The Megaregional Process: What’s happening in the Texas Triangle and the rest of the world?

- Introduction to UTC/CM$^2$
- Megaregion concept and efforts in the US and abroad
- Megaregional process in the Texas Triangle
- Discussions
1. What is University Transportation Center (UTC)?

UTC program created by USDOT with authorization of federal Transportation Acts

UTC Mission and Objectives

• Research
• Education and Workforce Development
• Technology Transfer
UTC 2016 Competition (Announced Dec. 5, 2016)

FAST Act Total: $300+ billion; For UTC: $300 million
UTC Proposals: 212 applications, 32 awarded
MISSION

The consortium of Cooperative Mobility for Competitive Megaregions (CM2) aims to advance research, education, and technology transfer initiatives to improve the mobility of people and goods in urban and rural communities of megaregions.

LEARN MORE
CM² Proposed Activities

FAST ACT Priorities and Topic Areas selected

Priority 1: Improving mobility of people and goods;
Priority 2: Reducing congestion;
Priority 3: Promoting safety;
Priority 4: Improving the durability and extending the life of transportation infrastructure;
Priority 5: Preserving the environment; and
Priority 6: Preserving the existing transportation system.

CM² Selected Topic Areas

Topic Area 1: Regional planning and setting of transportation priorities

Topic Area 2: Increase access to opportunities that promote equity in connecting regions and communities, including urban and rural communities.

Topic Area 3: Innovations in multi-modal planning and modeling for high-growth regions
USDOT UTC (Tier-1): Cooperative Mobility for Competitive Megaregions (CM²)
CM² Admin Staff, GRAs, and Researchers

Ming Zhang, Ph.D., AICP
CM² Director
Professor, The University of Texas at Austin

Inessa Ach
CM² Assistant Director for Administration

Lisa Loftus-Otway
CM² Assistant Director for Research

Nicole McGrath
CM² Graduate Research Assistant for Administration
2. What are megaregions? Where are they? Why?
Re-Discovery of Jean Gottmann’s Megalopolis in the 21st Century

Jean Gottmann (1961):
“The cradle of a new order in the organization of inhabited space.”

RPA/Penn 2004 Study:
70~80% of US population, employment, and wealth concentrate in the 11 agglomerations of networked metropolitan areas and their integrated hinterland
Strong Interests in the United States ...

- Trend of continued urbanization/agglomeration
- New geographic unit for competition in economic globalization
- Concerns over current and future challenges associated with the agglomeration
- Strategic preparation, especially in infrastructure investments
The European Practice

“European Spatial Development Perspective”
-- European Commission, 1999

Key Concepts:
• Territorial cohesion
• Balanced sustainable spatial development
The UK Concept and Practice

Peter Hall, 1966

*World City* of polycentric regions
e.g., The Randstad and the Rhine-Ruhr region

Peter Hall and Kathy Pain 2005, 2006

Mega-City Region

Fig. 5.1 South East England Mega-City Region: Constituent FURs. Source: Hall/Green (2005: 4)
The Asian/China Concept and Practice

City-cluster regions
- Accentuated national spatial/urbanization strategy
- HSR investments to support city-cluster regions
World Cases

[Diagram showing various regions with different population densities and areas, labeled with countries and regions such as China, North West Europe, and the US, with population markers indicating different population sizes.]
3. The Texas Triangle

The Texas Triangle: A Geometric Coincidence or an Integrated Megaregion?

Ming Zhang, Ph.D.
1 University Station, B7500
School of Architecture
University of Texas at Austin
Austin, TX 78712
Tel. 512-471-40139
zhangm@mail.utexas.edu

Frederick Steiner, Ph.D.
1 University Station, B7500
School of Architecture
University of Texas at Austin
Austin, TX 78712
Tel. 512-471-4119
fsteiner@austin.utexas.edu

Kent Butler, Ph.D.
1 University Station, B7500
School of Architecture
University of Texas at Austin
Austin, TX 78712
Tel. 512-727-6644
kentsbutler@hotmail.com

ABSTRACT

The Texas Triangle is formed by the metropolitan areas of Houston, Austin/San Antonio, and Dallas/Fort Worth. There have been debates on whether it is simply a geometric coincidence or an integrated megaregion. This paper presents a study on the economic complementarities and spatial interconnections of the Triangle metros. The study verifies empirically the existence of the Triangle megaregion. Theoretical and methodological issues on studying the megaregion are also explored.

To accommodate the anticipated vast growth in such a vast area, demands for employment, education, health care, and other services. A third challenge is mobility. National mobility studies show that all of the metro areas in the Texas Triangle have been among the nation's top congested regions in the past two decades [5]. The region's transportation infrastructure needs major enhancement in order to keep people and goods moving within the region, cross the Texas-Mexican border, and along the NAFTA corridor.

