COMMUNITY PROCESS GUIDE

Snapshot Module

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1. Introduction

This process guide describes ways in which DSS snapshots can support community planning processes. A "snapshot" is a static, or single point in time, analysis of a given situation. The snapshot module of the DSS is a support tool to help stakeholders and decision-makers:

- ***Create plans*** through issue identification, alternatives analysis, and goal-setting.
- ***Implement plans*** by evaluating development consistency with goals.
- ***Achieve plans*** by measuring cumulative progress toward goals.

At the heart of snapshots are a set of indicators that are used to benchmark existing conditions, evaluate alternative courses of action, and monitor change over time. Indicators are measurements of key community characteristics that provide insights into overall conditions. For example, the residential indicator of "dwellings per acre" is a useful measurement of an area's suitability for transit service because of its spatial representation of potential ridership density.

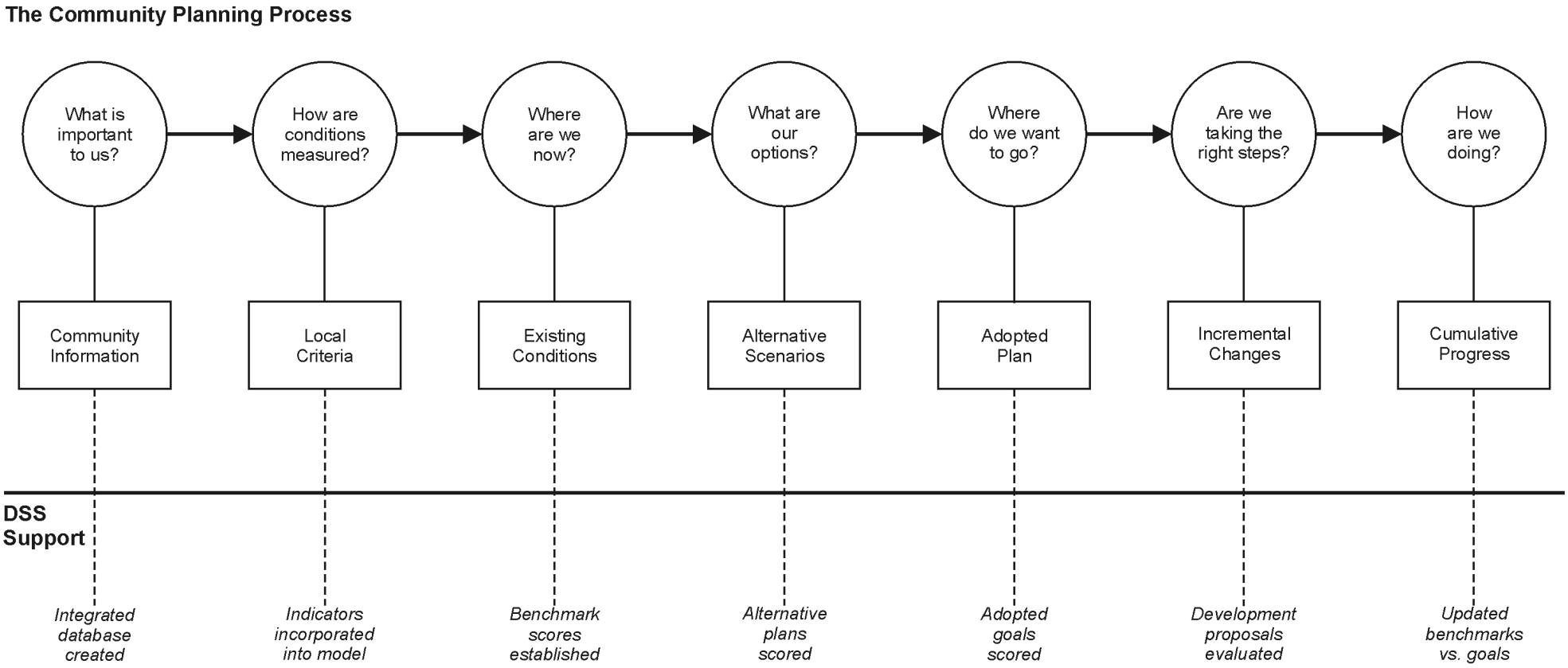
The premise of the DSS is that plan formulation and implementation can be valuably informed by a standardized set of indicator measurements that are used regularly to gauge actions. Figure 1 illustrates a typical community planning process and the stages where DSS snapshots can provide this kind of decision support. Some users may choose to apply the tool systematically in all stages, while some may find it helpful at one or two key points. Regardless of where it is applied, it should be viewed as a support tool intended to inform rather than as a regulatory device intended to control.

