A PLANNER’S RESPONSE TO THE PANDEMIC

SCENARIO PLANNING

Photo credit: Kumweni
Scenario Planning

• Provide help and tools you can use now, as we navigate this new world
• Provide CM credits before the May 28 Grace period ends

Michigan Chapter Upcoming Events
• Planning Law Seminar, Tuesdays from May 12 to June 2
• Book Group, MAP Reads, on May 27 and June 24
Why Planning is Still Important: Ten Things Planners Can Do Now

1. Essential Service versus Work from Home (WFH).
2. Remote Work.
3. Hazard Mitigation Team.
4. Virtual Alternatives.
5. Economic Response and Recovery.
6. Repurpose Planning Staff.
7. Scenario Planning.
8. Messaging.
TODAY’S PRESENTER

Robert Goodspeed, PhD
University of Michigan
Scenario Planning

Presented to the Michigan APA
A Planner’s Response to the Pandemic Series

Robert Goodspeed, PhD, AICP
Scenario Planning Helps Planners Respond to Contemporary Planning Challenges

**Transformation**: How can the physical and functional pattern of a city be changed to improve sustainability?

**Resilience**: How can cities be prepared for uncertain external forces, such as climate change impacts or new technologies?
When and Why Use Scenario Planning?

**Urban Scenario Planning** is a form of strategic planning that creates multiple representations of plausible urban futures in order to manage uncertainty and envision transformation. It can be used to:

- **Build consensus** and reframe issues among diverse stakeholders
- **Analyze connections** across functional domains (land use, trans., etc)
- **Combine** values and data/analysis discussions

Possible applications:

- Master Plans
- Long-term Transportation Plans
- Hazard Mitigation Plans
- Internal/staff retreats...
Planning Approaches

Visioning
Planning Approaches

- Whose vision?
- Data?
- Plausibility?
Planning Approaches

Visioning

Forecasting
Forecasts are Often Wrong

“Heavier-than-air flying machines are impossible.”
– Lord Kelvin

“With over fifty foreign cars already on sale here, the Japanese auto industry isn’t likely to carve out a big slice of the U.S. market for itself.”
– Business Week, 1968

“I think there is a world market for about five computers”
– Thomas Watson, IBM Chairman, 1943

*The Experts Speak*, quoted in Schoemaker 1991
Quantitative Trends Aren’t Easier to Predict…

Metro Detroit Average Daily VMT, Actual and Forecast in Long-Range Plans

Note: VMT estimation methodology varies between studies. Data Sources: SEMCOG, Richard Murphy
Planning Approaches

Visioning

Forecasting

Strategic Planning
Strategic Planning

1. Initial Agreement
2. Mandates
3. Mission/Values
4. External Environment
5. Internal Environment
6. Strategic Issues
7. Strategies
8. Vision of Success

Forces-Trends
Stakeholders
Competitors - Collaborators

Opportunities Threats
Strengths Weaknesses
Resources
Present Strategy
Performance

Strategy Formulation
Implementation

Source: Bryson, John, Strategic Planning for Public and Nonprofit Organizations
Planning Approaches

Visioning

Forecasting

Consensus Building

Strategic Planning
Planning Approaches

Internal Project Focus
Mutual Understanding

External Focus
Trends & Systems

Future Focus
Single Vision

Visioning

Forecasting

Present Focus
Anticipates Plural Viewpoints

Consensus Building

Strategic Planning
Scenario Planning in Urban Planning

Visioning
- Inspiring visions
- Charrettes

Forecasting
- Plausibility
- Trend analysis

Strategic Planning
- Strategic Issues
- Values
- Goals
- Strategies

Consensus Building
- Stakeholder Engagement
- Participation

Scenario Planning Ideas

Urban Scenario Planning Practice
A Forecasting Metaphor

How to anticipate the road ahead?
Curvy or straight? Types of obstacles?

What Are Often Analyzed in City Scenarios?

- **Uncertainties:**
  - Population or employment growth
  - Location, type, and density of new development

- **Predetermined:**
  - Existing housing and infrastructure
  - Current institutions such as private property markets

Scenario Can Describe Trends, Decisions, or Events

- Decision point
- Uncertain trends
- Disruptive event
- Plausible future states

Today

Future

We are here now
Why create scenarios in urban planning?