Zhang, M. et. al. 2007
Five Dimensions of the Megaregional Process
-- A glance at the Texas Triangle

1. Interactively agglomerating
2. Networked flowing
3. Territorial re-sorting
4. Competitive co-producing
5. Identity forming
1. Interactively agglomerating

- Networked flowing
- Territorial re-sorting
- Competitive co-producing, and
- Identity forming
Population Density
1940
Population Density

1960

Population Growth for the State of Texas

Legend
Population Density by County
Persons/Square Kilometers
- 0
- 0 - 45
- 46 - 175
- 176 - 375
- 376 - 650
- 650 - 1390

N

0
60
120
180
240
300
360 Miles
0
110
220
330
440 Kilometers

Year
Population
0
100,000
200,000
300,000
400,000
500,000
600,000
700,000

- Triangle Region
- State of Texas

1880 1900 1920 1940 1960 1980 2000 2020 2040 2060
Population Density

1970

Population Growth for the State of Texas

Legend
Population Density by County
Persons/Square Kilometers
- 0
- 0 - 45
- 46 - 175
- 176 - 375
- 376 - 650
- 651 - 1,090
Population Density

2040

Legend
Population Density by County
Persons/Square Kilometers

- 0
- 0 - 45
- 46 - 175
- 176 - 375
- 376 - 650
- 650 - 1090

Population Growth for the State of Texas

- Triangle Region
- State of Texas

Year
1880 1900 1920 1940 1960 1980 2000 2020 2040 2060
Population
0 10,000,000 20,000,000 30,000,000 40,000,000 50,000,000 60,000,000 70,000,000
Population Density
2050

Population Growth for the State of Texas

Legend
Population Density by County
Persons/Square Kilometers
- 1
- 0 - 45
- 46 - 175
- 176 - 375
- 376 - 650
- 651 - 1900

Year
1880 1900 1920 1940 1960 1980 2000 2020 2040 2060
Population
0 10,000,000 20,000,000 30,000,000 40,000,000 50,000,000 60,000,000 70,000,000

Triangle Region
State of Texas
Census estimates hint at mega-region between San Antonio and Austin

The 10 fastest-growing U.S. counties
Of 10,000 or more population, July 1, 2013, to July 1, 2014

<table>
<thead>
<tr>
<th>RANK</th>
<th>COUNTY</th>
<th>PERCENT CHANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Williams, N.D.</td>
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<tr>
<td>2.</td>
<td>Stark, N.D.</td>
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<td>3.</td>
<td>Sumter, Fla.</td>
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<td>Pickens, Ala.</td>
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<td>5.</td>
<td>Hays</td>
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<td>6.</td>
<td>Fort Bend</td>
<td>4.7</td>
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<td>7.</td>
<td>Forsyth, Ga.</td>
<td>4.6</td>
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<tr>
<td>8.</td>
<td>Wasatch, Utah</td>
<td>4.3</td>
</tr>
<tr>
<td>9.</td>
<td>Comal</td>
<td>4.0</td>
</tr>
<tr>
<td>10.</td>
<td>Morgan, Utah</td>
<td>4.0</td>
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</table>

Fastest-growing metro areas
July 1, 2013, to July 1, 2014

<table>
<thead>
<tr>
<th>RANK</th>
<th>METRO AREA</th>
<th>PERCENT CHANGE</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>The Villages, Fla.</td>
<td>5.4</td>
</tr>
<tr>
<td>2.</td>
<td>Myrtle Beach-Conway-N. Myrtle Beach, S.C.-N.C.</td>
<td>3.2</td>
</tr>
<tr>
<td>3.</td>
<td>Austin-Round Rock</td>
<td>3.0</td>
</tr>
<tr>
<td>4.</td>
<td>Odessa</td>
<td>2.9</td>
</tr>
<tr>
<td>5.</td>
<td>St. George, Utah</td>
<td>2.9</td>
</tr>
<tr>
<td>6.</td>
<td>Cape Coral-Fort Myers, Fla</td>
<td>2.7</td>
</tr>
<tr>
<td>7.</td>
<td>Bend-Redmond, Ore</td>
<td>2.7</td>
</tr>
<tr>
<td>8.</td>
<td>Greeley, Colo</td>
<td>2.6</td>
</tr>
<tr>
<td>9.</td>
<td>Midland</td>
<td>2.6</td>
</tr>
<tr>
<td>10.</td>
<td>Naples-Immokalee-Marco Island, Fla</td>
<td>2.5</td>
</tr>
<tr>
<td>11.</td>
<td>Houston-The Woodlands-Sugar Land</td>
<td>2.5</td>
</tr>
<tr>
<td>24.</td>
<td>San Antonio-New Braunfels</td>
<td>2.0</td>
</tr>
</tbody>
</table>

