

Maximal Surface Tension: Jordan Geiger Very Large Organizations and Their Apotheosis in Songdo

Today the term "surface tension" implies more than the sort of minimal membranes, maximal volumes, and material efficiencies that might have been found in soap bubbles past.¹ Instead, surface tension is increasingly about the collaborative forces of excess that result from architectural and landscape conditions with an unprecedented mixture of performance criteria: tectonic, social, financial, legal, and informatic. Now, surfaces of all kinds are planes of immanence onto which new physical and non-physical orders are inscribed; and they range from building skins to the earth beneath our feet, from turbulent international waters, up through the hazy plenum, and into outer space. Surface tension still mediates air and water, but in the context of new urban developments like Songdo, Korea, it also acts on regional and planetary scales under the impact of things like business flight times and undersea cables.

Such contemporary surface tensions are the sites of Very Large Organizations (VLOS), a term I would like to propose to describe contemporary institutional assemblages, at this moment when the built environments of work, public assembly, agriculture, incarceration, trade, travel, education, and even death are increasingly part of global financial and communications networks. The "organization" of a VLO is both spatial and administrative: for example, border control stations and GPSenabled tracking devices for ex-convicts adhere to strict spatial and even temporal orders, but these are negotiated and governed by private and public stakeholders, newly implemented technologies, cross-referenced databases, and erratic legal

facing page: Regional map locating Songdo relative to its nearest land access to subsea fibre optic cable. The dot grid indicates a technically feasible possibility to deploy a vast matrix of small buoys to optically boost high speed signal over water, at 30 km intervals. constructs. For this reason, a VLO appears by induction rather than deduction, and can be recognized by its new traits rather than its essence. Border controls have long existed, for example, but networked, RFID-enabled fast passage as a VLO, has not. Its planning and infrastructure demand logistics, capital, and population magnitudes that can all accommodate volatile shifts in spatial and computational stability. Adaptability is at the crux of dealing with diverse users or publics and unprecedented technical, cultural, social, and ecological challenges, and it signals the means by which control can give way to engagement and participation.

It is important that we also recognize what VLOS are not. They are distinct from both the built structures of globalization and its immaterial infrastructure. Instead, they reflect the intersection of numerous physical and nonphysical ordersat minimum, spatial and administrative, but frequently also legal and technological. They take such diverse forms as to defy easy recognition: space programs, big agriculture, border controls, electromagnetic field regulations—all these are Very Large Organizations and they each manifest novel intersections of built environments and computing technologies. VLOs also bridge extra-planetary and molecular scales, since they so often conjoin the designs of things like a human-computer interaction with the planning of a satellite network. For many reasons, work on VLOS is well suited to the generalist professional skills of architects, even as they demand the collaboration of many other fields of knowledge such as organization theory (sociology), game theory (economics), and diverse areas of computer science.

AEROTROPOLIS THEN... AQUAPOLIS NOW

Along the shifting edges of the seas that bind Songdo, surface tension provides a frail mix of both climatic and fiduciary shelter.² The city is built on land-fill and a complex tangle of financial arrangements: a 70% private stake from Gale International developers, Morgan Stanley underwriting, Korean government tax



World map shows relative concentration of distribution points where subsea fibre-optic cable reportedly touches land (or, at times, mid-ocean air). Inset shows the averaging of distances between points around the Korean peninsula.

incentives, a remaining stake from Posco, and constant development and testing of new embedded technologies from Cisco. It is tactically sited as an "aerotropolis"³ (between Incheon and Seoul, and more generally between Seoul, Hong Kong, Beijing, Tokyo, and Shanghai), but floats within the Incheon Free-Trade Zone and near the line of international waters.Indeed, for all its vaunted "U-city" planning, the tensions worth our consideration are found less on its land than in its surrounding waters.⁴ Its location on land corresponds very well to human paths of air traffic, but the city is hundreds of miles from the nearest of thousands of global locations where the Internet's undersea fibre-optic cables break water at land. Proximity to

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such locations can afford a thousandths of a second advantage to high-speed market trading.⁵ This is why the waters are so critical: they separate or connect the city to its lifeblood. We might say that this city was conceived as a strategic aerotropolis, but its economic function requires it to work as an *aquapolis*.

