

MASS EXODUS AND THE NEW MEGALOPOLIS

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Introduction and Context

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Speculating on the impact our transition into a post-planetary society may have on our home planet, our research looks into the future of existing cities and the emergence of new metropolitan hubs and regional and global networks. This is further expanded upon, and tied together, through our consideration of the implications each of these may have, and opportunities these present, for the potential futures of the surrounding landscape.

The (future) historical context, or narrative, from which our version of the future emerges is predicated by global sea level rise as a catalyst for the redistribution of the world's urban population. Historical development and migration, based on oceanic exploration and shipping, has left us with a legacy of increasingly obsolete port cities facing an ever increasing threat from catastrophic storms and rising tides. Proposals to mitigate this situation are mere temporary solutions.

Sea level rise directly or indirectly threatens the majority of the world's urban population and a percentage of the total population that will only increase over time. Long term projections of global sea level rise show the areas this population calls home permanently under water in the not so distant future. The eventual relocation of the majority of the world's population is inevitable.

Through our research, we anticipate that space ports will eventually (and concurrently with the aforementioned mass exodus) become the economic, political, and physical nuclei of new regional and global networks in our post-planetary society. Here we will see new metropolitan centers emerge, connected across vast regions by a new terrestrial transit and shipping infrastructure, and a complete restructuring of the physical, economic, and political landscape.

Dependent on certain reliable weather conditions and sky access, the optimized (i.e. maximum clear days sans precipitation for the greatest number of potential launch days) development of space ports is limited to specific (and rather narrow) bands of latitude encompassing what are (at present) predominantly remote and inhospitable territories. While this raises issues regarding the construction of mass infrastructure and sustainable megacities within this extreme and remote physical context, even greater challenges (or opportunities) come to light considering these locations in relation to present day

centers of economic and political power. Additionally, a limited number of spaceports will further consolidate the population and economic and political power into a limited number of regional networks.

Further, it is worth noting that, while it may be nearly impossible to predict what technology may be available to us in the future, it is safe to say that the technology required for interstellar or interplanetary trade, off-world colonization, and the like, can and will help solve many of our current environmental issues and improve the quality of life for both urban and rural citizens. Given the historical relationship between advancements in technology and government funded military and scientific research and exploration (consider DARPA, NASA, et al), we can only imagine what new technologies will come out of this second space race, especially when considering the amount of private funding we are seeing in the early stages. One day this technology will have profound implications for our daily lives.

We recognize that our research as presented here only skims the surface of the many social, cultural, political, economic, environmental, infrastructural, and architectural challenges and opportunities that will arise from this mass redistribution of population and power. That said however, and more importantly, we believe many of these opportunities will take 100 years or more to implement, preceded by decades or more of research, policy, and planning, and as such, serious foundations for this must be implemented within our lifetimes if we are to not only avoid catastrophe but seize the inherent opportunities of the situation.

The success or failure of our post-planetary society will be dependent on the technological, economic, and political context from which it is born. As we work to unravel the impact our transition into a post-planetary society may have on our home planet we hope to draw attention to the near future context, relationships, and dynamics involved and to the importance of global cooperation on successfully ushering our species into this potential future.

On the Future of Existing Cities

Brian Pickard

Rising sea levels, coupled with the direct and indirect effects of our transition into a post-planetary society, will have a profound impact on existing “higher ground” cities. Major issues involving increased density and potential overcrowding will arise due to mass population shifts and an ever increasing urban population. These issues will only be further complicated by the already antiquated building stock and infrastructure. While reuse may be more sustainable from a construction resource standpoint, the existing infrastructure is already unsustainable. We look to the future development of sufficient adaptive or retrofit technologies to resolve issues of an insufficient and aging building stock and inadequate infrastructural capacities and reliability if existing cities are to support exponential population increase.

That said however, this mass population shift presents many opportunities for the rebirth of dead or decaying urban centers. Cities such as Detroit may see a boom in population and the local economy. These cities could take on a new role, via economic focus or political role, in the newly developed regional networks.

Certain post-planetary scenarios, such as asteroid mining or off-planet resource extraction, will have greater repercussions for cities historically (physically or economically) tied to the extraction or refinement of earthly natural resources. Coupled with advancements in technology and an ultimate shift in resource dependency, a shift in material type, source, or refinement locations will forever change the local economies of these cities and potentially shift existing regional centers of economic power.