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Goal</th>
<th>Measures of Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normative</td>
<td>• Create a shared vision through creating and comparing several scenarios</td>
<td>• Consensus on vision, implementation strategies, goals, indicators, etc...</td>
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<tr>
<td></td>
<td></td>
<td>• Quality of vision(?)</td>
</tr>
<tr>
<td>Exploratory - Focused on Decisions</td>
<td>• Make better decisions through creation of scenarios</td>
<td>• Plans which allow for better decisions (robust, contingent strategies)</td>
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<tr>
<td></td>
<td></td>
<td>• Number, quality, analysis of strategies</td>
</tr>
<tr>
<td>Exploratory Projects</td>
<td>• Improve understanding of uncertainty and future trends</td>
<td>• Foresight?</td>
</tr>
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<td></td>
<td></td>
<td>• Enlightenment?</td>
</tr>
</tbody>
</table>

In all cases, the goal is achieved through the comparison of a **set of scenarios**, designed to be *similar* in some ways and *different* in others.
Normative Scenario Projects

Oregon Model for Normative Scenarios

- Base year
- Reference scenario (trend)
- Evaluate alternative scenarios
- Alternative scenarios
- Preferred scenario
- Implementation activities

Backcasting

Sustainability impact:
- CO₂
- Local environment
- Accessibility
- Safety
- Economy

- Unsustainable mobility
- Sustainable mobility

Unsustainability


Bannock, ID MTP 2040

- Small MPO, hired consultant with scenario expertise
- Created four conceptual scenarios to clarify vision
  - The Trend scenario
  - The University/Active Living scenario
  - The Great Place for Business scenario
  - The Outdoor Life scenario
Imagine Madison (2018)

Imagine Madison Scenario Metrics (UrbanFootprint)

Citywide UrbanFootprint Scenarios Results Summary

<table>
<thead>
<tr>
<th></th>
<th>Scenario #1: Edge Growth Focus</th>
<th>Scenario #2: Edge/Redevelopment Balance</th>
<th>Scenario #3: Redevelopment Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture/Woodland/Rural Land Consumed (acres)*</td>
<td>2,072</td>
<td>1,702</td>
<td>1,140</td>
</tr>
<tr>
<td>Annual Energy Use – Residential (BTUs/year, in trillions)</td>
<td>19.65</td>
<td>19.61</td>
<td>19.52</td>
</tr>
<tr>
<td>Transportation-Related Greenhouse Gas Emissions for Passenger Vehicles (metric tons/year, in millions)</td>
<td>1.78</td>
<td>1.76</td>
<td>1.73</td>
</tr>
<tr>
<td>Annual Gasoline Costs ($/household/year)</td>
<td>$2,887</td>
<td>$2,852</td>
<td>$2,781</td>
</tr>
<tr>
<td>Vehicle Miles Traveled (miles/year, in billions)</td>
<td>4.85</td>
<td>4.77</td>
<td>4.68</td>
</tr>
<tr>
<td>Additional Vehicle Miles Traveled (difference between base year of 2015 and scenario end year of 2040; miles/year, in millions)</td>
<td>574.8</td>
<td>490.8</td>
<td>405.2</td>
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<tr>
<td>Transit Trips/day</td>
<td>63,996</td>
<td>88,090</td>
<td>90,394</td>
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</tbody>
</table>

Note: All numbers assume that the only changes from 2015 are to land use and transportation to isolate the impacts of different styles of development. No assumptions have been made on increased fuel efficiency, inflation, etc. Analysis run for Dane County, but growth of 70,000 population and 37,000 jobs was assigned only to land that is already in the city or planned to become part of the city under existing boundary agreements.

* Some of this land is agricultural land that is already within the city boundary.
Exploratory Projects

- Decision-focused (often quantitative)
- Learning-focused (often qualitative)
Transform 2040: Bloomington/Monroe County MTP (2017)

• MPO mostly the city of Bloomington, but also surrounding rural county, housed in city
• Context: Ongoing conflict within MPO and with state DOT about specific infrastructure decisions
• Scenario Approach:
  – Created 9 Land Use Scenarios (3 growth scenarios x 3 development styles)
  – Created 12 “Transportation Options” scenarios which combine selected land use scenarios with different transportation policies or projects
Decision-Oriented, Analytical Project:
Transform 2040, Bloomington (IN) MTP