Important process-related features include:

- *Sketch areas.* The software can be applied to any portion of Chittenden County where data is available to support indicator calculations. Sketch areas may be created using existing official boundaries, such as parcels, local government jurisdictions, traffic analysis zones, or other administrative boundaries. Natural features such as watersheds may also be used, or users may also create unique one-of-a-kind boundaries to fit special needs.

- *Sketches.* Any number of planning scenarios or "sketches" can be modeled in a sketch area. Sketches can represent actual or proposed conditions. Usually a "base sketch" is used as a starting point in an application and "alternate sketches" are created to represent different ideas and approaches to the issues at hand.

Figure 1. SUPPORT OF COMMUNITY PLANNING WITH DSS SNAPSHOTS

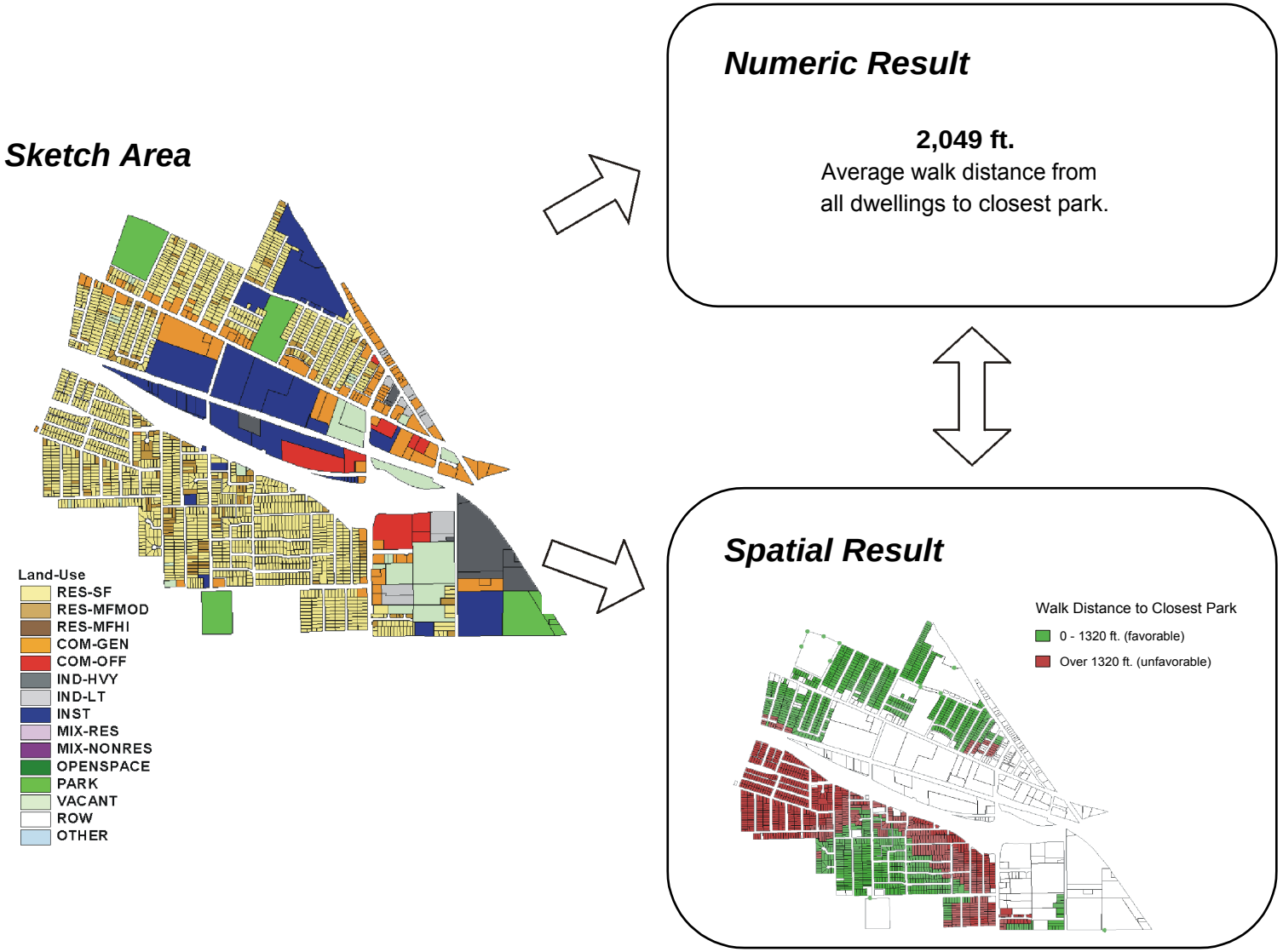


- *Indicators.* Indicators are "yardsticks" for identifying an area's strengths and weaknesses, testing alternative courses of action, and monitoring change over time. The DSS snapshot module has a menu of 56 indicators available for evaluating sketches. From this menu, users may select those indicators that are most relevant to a given situation. Figure 2 illustrates the two kinds of indicator measurements made by DSS snapshots: first, a numerical score for the study area; and second, mapping of the spatial pattern that produced the score. In this way users obtain both quantitative and geographic assessments of an area. The numeric scores are interpreted in relation to typical standards in the professional literature, common conditions in the local area, other alternative sketch scores, or adopted goals in sketches where they already exist. The geographic results are used to delineate areas where strengths can be protected and areas where weaknesses need to be corrected.

