Adaptability?

This paper started from the counter-intuitive assumption of a structural analogy between mega-events and large-scale disasters. Both imply forceful interruptions of everyday routines, and both involve imperatives for imminent action. Similar to the immovable deadline of an opening ceremony in front of a global audience, an imminent natural disaster triggers a complex set of preparations and precautions to cope with the inescapable forthcoming shock. In the case of mega-events, of course, this shock is self-induced. In fact, cities deliberately compete to host a mega-event. However, once selected, they are locked in a fight against the unstoppable “countdown-time” [72].

The action-generating capacity of mega-events is a key motivation of cities (and nations) for this self-inflicted shock therapy when they decide to bid for hosting Olympic Games, EXPOs, Cultural Capital of Europe and other prestigious spectacles. This “self-doping” ([73], p. 21) is a paradoxical move: Cities deliberately decide to relinquish autonomy to an external powerful actor (like the IOC, for example) in order to regain strategic-acting capacity to reach wide-ranging urban goals. The self-induced “state of emergency” is used to overcome the manifold restrictions of everyday administrative procedures and routinized political processes.

In the face of the daunting challenges of hosting a mega-event, cities traditionally have resorted to *hierarchical* approaches to assure a tight grip on involved agencies and stakeholders. The chief imperative of *adapting* to these daunting circumstances in a hierarchical fashion frequently implied a neglect of the enormous complexity of a mega-event like the Olympic Games ([12], p. 1991). By ignoring that in a complex system small incidents can turn into major disasters [74], the ostensible security and predictability of hierarchy, paradoxically, increased the vulnerability of the entire venture.

In a deliberate attempt to learn from the past record of cost escalations, abandoned or oversized venues and infrastructures and failed legacy regeneration schemes, the project ecology in charge of the London Games was geared towards *adaptability* to cope with unforeseeably changing circumstances. This overarching goal did not imply to discard hierarchy altogether. Rather, the project ecology was furnished as a *heterarchy* with multiple, tangled and shifting hierarchies [20]. Rather than suppressed, the complexity of the venture was appreciated.

Critically, the London project ecology pursued a learning strategy that sought to draw lessons from the mistakes made elsewhere, be it in previous host cities, in other large construction projects or in earlier urban regeneration schemes. This learning strategy represented the *cognitive dimension* of adaptability. Underpinned by a collective “acceptance that things can go wrong” (PRL4), learning fostered “mindfulness” that is an “enriched awareness [...] that facilitates the construction, discovery, and correction of unexpected events capable of escalation” ([55], p. 37). Mindfulness qualifies the appropriateness of strict hierarchy and foregrounds the probability of necessary deviations from plan. By nurturing skepticism and reflexivity, mindfulness affords an antidote to the “optimism bias” that, according to Flyvbjerg *et al.* [3], lies at the heart of many mega-project failures.

“Learning from the failures of others” is a central strategy of “effective high reliability organizations” ([55], p. 54) since in nuclear power production, space travel and air traffic control trial-and-error-learning for obvious reasons is not an option. The structural analogy between events and disasters, therefore, is also reflected on the organizational level: The London Olympics project ecology embodied a general attitude that was strongly reminiscent of the culture of organizations whose everyday business is avoiding disastrous events. This attitude directed the attention of all those involved to acknowledge the systemic vulnerability of an exceptional and complex global event.

Mindfulness and preparedness to changing circumstances, however, only can be actualized with resources and capacities that allow to implement responses and to generate alternative courses of action. Here, the *structural dimension* of adaptability comes into effect. Options arise out of multiple evaluative principles (ambiguity), additional resources and multiple inter-linkages (redundancy), and compartmentalization and de-centralized responsibilities (loose coupling). These heterarchic attributes precluded that the London Olympics project ecology became unconditionally locked in the countdown towards the event, and was able to widen the corridor for alternative actions during this countdown.

Tolerance of ambiguity, redundancy and loose coupling added to the “organizational reflexivity” by enhancing, as Stark ([68], pp. 1021–22) puts it, “the possibilities for cross-fertilization inside and across organizations where multiply operative legitimating principles collide”.

The heterarchic elements, unquestionably, not only added to adaptability, but also to the total bill of the venture in a quite significant fashion. Can this bill be justified with the eventual impacts of the expected (and promised) action-generation capacity of the mega-event? Does the organizational adaptability of the project ecology translate into urban adaptability? Put briefly: Has the self-doping worked?

These are daunting questions, of course, particularly since the effects on Greater London will only materialize in a longer term. However, from the evidence presented here, two interconnected mechanisms of transferring adaptability into the wider urban fabric appear feasible: the reputation of a venture that is perceived as successful, and the post-Olympic Games trajectories of the involved individuals. Both mechanisms will work rather selectively and most likely will have an impact on three levels.

First, the obvious success of organizing a most complex mega-event by drawing lessons from previous instances and vigilantly attending to risks and contingencies is the success of a new, more skeptical and less euphoric style of staging an event. It could lay the foundations for a new and more robust “London model” [13] of realizing mega-projects and mega-events that will inform future undertakings of this kind in London, but presumably will also be circulated across the nation and the globe. One group of players will definitely receive the lion’s share of the symbolic profit: the global consultancies which actively contributed to the London Games and which now act as global carriers of “shockproof” Olympic Games [75].

Second, the career-boost through the involvement in a successful mega-event in the London case is definitely true for the senior management. They almost without exception have landed prominent positions in project management consultancies, construction companies and public sector institutions. This career lift might affect the adaptability of the urban system by reshuffling the elite structure, “giving newcomers access to relational spaces already institutionalized” ([76], p. 1138). In the case of London, as national capital, this rejuvenation of relational systems particularly affected institutions and organizations of a national range and less the locally oriented growth coalitions. Moreover, the new management elite may carry key ideas of adaptability, and particularly its cognitive dimension, onto their new jobs ([19], p. 13). The career paths of management members, then, might function as channels for the diffusion of a more mindful management style.

Third, the upward momentum yielded through the symbolic profit of the Olympic Games is particularly reflected on a national and even global scale. Local borough administrations and other locally oriented organizations, it seems, hardly benefitted from the learning dynamics triggered in the run-up period of the event. The boroughs were involved in the planning and organization of the event, but in a rather reactive and corrective position. Moreover, there was an irreversible brain drain from the boroughs to the Olympic Games. Hence, there is some reason to believe that local organizations were rather weakened than strengthened through the success of the Olympic Games. This is all the more valid as a part of the costs for the Olympic Games are now to be recovered by the revenues from selling the land in the Olympic Park.

The London Olympics were originally conceived as a regeneration project for the eastern part of the city. The local legacy was not only the essential element of political objectives, but also institutionalized as an independent component within the project ecology. Nonetheless, it is this local legacy that seems to bear the costs of the Olympic Games' success as their symbolic profit is largely exploited on a national and global scale.

Author Contributions

The paper was written jointly by both authors.

Appendix

Interview Code Key

EL	Executive level core organizations
PRL	Programme level core organizations
PL	Project level core organizations
LM	Legacy management
ST	Staging organization
EC	Engineering Contractor
CC	Construction Contractor
BS	Borough stakeholder
GS	Government stakeholder

Conflicts of Interests

The authors declare no conflict of interest.

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