<table>
<thead>
<tr>
<th>Land Use Scenario Development</th>
<th>Overall Growth Scenario</th>
<th>Low Growth</th>
<th>Mid-Range Growth</th>
<th>High Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forecasts 2040</td>
<td></td>
<td>Standard</td>
<td>Compact</td>
<td>Standard</td>
</tr>
<tr>
<td>Control Totals - TAZ Global Assumptions</td>
<td></td>
<td></td>
<td>Low Density</td>
<td>Compact</td>
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<tr>
<td>Number of households by scenario</td>
<td>64,431</td>
<td>64,431</td>
<td>64,431</td>
<td>72,952</td>
</tr>
<tr>
<td>Total population by scenario</td>
<td>153,209</td>
<td>153,209</td>
<td>153,209</td>
<td>173,784</td>
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<tr>
<td>Total employment by scenario</td>
<td>94,240</td>
<td>94,240</td>
<td>94,240</td>
<td>107,135</td>
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<tr>
<td>School enrollment</td>
<td>15,762</td>
<td>15,762</td>
<td>15,762</td>
<td>17,879</td>
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<tr>
<td>IU enrollment forecast</td>
<td>48,500</td>
<td>48,500</td>
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<td>49,000</td>
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<tr>
<td>Employynet Global Development Assumptions</td>
<td></td>
<td></td>
<td>Low Density</td>
<td>Compact</td>
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<tr>
<td>Emp. Growth Existing</td>
<td>10.0%</td>
<td>10.0%</td>
<td>10.0%</td>
<td>10.0%</td>
</tr>
<tr>
<td>Emp. Growth Undeveloped</td>
<td>70.0%</td>
<td>40.0%</td>
<td>80.0%</td>
<td>70.0%</td>
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<tr>
<td>Emp. Growth Redevelopment</td>
<td>20.0%</td>
<td>50.0%</td>
<td>10.0%</td>
<td>20.0%</td>
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<tr>
<td>New Housing - Low Density</td>
<td>50.0%</td>
<td>10.0%</td>
<td>80.0%</td>
<td>50.0%</td>
</tr>
<tr>
<td>New Housing - Medium Density</td>
<td>25.0%</td>
<td>50.0%</td>
<td>19.0%</td>
<td>25.0%</td>
</tr>
<tr>
<td>New Housing - High Density</td>
<td>25.0%</td>
<td>40.0%</td>
<td>1.0%</td>
<td>25.0%</td>
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<tr>
<td>Residential Global Assumptions</td>
<td></td>
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<td>Low Density</td>
<td>Compact</td>
</tr>
<tr>
<td>Infill Medium Density</td>
<td>10.0%</td>
<td>50.0%</td>
<td>1.0%</td>
<td>10.0%</td>
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<tr>
<td>Redevelopment High Density</td>
<td>70.0%</td>
<td>90.0%</td>
<td>30.0%</td>
<td>70.0%</td>
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<tr>
<td>Rural SFR Units per acre</td>
<td>0.2</td>
<td>0.1</td>
<td>1.0%</td>
<td>0.2</td>
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<tr>
<td>Urban SFR Units per acre</td>
<td>8.0</td>
<td>12.0</td>
<td>5.0</td>
<td>8.0</td>
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<tr>
<td>Max. Rural Growth</td>
<td>0.5%</td>
<td>0.1%</td>
<td>1.0%</td>
<td>0.5%</td>
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</table>
## Transform 2040 Transportation Option Scenarios