- *Interpreting indicator scores.* Indicator scores should be interpreted in the context of existing conditions and adopted goals or applicable policies. Thus, it is important to know how current conditions score versus desired policy-based scores. Establishing a quantitative policy gradient for indicators at the outset of the tool's use will help interpret sketch results. A key document is the Indicator Dictionary that defines what is included in each indicator, how it is calculated, and illustrative scores. Users will need to gain experience in interpreting scores and changes in scores between sketches. It is impossible to generalize about what constitutes a significant score change because so many variables are at play in different locations and scenarios being modeled. Users should examine the direction of change (numerically increasing or decreasing) and the magnitude of change (percent difference). In most sketches, score changes of relatively small magnitude should be insignificant for purposes of a given analysis. Exceptions include vehicle trips, vehicle miles traveled, and travel-related air pollutant emissions, all of which will change in relatively small amounts as a function of alternations in land-use density, diversity, and design. Finally, practitioners will want to interpret scores in light of community preferences and goals, while considering trade-offs, when communicating results to the public.

- *Indicator rating and weighting.* To determine if indicator scores are favorable or unfavorable according to local norms, users may set objectives for each indicator according to the desired direction of indicator score movement, and thresholds of score desirability. For example, the objective for walk distance to parks would be a decrease in distance since shorter walks would be positive. The threshold for a desirable walk distance might be anything less than 1,000 feet. To help stakeholders evaluate and rank multiple sketches, weights of importance can also be assigned to indicators. These and the score ratings enable the calculation of a single overall weighted score for a given sketch.

Figure 2. INDICATOR EXAMPLE: HOUSING PROXIMITY TO PARKS



2. User Requirements

In order to use the DSS for snapshots, it is necessary to have the following:

- *Hardware.* The minimum configuration is a 300 MHZ PC with at least 128 MB of RAM, and at least 1.5 GB of available hard disk space. Faster speed and larger memory are desirable for evaluating large study areas. Minimum screen resolution is 1024x768.