A complex combination of existing conditions (such as location, and political and economic systems) and a city's (assumed) place within the new megalopolis, regional networks, will effect various cities in differing ways and to varying degrees. Cities such as Pittsburgh, historically tied to steel manufacturing, may see (and necessitate) a complete economic shift, accompanied by direct and indirect political and social repercussions, as it takes on a completely new as yet unimaginable role and identity. However, Huston for example, while seeing a similar initial economic impact from the shift away from our our reliance on particular earthly resources, may in fact potentially see an economic boom in the long run – due in part to its proximity to the North Texas and New Mexico deserts (i.e. its closer relation / proximity to future space ports) and the potential this presents for Huston to shift its focus to the refinement and shipping of new, or at least new source, resources.

Still other cities, such as Dubai, an economic center fed through its connection to a resource based infrastructural network, may simply see a boom in population and economic and political power. Assuming opportunities are seized in its relationship to the new regional networks and economic markets, the city itself may be less effected, or at least less directly transformed, by our transition into a post-planetary society.

Further, the privatization of space exploration and travel, amidst all the positives it has to offer, presents yet another set of complex and troubling problems. Given the economic power and political influence anticipated to be centered around space ports in the not-so-distant future, populations are at risk of being at the mercy of private companies. The motives of these companies and the political system that (literally) surrounds them will shape both new metropolitan areas and adjacent existing cities, profoundly impacting the lives of the local populations. To some extent all populations face this risk, however certain populations, namely those lacking a strong pre-existing economy and political structure, are at risk (socially, economically, politically) more than others. We can see evidence of a precedent for this today with the involvement of Chinese companies in large development projects in North Africa, an area ideal for the location of future space ports.

While we can only begin to imagine what life in the future will be like in existing cities, there is no doubt that it will be dramatically (socially, culturally, economically, politically) different than life today. The

dominant influential factors on the potential futures of existing cities, at least on those that will survive sea level rise, will be their proximity to space ports and the new surrounding metropolitan areas, their position and role within regional networks, and, most importantly, their capacity to adapt and capitalize on the opportunities presented by the emerging economic and political structure.

The New Metropolis: The City in the Desert

Mateusz Rek

Until recently, spaceport development in the United States had been controlled exclusively by the Federal Government. In the 1990's several commercial spaceports were developed through a cooperative State-Federal system to support commercial orbital launches. Since then, spaceport development has continued to evolve. We are now seeing the development of commercially owned spaceports within the United States and around the world.

In the United States alone, we can see privately backed political and financial muscle hard at work on the development of spaceports in a number of states including New Mexico, Oklahoma, and Texas. Still other states, namely Florida, are busy trying to not be left behind in this new space race, busy seeking out new spaceport legislation.

In 2004, The Mojave Airport and Spaceport in Southern California became the site of the first privately funded spaceflight, SpaceShipOne. This is a prime example of a non-federal launch site leading the way within the modern space industry. One of the few private spaceports to facilitate a manned flight, the Mojave Airport and Spaceport has since evolved into one of the most important centers for spaceflight research and development.

Located on a barren stretch of desert in Las Cruces, New Mexico, Spaceport America on the other hand, the first "purpose-built commercial spaceport", is specifically constructed to facilitate space tourism. The 225 million dollar project has already attracted large corporations including Virgin Galactic and Up Aerospace.

The barren landscape associated with spaceports should not be overlooked when considering potential sites for the development of new megacities. In the United Arab Emirates for example, harsh climate, limited agricultural potential, and water scarcity have not been insurmountable obstacles to urban development. The UAE has experienced rapid growth since the discovery of oil. Economic development has driven a massive inward migration of expatriates who now comprise more than three quarters of the population.

Similarly, Masdar City, established by the government of Abu Dhabi to advance the development of renewable energy and clean-technology solutions for a life beyond oil, is an example of a newly (and

completely) fabricated city. Here, state-of-the-art technologies create a carbon neutral, net zero, community in the desert.

As the importance of space travel rises over time and with the development of off planet mining, Spaceports have great potential as centers for urban growth. Existing and future spaceports are potential breeding grounds for new megacities.

The motivation to place existing launch sites in desert landscapes has as much to do with isolation as it does with climate. Presently, spaceports are built as far away as possible from populated areas in order to extenuate risks should a catastrophic failure occur. We also see launch sites built close to large bodies of water, ensuring that debris is not shed over populated areas. Further, the massive scale of a spaceport site is necessary in order to reduce the risks to human lives or damage to adjacent launch pads in the event of an explosion.

Near future advancements in propulsion technology, aerodynamics, and avionics will lead to dramatic improvements in reliability and safety among both crafts and launch sites. Fear of catastrophic malfunctions will no longer be a reality. People will one day think of rocket ships, shuttles, x-planes, and the like similarly to the way we think of airplanes today.