<table>
<thead>
<tr>
<th>#</th>
<th>Scenario Name</th>
<th>Land Use</th>
<th>Network</th>
<th>Note</th>
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<tbody>
<tr>
<td>0</td>
<td>Do Nothing</td>
<td>Base Year</td>
<td>E+C</td>
<td></td>
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<tr>
<td>1</td>
<td>I69 Section 5</td>
<td>Mid-Stnd</td>
<td>E+C</td>
<td>Existing and committed projects</td>
</tr>
<tr>
<td>2</td>
<td>BRT Route #3</td>
<td>Mid-Stnd</td>
<td>E+C+BRT</td>
<td>Test BRT route</td>
</tr>
<tr>
<td>3</td>
<td>State Road 37</td>
<td>Mid-Stnd</td>
<td>E+C excluding I69 projects</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Peak Oil</td>
<td>Mid-Stnd</td>
<td>E+C</td>
<td>Test $5/gal gasoline</td>
</tr>
<tr>
<td>5</td>
<td>TIP</td>
<td>Mid-Stnd</td>
<td>TIP</td>
<td>E+C plus projects in TIP</td>
</tr>
<tr>
<td>6</td>
<td>TIP + Public Workshop Allocation</td>
<td>Mid-Stnd</td>
<td>TIP+</td>
<td>TIP plus four additional projects: two trails, transit service, and connecting road</td>
</tr>
<tr>
<td>7</td>
<td>TIP + MTP 2035 Carryover Projects</td>
<td>Mid-Stnd(?)</td>
<td>TIP+ additional projects</td>
<td></td>
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<tr>
<td>8</td>
<td>TIP + MTP 2030 Limited Carryover</td>
<td>Mid-Stnd(?)</td>
<td>TIP+ additional projects</td>
<td></td>
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<tr>
<td>9</td>
<td>TIP + IU Research Park</td>
<td>IURP</td>
<td>TIP</td>
<td>Test impact of relocation of hospital to research park</td>
</tr>
<tr>
<td>10</td>
<td>TIP + Sample Road Bedroom Community</td>
<td>Bed Comm.</td>
<td>TIP</td>
<td>Explore consequences of potential new low-density development</td>
</tr>
<tr>
<td>11</td>
<td>TIP + 2-Way Streets</td>
<td>Mid-Stnd</td>
<td>2-Ways</td>
<td>Converts existing one-way streets to two-way</td>
</tr>
<tr>
<td>12</td>
<td>TIP + Urban Infill</td>
<td>Infill</td>
<td>TIP</td>
<td>Increases density through ADUs and minor density increases</td>
</tr>
</tbody>
</table>

Transform 2040: Metropolitan Transportation Plan, Bloomington/Monroe County MPO
### Scenario Statistics

<table>
<thead>
<tr>
<th>Category</th>
<th>Measure</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 4</th>
<th>Scenario 5</th>
<th>Scenario 6</th>
<th>Scenario 7</th>
<th>Scenario 8</th>
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<th>Scenario 11</th>
<th>Scenario 12</th>
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### Scenario Statistics

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<th>Measure</th>
<th>Scenario 1</th>
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<th>Scenario 6</th>
<th>Scenario 7</th>
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<th>Scenario 10</th>
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</table>

### Table 5-1: TDM Scenario Results
DenveRight Internal Scenario Workshop

DenveRight Internal Scenario Workshop

**Ranking the Drivers**

- Critical Certainties
- Critical Uncertainties
- Increasing Importance
- Increasing Uncertainty

**CRITICAL CERTAINTIES**
1. Aging Population + Net Population Growth; Nearing 4.3M in DRCOG
2. Longer, More Frequent Drought + Extreme Weather Events
3. Water is a Commodity, Continued Water Gap;
4. Access to the Outdoors and Recreational Tourism Remains a Major Value

**CRITICAL UNCERTAINTIES**
1. Development Capacity
2. Political Will
3. Mode Shift
4. Population Change
   *Followed closely by the Market and Quantity & Prioritization of Funding*
DenveRight Internal Scenario Workshop

CRITICAL CERTAINTIES
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CRITICAL UNCERTAINTIES
1. Development Capacity
2. Political Will
3. Mode Shift
4. Population Change
   *followed closely by the Market and Quantity & Prioritization of Funding

A
Denver Today
- Little Mode Shift
- Right Use, Right Place

B
Boom!
- Right Use, Right Place
- Vibrant Growth
- Mucho Millennials

C
Brown Cloud
- Little Mode Shift
- Absent Political Will

D
Deverisco
- Vibrant Growth
- Mucho Millennials
- Absent Political Will

Analyze Blueprint Denver Strategies in light of scenarios
## Project Success Measures

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Goal</th>
<th>Measures of Success</th>
</tr>
</thead>
</table>
| Vision Projects       | • Create a shared vision through creating and comparing several scenarios | • Consensus on vision, implementation strategies, goals, indicators, etc…  
                        |                                                                       | • Quality of vision(?)                                                               |
| Decision Projects     | • Make better decisions through creation of scenarios                 | • Plans which allow for better decisions (robust, contingent strategies)  
                        |                                                                       | • Number, quality, analysis of strategies                                            |
| Exploratory Projects  | • Improve understanding of uncertainty and future trends              | • Foresight                                                                        |
But what about the tools?
Digital Scenario Tools

• Generic Systems Modeling
  – Gaming
  – Systems Dynamics
  – Fuzzy Cognitive Maps

• Economic, Demographic, Travel Demand Models
  – Cohort-Component Population Projection
  – Economic Base Analysis
  – Input-Output Models / REMI
  – Four-step and activity-based travel forecasting models

• Place-Type Development and Analysis
  – CommunityViz
  – Envision Tomorrow
  – UrbanFootprint

• Urban Systems Models
  – Cellular Automata (e.g., SLEUTH)
  – Statistical Models of Land Use Change (e.g., LEAM)
  – Spatial Interaction Models (e.g., MetroScope)
  – Agent-Based Models (e.g., UrbanSim)

• Tools for Participation, Communication & Visualization
  – Various, e.g., CrowdGuage, MetroQuest, etc.