- *Data.* DSS snapshots require a variety of land-use, transportation, and environmental data in GIS format. Specific requirements depend on which indicators are being used in a given analysis.

- *GIS experience.* Users must have basic GIS familiarity and must attend a DSS training session before attempting to use the tool. Access is also needed to a "model steward" with advanced GIS skills to support certain technical functions of the model.

Because of the tool's potential to influence planning processes, its use includes the responsibility for ethical and professional representation of scenarios and results.

3. Organizing Sketches

Once the DSS is installed, there are three major process-related tasks in organizing snapshot sketches:

- *Select a sketch area boundary.* The selection of a sketch area boundary is an important step because of its influence on indicator scores and overall evaluation of a situation. Key considerations in selecting a boundary include:

    - The boundary should be derived from a study's scope and objective, e.g. city limits of an entire municipality that is being evaluated, or the neighborhood vicinity if a major development proposal is being examined.

    - Sizing of the boundary in relation to the subject being studied is important because it affects the magnitude of change in results from sketch to sketch, e.g. a small development proposal inside a large sketch area will not show significant differences from baseline scores because of its small size relative to the overall sketch area, whereas the same proposal in a smaller sketch boundary would produce notable score changes in relation to baseline values. In short, the boundary should be set to capture the logical spatial extent of a project's impact.

- In all sketches, care should be exercised along the boundary's outer edge to insure that important adjacent features that affect the study area are included, e.g. an elementary school just outside the boundary of a residential study area.

- Equally important, anomalous or irrelevant features should be excluded from sketch areas so they do not adversely influence scores, e.g. removing a commercial area from a residential housing study area.

It should be remembered that snapshot sketches are often small subareas of larger jurisdictions, and results are subject to the influence of forces beyond the sketch area.

- *Select indicators to calculate.* Users select those indicators that are most relevant to the subject at hand, e.g. employment-related indicators for an office park versus housing indicators for a residential subdivision. Occasionally, a user may select all of the indicators when a comprehensive set of measurements is desired, such as benchmarking existing conditions for a long-range community plan. A prerequisite for selecting any indicator is availability of data to support the indicator calculation; data requirements are detailed in the DSS User Manual.

- *Set indicator ratings and weights.* If weighted results are desired, users may assign weights of importance and score acceptability ratings to each indicator. This function, known as rating and weighting (RAW), can be used to apply established community standards, or to test new or modified standards. The RAW evaluation is also useful when stakeholders are evaluating and ranking multiple sketches in search of consensus on a preferred alternative. The RAW procedure includes the following general steps:

  1. *Rating.* These values are taken from the objective threshold entries made earlier by the user during the setting of indicator objectives. The model uses these values to convert actual indicator scores in their original units of measurement into a common zero-to-one rating scale.

  2. *Weighting.* Stakeholders establish weights of importance for each group of indicators (elements). The total weighting "budget" for all elements must equal 100. Each element budget is allocated to the indicators within the element. Total indicator weights for an element must equal the element's weighting budget.

  3. *Calculation.* To calculate RAW values, the weight is multiplied by the rating for each indicator and these values are summed to obtain an overall value for each sketch. This yields an overall score for each sketch between zero and one hundred.

A hypothetical example of the RAW procedure is shown in Figure 3. Detailed instructions on using the RAW function are given in the Getting Started Guide.

To illustrate a simplified DSS snapshot application, a series of hypothetical neighborhood sketches are shown in Figure 4. This example assumes a policy initiative to densify employment along an arterial corridor to encourage travel mode shifting to transit. The objective is to create a corridor of ridership that will support frequent transit service. "Employees per acre" is selected as a key indicator of transit service feasibility (higher employment density supports greater frequency in transit service). Each panel in Figure 4 is discussed sequentially in the following sections as the neighborhood planning process unfolds.