As the proximity of urban development and spaceports becomes more conventional, we will see a physical, political, and economic shift away from existing cities to new spaceport-centric megacities. Spaceport Abu Dhabi for example, currently planned 20 miles outside of downtown Abu Dhabi could become the center of a new growing megacity, shifting the center of the regional network, engulfing the existing city or relegating it to a suburban role.

Within the context of the increasingly privatized space industry, it is highly unlikely that we will see the development of future spaceports solely for space exploration, not capitalizing on the potential for financial gain through space travel, resources, or shipping. A corporation such as Exxon funding a spaceport in a developing country in an attempt to make money from off-planet mining has profoundly different repercussions than say Virgin's space tourism port in the United States.

Finally, with off-planet mining of resources and rare metals, we can anticipate a decline in activity in existing sites tied to resource extraction. Many oil fields in the Middle East and coal mines in North America and Europe for example have existing (and massive) infrastructure that could be recycled or repurposed into infrastructure serving "new" cities at those locations.

Global Networks: The New Megalopolis and the Metacity

Berkay Guney

The existing concept of the inner city is dying with the introduction of the new megalopolis. The emergence of a new communications system and the 'cloud' is significantly changing the way cities are,

or will be, structured, and our lives within them. The speed of communication today blurs geopolitical boundaries, creating a globally connected, and a highly efficient human habitat.

The Mid-20th century saw major proposals which connect the world physically using highly standardized and mass produced tools of accessibility, transportation, and information technologies. Buckminster Fuller first introduced the idea of the ultra-high voltage electricity grid which is a planetary scale implementation of what we know today as the smart grid.

Looking at the development of cities of the past we see the reliance on access to water and trade routes and the impact of this on the potential for economic and political power. Phoenicians once traveled the Mediterranean Sea using trade winds as the only means of communication between port cities. The Galley was the tool for transferring information, culture, and progress from one port city to another. The ocean itself was the medium used to transfer and process information. While the emergence of the cloud suggests a new means of communication and information storage, the information that travels around and through this medium is not so different than the ocean the Phoenicians sailed around.

Cloud technology and the resulting geopolitics suggest a means of communication where port cities may maintain their geographic significance. The underwater cable network of today is in fact similar to what Fuller suggested in mid-20th century. The map developed by Telegeography shows the increasing density of cables under the ocean and how they plug into the land. Our daily digital interactions are delivered through invisible networks, saved on data servers located on the outer skirts of cities. The underwater cables cluster in port cities. 60 Hudson street in Manhattan for example, currently occupied by google, is the point where the majority of the communication cables coming from Europe are distributed to the rest of the United States.

With the power of the institutions taking control over the infrastructure, the geopolitical borders that remain are rather symbolic. Clustering megacities are more dependent on the private institutions than government. The identity of the city and people living in the city are abstract and constantly changing.

While the new megalopolis is built around a smart grid system that connects every house to another (literally) up on the cloud this speculates the condition where the outer city which sprawls spontaneously (not) becomes a part of this new network system. The internet as we know it and the concept of the data center is now reversed and dispersed in the city fabric, plugging into individual human habitats as storage spaces.

Within the context of rising seas and the future port cities, we see the power of the institution exceed the government; Resources, communications, and media create the new hierarchy of the future megalopolis.

In the case of existing cities this might significantly affect the low density areas dominated by transportation infrastructure, mainly being highways. The new megalopolis and the space hub as a core could be well attached to a part of the grid, controlling traffic and information flow.

As the institution becomes the state, the government remains symbolic. Currently institutionalized art, health and finance related organizations have the potential to be controlled by individuals. The common network space (i.e. Google) allows anyone to produce their own film, music etc. and get popularity without being tied to the organization. Third world countries which have less institutional power are subject to be dominated by the institutions that have control of the new cyber trade routes.

The megalopolis doesn't sprawl only on the surface of the earth, however. Sky access and wireless communications become essential parts of a new infrastructure. The city extends out (up) with the layers of orbit, suburbs become literal satellite municipalities. Wireless access to the ground, the new inner city (or ground city) is essential for successful and robust financial, political, and cultural networks.

The new means of communication defines a collective community above existing geopolitical boundaries. This new cyber country however defines a continuous and limitless city under the resolution of the private institution.