The 10 counties with the largest population increase
July 1, 2013, to July 1, 2014

<table>
<thead>
<tr>
<th>RANK</th>
<th>COUNTY</th>
<th>INCREASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Harris (Houston)</td>
<td>89,000</td>
</tr>
<tr>
<td>2.</td>
<td>Maricopa, Ariz. (Phoenix)</td>
<td>74,000</td>
</tr>
<tr>
<td>3.</td>
<td>Los Angeles, Calif.</td>
<td>63,000</td>
</tr>
<tr>
<td>4.</td>
<td>San Diego, Calif.</td>
<td>41,000</td>
</tr>
<tr>
<td>5.</td>
<td>Clark, Nev. (Las Vegas)</td>
<td>40,000</td>
</tr>
<tr>
<td>6.</td>
<td>Bexar (San Antonio)</td>
<td>34,000</td>
</tr>
<tr>
<td>7.</td>
<td>King, Wash. (Seattle)</td>
<td>33,000</td>
</tr>
<tr>
<td>8.</td>
<td>Dallas</td>
<td>33,000</td>
</tr>
<tr>
<td>9.</td>
<td>Riverside, Calif.</td>
<td>32,000</td>
</tr>
<tr>
<td>10.</td>
<td>Tarrant (Fort Worth)</td>
<td>31,000</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau
2. Networked flowing
Freight flows by trucks

Source: Texas Department of Transportation
Air passenger flows
Super-Commute in the Texas Triangle
(50+ miles or 90+ minutes one-way)

(Dallas-Ft. Worth, Austin, San Antonio, Houston)

3. Territorial re-sorting
US migration trends (Partridge et al., 2012)

- Declining intra-state and inter-state migration since 1970s
- Entering an era of ‘new localism’ and increased rootedness (Kotkin 2009, Cooke 2011)
Migration patterns in Texas 2011-15

- Non-Movers, 82.84%
- Movers, 17.16%
  - Movers in the same county, 10.39%
  - Movers from different county, same state, 3.88%
  - Movers from different state, 2.10%
  - Movers from abroad, 0.79%
Migration spatial patterns in Texas 2011-15

Mostly migrants moved into, out of, or around within the core counties of metros in the Triangle

Number of movers from different county, same state

Number of movers from different state

Number of movers from abroad
Migration spatial patterns in Texas 2011-15

Intra-MSA county-to-county migration patterns
Migration spatial patterns in Texas

There seems to be a strong Triangle adherence suggested by the migration pattern

County-to-county migration flow patterns: 2007-2011 (left); 2011-2015 (right)
4. Competitive co-producing
# Location Quotient Analysis of Local Specialization

## 4 Metros in Texas Triangle 2004 (highlighted: industries serving mostly non-local markets)

<table>
<thead>
<tr>
<th>Industries</th>
<th>Austin</th>
<th>Dallas Fort-Worth</th>
<th>Houston</th>
<th>San Antonio</th>
<th># of Metros Having the Industry as Part of their Economic Bases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communications</td>
<td>1.17</td>
<td>1.82</td>
<td>1.96</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Holding and other investment offices</td>
<td>1.16</td>
<td>2.10</td>
<td>1.72</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Oil and gas extraction</td>
<td>4.82</td>
<td>13.81</td>
<td>1.30</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Transportation services</td>
<td>2.12</td>
<td>3.32</td>
<td>2.85</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Electric, gas and sanitary services</td>
<td>3.69</td>
<td>3.13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Electronic and other electrical equipment</strong></td>
<td>3.32</td>
<td>2.47</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy construction</td>
<td>3.03</td>
<td>1.18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Industrial machinery and equipment</strong></td>
<td>3.69</td>
<td>1.26</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance</td>
<td>1.16</td>
<td>2.35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miscellaneous repair services</td>
<td>1.37</td>
<td>1.58</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real estate</td>
<td>1.54</td>
<td>1.27</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Transportation by air</strong></td>
<td>2.49</td>
<td>1.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wholesale trade</td>
<td>2.08</td>
<td>1.47</td>
<td>1.28</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Auto dealers and service stations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chemicals and allied products</strong></td>
<td></td>
<td>2.43</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Depository and nondepository institutions</td>
<td>1.16</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eating and drinking places</td>
<td></td>
<td>1.35</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Engineering and management services</td>
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<td>1.40</td>
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<td>Federal civilian</td>
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<td>1.84</td>
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<td>General building contractors</td>
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<tr>
<td>General merchandise stores</td>
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<td>1.19</td>
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<tr>
<td>Home furniture and furnishings stores</td>
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<td>1.38</td>
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<td>Legal services</td>
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<tr>
<td>Military</td>
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<td></td>
<td>4.70</td>
<td>1</td>
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<tr>
<td>Miscellaneous manufacturing</td>
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<td>1.18</td>
<td>1</td>
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<tr>
<td><strong>Petroleum and coal products</strong></td>
<td></td>
<td>4.97</td>
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<tr>
<td>Pipelines, except natural gas</td>
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<td>6.78</td>
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<tr>
<td>State government</td>
<td></td>
<td>2.27</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Trucking and warehousing</td>
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<tr>
<td><strong>Water transportation</strong></td>
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<td></td>
<td>3.38</td>
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</tbody>
</table>