4. Benchmarking Current Conditions

Most applications of the software will begin with benchmark measurements of existing conditions in a study area. Benchmark indicator scores are used to:

- *Identify an area's strengths and weaknesses.* Scoring and mapping of existing conditions will reveal problems and opportunities that merit attention in plans.

- *Provide input into the formulation of community standards.* Benchmark scores are an important reference point when formulating regulatory standards that will be applied to community development.

- *Provide a baseline for gauging the magnitude of change.* During plan implementation when development proposals are evaluated, each proposal's scores can be compared to benchmark measurements to gauge the amount of change that development would cause.

Figure 3
HYPOTHETICAL RAW EXAMPLE

	SET UP						APPLICATION						
	Weighting		Rating										
Indicator	***Overall Topic Importance***	***Allocation to Indicators***	***Positive Movement of Score***	***Worst Indicator Scores (Get 0)***	***Mediocre Indicator Scores (Get 0.5)***	***Best Indicator Scores (Get 1)***	***Indicator Score***	→	***Equivalent Rating (0 to 1)***	**X**	***Indicator Weight***	**=**	***Indicator RAW Score***
Housing	50	- - -											
Dwelling Density	- - -	20	Up	10-	15	20+	16	→	0.6	**X**	20	**=**	12
Distance to Transit	- - -	30	Down	2640+	1170	300-	1250	→	0.4	**X**	30	**=**	12
Employment	25	- - -											
Employee Density	- - -	10	Up	20-	35	50+	37	→	0.6	**X**	10	**=**	6
Distance to Transit	- - -	15	Down	2640+	1170	300-	863	→	0.2	**X**	15	**=**	4
Parks	25	- - -											
Distance to Housing	- - -	25	Down	2640+	1170	300-	2300	→	0.9	**X**	25	**=**	21
	100	100											

Case RAW Sum 55

- *Provide a baseline for gauging the amount of progress.* During periodic monitoring of plan accomplishments, updated benchmark measurements can be compared against previous benchmarks to gauge progress toward goals.

Benchmarking is shown in the left-hand panel of Figure 4 where the employment density indicator finds a relatively low 12 employees/acre, which is insufficient to support frequent transit service. This segment of the corridor therefore meets the threshold issue test of needing land-use changes to increase employment density.