Within high-speed trading, currency is better described as "arbitrage,"⁶ the perpetual and simultaneous buying and selling of securities, currencies, or commodities in different markets or in derivative forms.Such activity puts the "current" in currency as never before, as millions of dollars can hinge on a miniscule, fraction-of-a-second price change in an asset. And yet the inadequacy of Songdo's location raises questions—after all, what point on a map could ever perfectly and enduringly maintain an optimal position for the pre-existing yet shifting paths of both human and fibre-optic traffic?

This geography of "speed-distance" requires us to revisit and refresh Paul Virilio's original notion of the term. In his prophetic 1983 essay "The Overexposed City," Virilio identifies speed-distance in terms of new time-space irruptions like a "perspective devoid of horizon" and the "electronic light of another day," all at the behest of the fax machine and CNN. Importantly for him, these are also about the disintegrating boundaries of the workday, the transfer of technologies between the spaces and protocols of incarceration and travel, and the movement of a city's boundaries to match the nation's borders at the airport.⁷ As Virilio names each of these simultaneously to be physical sites, legal constructs, technological augmentations, and protocols, I would suggest that we should also recognize their emergence as constitutive of vLos. When we then turn our attention to the case of Songdo, we recognize the emergence of the VLO itself as larger and more encompassing than ever before. The Very Large Organization is no longer just airport, but the aerotropolis, the city itself-this decade's VLO par excellence. In this largest and most foundational case so far, it is not merely the city's services that are marked by the collection and remote, global handling of information. These contributing servicesdown to the vacuum-tube systems for the collection of waste, which boast the ability to scan recyclables from home chutes and credit deposits back to their owner's bank account—are all coor dinated parts of a still-larger organization.⁸

Any who doubt that this VLO is repeatable need only look at the brochure of info and sponsors for the recent Airport Cities World Conference and Exhibition in Denver, Colorado.9 Yet, speeddistance in the context of the aerotropolis comes with several potential eventualities. As the Very Large Organization takes on entire urban regions, with all their force relations, then it must contend with the unknown as well as the known volatility of such relations.¹⁰ These include things like seismic and climatic events, which are a part of planning, and yet rife with un*known* unknowns that can further complicate the geographic and economic situation of the city.¹¹ Further, such events have ripple effects on backup plans for high-speed trading. Where fibre-optic cable is assumed to be our best technology for global data transfer, it sometimes loops around entire ocean-floor mountain ranges and relies on "cableless" connections for redundancy if the cables fail.¹² And these connections are much more liable to fail as they try to penetrate more nebulous things like smog and cloud cover.¹³

The greatest eventuality is the untenable yet now inevitable question of what is to come: what happens when one of the foundations of such structures comes unmoored and crumbles? If Songdo marks the appearance of the city as VLO, then that appearance indicates more than just the most intensive coordination of economic, material, and technological constructs on a surface between air traffic and subsea cable networks. It is also the most precarious—surface tension at its extreme. The most unpredictable variable in its formulation has in the past few years appeared to be its economic, rather than technological, make-up, symptoms of which can be found in the faltering pace of the city's completion and the many worldwide challenges to global capital found in the Occupy demonstrations, which even came to nearby Seoul.¹⁴ Were it to be replaced in

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Songdo's formula, what could succeed capitalism itself as a base for relations between the built environment and humancomputer interaction at this most extreme of large scales?¹⁵ What happens after the proverbial and literal bubbles burst? On the other side of excess, we can look forward to many discoveries beneath the surface. O

Images courtesy of Jordan Geiger. Graphics and underlying research by William Sedig, Situated Technologies Research Group, Department of Architecture, University at Buffalo.