Source: Adopted from Gilmer 2004a, 2004b and authors’ calculation
## Location Quotient Analysis of Local Specialization
### 4 Metros in Texas Triangle 2016 (highlighted: industries serving mostly non-local markets)

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</thead>
<tbody>
<tr>
<td>Real estate</td>
<td>1.36</td>
<td>1.28</td>
<td>1.16</td>
<td>1.06</td>
<td>4</td>
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<tr>
<td>Heavy construction</td>
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<td>1.21</td>
<td>3.17</td>
<td>4.08</td>
<td>4</td>
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<tr>
<td>Eating and drinking places</td>
<td>1.31</td>
<td>1.06</td>
<td>1.10</td>
<td>1.29</td>
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<tr>
<td>Auto dealers and service stations</td>
<td>1.03</td>
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<td>Transportation by air</td>
<td>3.42</td>
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<td>1.15</td>
<td>2</td>
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<td><strong>Industrial machinery and equipment</strong></td>
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<tr>
<td>Electric, gas and sanitary services</td>
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<td><strong>Petroleum and coal products</strong></td>
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<td>4.47</td>
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<td>Water transportation</td>
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<tr>
<td>Chemicals and allied products</td>
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<td>2.12</td>
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<tr>
<td>General merchandise stores</td>
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<td>1.05</td>
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<td>Military</td>
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<td>Miscellaneous manufacturing</td>
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*Highlighted industries serve mostly non-local markets.*
5. Identity forming
The Texas Triangle Identity?

• “The Texas Triangle”, one section of Missouri Pacific (MoPac)’s premier name services, “Sunshine Special” in 1936, from St. Louis and Memphis to link Dallas, Fort Worth, Houston, Austin, and San Antonio.

• “Texas Triangle” now probably better known as the tough road trip facing NBA teams against the Dallas Mavericks, the Houston Rockets, and the San Antonio Spurs.

• The culture identity of Texas Triangle megaregion remains to be built.
Implications when treating the Triangle as one integrated megaregion

- Functions and services: Expanded access and choices to employment, housing, and services at the megaregion scale

- Behavioral: Inter-metro travel $\rightarrow$ Intra-megaregion travel; daily travel decision frame $\rightarrow$ weekly travel decision

- Spatial (in)equality trend, increasing or decreasing along with the megaregional process?

- Infrastructure investment: Growth of demand for large volume, high-speed, and better services

- Institutional: Role of Metropolitan Planning Organizations (MPO)
Concluding Remarks

• Megaregion/Super-City Region/City-Cluster agglomeration, a shared phenomenon in the global urbanization trend

• These agglomerations develop at different stages, reflecting both the status and the process

• Countries are taking different approaches to embrace the process, making sense to their respective economic and institutional settings

• Thank ahead: strategic transportation infrastructure investments
Current HSR Proposals for the Texas Triangle
Call for Paper for the Special issue: Megaregional Approaches to Address the Mega-Challenges of Transportation and Environment

Call for papers for a virtual special issue at Transportation Research Part D on the Topic:

“Megaregional Approaches to Address the Mega-Challenges of Transportation and Environment”

Megaregion (also termed “mega-city region”, “super-city region”, or “city-cluster region” in the European and Asian context) refers to a large agglomeration consisting of two or more networked metropolitan areas and their hinterlands. French geographer Gottman first observed in the early 1960s the agglomerating phenomenon of megalopolis from Boston to Washington, D.C. and in other multi-metropolitan corridors of the United States. At the turn of this century, the agglomeration pattern re-emerged in the spotlight after a group of U.S. planners

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**UK 2070**

**Programme of Activities**

**UK Charrette Manchester**
February 9th – 17th 2019

**Led by**

PennDesign: Dean Fritz Steiner & Professor of Practice Bob Yaro
UT Austin: Professor Ming Zhang & Research Scientist Ms. Lisa Luftus Otway

Venue for Sessions
Turner & Townsend
6th Floor 55 Spring Gardens
Manchester, M2 2BY
Tel: +44 (0)161 237 7750
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Research Contributions from:
Liang Chen
Ziqi Liu
Caleb I Roberts
Jie Xu