Does your model facilitate exploration or bake-in present assumptions?
Place-type Development Overview

<table>
<thead>
<tr>
<th>Buildings</th>
<th>Development Types</th>
<th>GIS</th>
<th>Evaluation Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROI Model</td>
<td>Scenario Spreadsheet</td>
<td>Painting ArcGIS</td>
<td>Scenario Spreadsheet</td>
</tr>
</tbody>
</table>

- 5 Story Mixed Use
- 2 Story Mixed Use
- 3 Story Apartment
- Townhome
- Compact Single Family
- Conventional Single Family

**Other Assumptions**
(e.g., street network type and widths)

- Town Center
- Town Neighborhood
- Residential Subdivision

**Density & Mix**
- Travel
- Health
- Sustainability
- Investment
- Fiscal Impact

Slide Source: Fregonese Associates (describes Envision Tomorrow Plus tool)
### Evaluation Indicators Rely on Quantitative Representation & Empirical Research

#### Development Types

**Building: Infill Residential**
- Lot Coverage (%): 68%
- Parking Coverage (%): 22%
- Building Size: 73,455 SF
- Avg. Rent: $1,225/month
- SF per use: 70% residential, 20% retail

**Neighborhood: Mixed Use**
- Block Size: 400 ft
- Lanes: 4
- Lane Width: 11
- Bike Lakes: Y
- Sidewalk Width: 12
- % Cul-de-sacs: 0%
- Intersection Density: 127 / mi²
- Street Miles / Acre: 0.12
- % Land for streets, civic, parks: 27%

#### Quantitative Representation

- Population Density
- Housing Unit Mix
- Land Use Mix
- Developed Acres
- Housing Cost
- Housing Unit Size
- Parking Spaces

#### Evaluation Indicators

- Energy Use
- Water Use
- CO2 Emissions
- Vehicle Mi. Traveled
- Mode Choice

#### Assumptions & Empirical Studies

- Descriptive
- Predictive
More Good Stuff

• How and why should scenarios be created *collaboratively*? (Ch. 1, 6)
• What are the qualities of *good scenarios*? (Ch. 6)
• What *evidence* exists that this is an effective way to plan? (Ch. 7, 8, 9)
• How can scenarios be used to imagine more *transformative futures*? (Ch. 10)
TAUBMAN COLLEGE OF ARCHITECTURE + URBAN PLANNING IS BUILDING TOMORROW

ENGLISH IN CRITICAL THINKING AND APPLIED DISCOURSE TO BECOME AGENTS OF CHANGE

STATE-OF-THE-ART DIGITAL FABRICATION LAB

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EXTENSIVE TRAVEL ABROAD OPTIONS

37,500-SQUARE-FOOT DESIGN STUDIO
DEGREE PROGRAMS

ARCHITECTURE:
- BACHELOR OF SCIENCE (B.S.)
- MASTER OF ARCHITECTURE (M.ARC.H.)
- POST-PROFESSIONAL DEGREES
  - MASTER OF URBAN DESIGN (M.U.D.)
  - MASTER OF SCIENCE (M.S.) DEGREE WITH CONCENTRATIONS IN DIGITAL AND MATERIAL TECHNLOGIES, AND DESIGN AND HEALTH
- PH.D. IN ARCHITECTURE

URBAN + REGIONAL PLANNING:
- MASTER OF URBAN AND REGIONAL PLANNING
- GRADUATE CERTIFICATES:
  - REAL ESTATE DEVELOPMENT
  - HEALTHY CITIES
  - URBAN INFORMATICS
- PH.D. IN URBAN AND REGIONAL PLANNING
Discussion

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Thank you to our presenter

This presentation and other resources will be placed on MAP’s website, www.planningmi.org

Look for the Planning Tools During COVID-19 button