ENDNOTES

- As typified by the work done at Frei Otto's Institute for Lightweight Structures at the University of Stuttgart, surface tension most famously brought lessons from the study of soap bubbles to the development of vast tensile and thin membrane structures.
- 2 The city and its creation story have been subject of many studies. Two particularly interesting takes are: Germaine Halegoua, "The Policy and Export of Ubiquitous Place: Investigating South Korean U-Cities," in From Social Butterfly to Engaged Citizen: Urban Informatics, Social Media, Ubiquitous Computing, and Mobile Technology to Support Citizen Engagement, eds. Marcus Foth et al. (Cambridge, Mass.: MIT Press, 2011), and Saskia Sassen, "Talking Back to Your Intelligent City," Voices on Society, http://voices.mckinseyonsociety.com/talking-back-to-your-intelligent-city.
- 3 The term has been elaborated, or even branded, in John D. Kasarda and Greg Lindsay, *Aerotropolis: The Way We'll Live Next* (New York: Farrar, Straus and Giroux, 2011), 5. "(I)n the era of globalization, we choose cities drawing closer together themselves, linked by fiber-optic cables and jet aircraft."
- 4 Short for "ubiquitous city," U-city is a term that dates back to 2005 to describe the planning of cities fully imbued computing technologies to handle infrastructures and services from traffic circulation to parking, crime prevention, waste processing, and more.
- 5 The physicality of the Internet was recently given an in-depth look in Andrew Blum's *Tubes: A Journey to the Center of the Internet* (New York: Ecco, 2012).
- 6 From the Oxford English Dictionary: "traffic in Stocks, so as to take advantage of the difference of price at which the same stock may be quoted at the same time in the exchange markets of distant places." See also John Maynard Keynes, A Tract on Monetary Reform (London: Macmillan and Co., 1923), 115–139.

- 7 See Paul Virilio, "The Overexposed City," in *The Lost Dimension* (New York: Semiotext(e), 1991).
- 8 Pamela Licalzi O'Connell, "Korea's High-Tech Utopia, Where Everything Is Observed," *The New York Times*, October 5, 2005, http://www.nytimes. com/2005/10/05/technology/techspecial/050connell.html.
- 9 Available at http://www.aerotropolis.com/files/ace_2012.pdf.
- 10 As Ulrich Beck put it, "Risks exist in a permanent state of virtuality." Ulrich Beck, "Risk Society's 'Cosmopolitan Moment," lecture at Harvard University, November 12, 2008.
- Here we can look at the literature and the vast investment in research on geomagnetic storms. For example, "Geomagnetic Storms," from CENTRA Technology Inc., on behalf of the Office of Risk Management and Analysis, United States Department of Homeland Security (2011) describes the "prospects for a future global shock caused by an extreme geomagnetic storm and its effect on critical infrastructure for electrical power and satelliteenabled communications, navigation, and monitoring" (http://www.oecd. org/sti/futures/globalprospects/46891645.pdf).
- 12 Blum uncovers interesting air-ocean convergences and possible repercussions, as undersea cables trace suboceanic topographies and loop around sometimes vast, seismically unstable plates. Blum, *Tubes*, 191–199.
- 13 J. Otero, P. Yalamanchili, and H-W Braun, "High Performance Wireless Networking and Weather," High Performance Wireless Research & Education Network, White Paper (2001), http://hpwren.ucsd.edu/info/images/weather.pdf.
- 14 See *The Huffington Post*, http://www.huffingtonpost.com/2011/10/26/ occupy-seoul_n_1033214.html.
- 15 In contrast to how it was presaged in Peter F. Drucker's 1993 book *Post-Capitalist Society*, we can today look to other post-capitalist visions such as gift economies and others. In this short text, I am by no means speculating on what economic or urban forms they might take, only that they may be soon requiring our invention.
- BIO Jordan Geiger is an architect and educator whose work crosses architecture and interaction design, considering implications of human-computer interaction for social and environmental issues. He lectures, exhibits, and publishes internationally on theoretical research and on his projects, ranging in scale and type from installation and gallery design to urban design and agricultural land-use proposals. Geiger has taught architecture, urban design, and advanced interdisciplinary studios and seminars at the Academy of Fine Arts in Vienna, at UC Berkeley, and the California College of the Arts in San Francisco, and is currently an Assistant Professor at the Center for Architecture and Situated Technologies (CAST) at the University at Buffalo.