Assuming wireless transportation through cloud storage and 3d printing at the molecular level, the manufacturing of goods will eventually happen at a local scale - schematics shared and stored in the cloud. Resourcing and commuting however is yet another issue. The top-down port cities require natural resources and commuter routes that have to be shared among multiple entities.

As telecommunications institutions redefine and restructure geopolitics, the new physical infrastructure that feeds these institutional cities could be redefined and constructed by similar sub-institutions. Structuring the crucial infrastructure that extends from the new port cities to the ones that are less directly or indirectly altered by the interstellar space travel.

As a new infrastructural system emerges in the Western hemisphere, for example, it defines a new megalopolis expanding from North America into Mexico. This network may be predominantly structured around the transferring of natural resources, feeding new port cities, shifting existing centers of economic and political power. A new megalopolis expanding through several countries from North Africa to the Mediterranean and the Middle East suggests a similar complex multi-national infrastructural network.

A similar condition today is the telecommunications infrastructure shared by multiple political regions. (i.e. Foxconn, Fibreoptic backbone) The City of the Cloud which is monstrous in scale basically becomes the major necessary infrastructure to be resourced which is supplied through asteroid mining and off planet\interstellar interactions, the planetary scale physical networking carries mostly biological and natural resources.

"It presupposes redundant power grids, water supplies, high-volume, high-speed fiber-optic connectivity, and other advanced infrastructure. It presupposes cheap energy, as the cloud's vast exhaust violates even the most lax of environmental rules. While data in the cloud may

seem placeless and omnipresent, precisely for this reason, the infrastructure safeguarding its permanent availability is monstrous in size and scope.”

“According to 2012 research by the New York Times, the cloud uses about thirty billion watts of electricity worldwide, roughly equivalent to thirty nuclear power plants’ worth of output. About one quarter to one third of this energy is consumed by data centers in the United States.”

The metacity absorbs what Superstudio and Archizoom suggested as an interconnected limitless city, however it leaves its tectonic elements only as infrastructure and physical communication devices. The inhabitants of this new megalopolis is altered and changed; The Cloud Citizen has the multiple qualifications and communal interactions in the mega-city of the cloud. She is no longer tied to a geopolitical region, identity defined and absorbed by a network of institutions. Physical accessibility is no longer a limitation, identity and presence is distributed throughout the new clustered megalopolises. She is a pure substance of information, more than a person, “she” as a knowledge is what remains.

(Return) to the Landscape...

Brian Pickard

As a response to sea level rise prompts a global environmental revolution and advancements in technology and evolution in design improve the quality of urban life (along with the political and economic influences previously mentioned), we can anticipate a greatly consolidated population (again, fewer larger metropolitan areas and regional networks), a truly post-sprawl society. Among other things, this presents a great opportunity for rural and suburban areas, to be converted to agricultural production or allowed to return to nature.

Scientists anticipate climate change will have dramatic impacts on global crop yields and fertile land, and the problem is only going to get worse (even given advancements in technology as the demand for food continues to grow) – every opportunity must be seized to improve and increase our food production to assure our long term survival.

Allowing a significant portion of the built landscape to return to nature is equally important to our long term survival, fighting further global warming and health issues arising from increased air pollution. Assuming a new form of terrestrial transit and a further reaching more connected system, the existing interstate highway system will become obsolete. Local roads (or whatever the future equivalent of a road may be) will connect agricultural areas to transit hubs in smaller cities, which will move people and goods on to larger cities. The highway system, currently carving up the landscape can be removed –

reconnecting divided wildlife habitats, returning many local / micro-ecosystems to their natural state, further aiding in planetary ecological recovery. – Note that these things however will not be possible without the responsible adaptation of existing cities and development of new sustainable cities and regional networks.

That said however, as a greater percentage of the total population is consolidated into a smaller number of mega/metro areas, a smaller percentage of the population will remain “outside”... removed or disconnected from urban society, working in support of (via agricultural production) those “inside”... This minority population is at risk of being socially discriminated against, politically under-represented, and economically impoverished, (potentially leading to the emergence of a new global cast system?). Anticipating this demographic (which already exists to some extent today) and as these two fractions of society (the urban and the rural) grow even further apart, we must consider how this situation can be mediated or prevented as we move forward.

There is great potential for a post-sprawl, post-scarcity, truly global society and post-planetary economy, however we must address certain essential steps and relationships in this evolution in order to usher us into this next phase in human history while avoiding, or at least properly responding to, potential catastrophes. While there are a great number of dystopian scenarios that could play out at various scales, the fact remains that (if all goes well) the responsible adaptation and development of future cities and regional and global networks has the potential to be what saves our planet...