5. Creating Plans

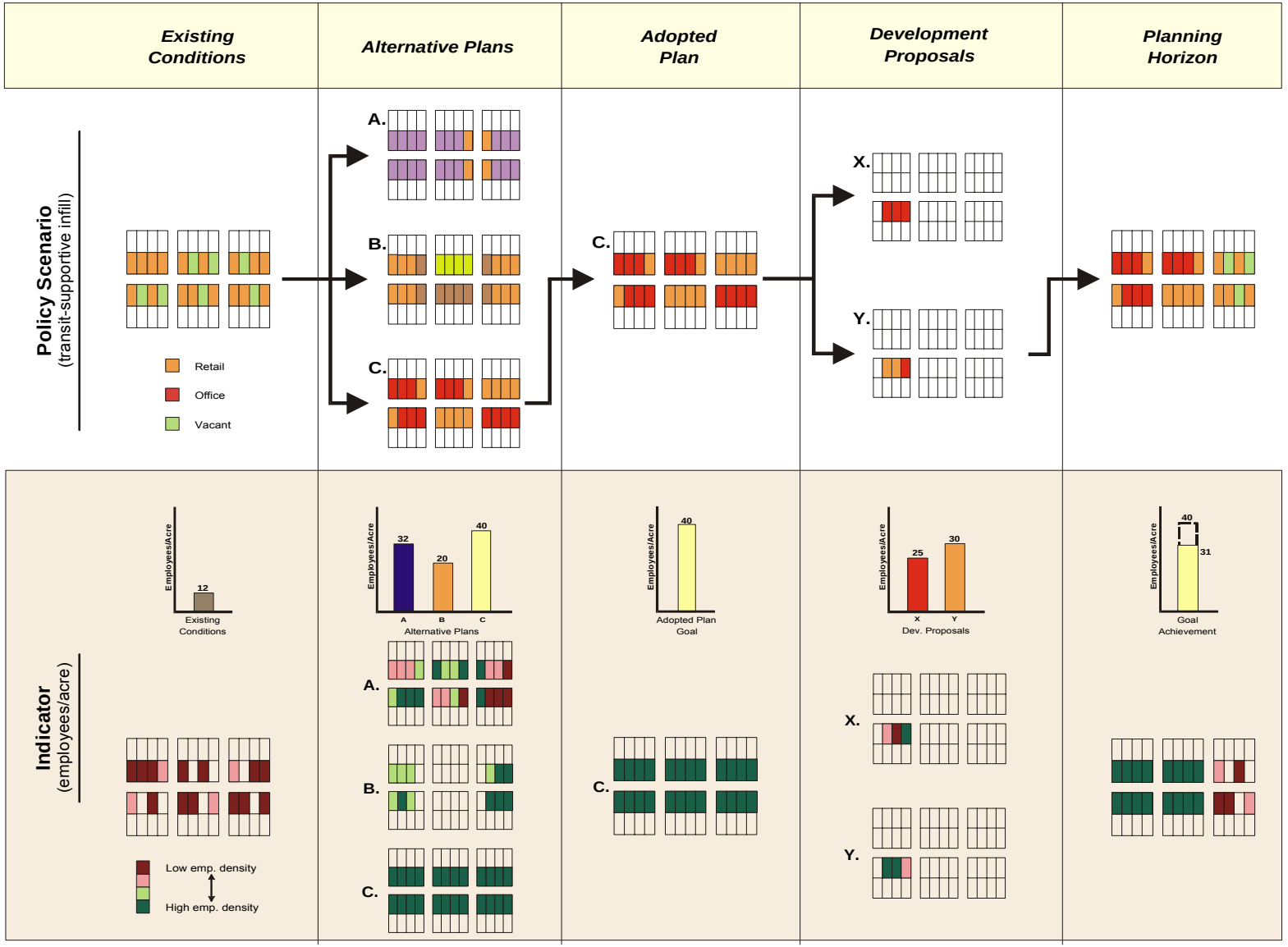
Once existing conditions have been evaluated and planning issues identified, stakeholders can use DSS snapshots to create and evaluate alternative plans that respond to the issues. These can range from comprehensive community plans to any number of special-purpose regional or neighborhood plans. In any of these processes, alternative plans can be evaluated according to the following general sequence:

- *Preparation of alternative plans.* Stakeholders prepare alternative plans that respond to the issues identified during benchmarking. Each of these is represented by an alternative sketch in the software with each sketch containing its own unique mix of features. If housing was identified as an issue, one alternative might emphasize a mix of single and multi-family dwellings while another alternative might contain only single-family units.

- *Review of alternative scores.* Stakeholders review alternative sketch indicator scores in comparison to other alternatives and benchmark measurements in order to determine which alternatives respond most effectively to identified issues. For example, if excessive walking distance to parks was identified as a problem at the outset, stakeholders would review the alternatives' park proximity scores to determine which alternative offered the shortest walking distance.

- *Iteration to preferred alternative and adopted plan.* Using the software to provide feedback of results, stakeholders can iterate among alternatives to a preferred, and ultimately adopted, plan.

Figure 4. HYPOTHETICAL APPLICATION OF DSS SNAPSHOT



- *Modeling of adopted goals.* Once a plan is formally adopted, its build-out or full implementation can be modeled and the resulting indicator scores used as quantitative expressions of its goals. In this way the tool can support performance zoning where quantitative goals can be adapted into performance criteria for evaluating proposed development.

In the Figure 4 example, three alternative plans are suggested for the neighborhood corridor by stakeholders: a) vertical mixed-use with employment on lower floors and housing on upper floors; b) new commercial retail with separate multi-family housing and a small park; and c) a mix of offices and retail. The three alternative plans are scored with the employment density indicator producing results of 32, 20, and 40 employees/acre, respectively. Given the hypothetical policy objective of increased density for transit support, Plan C is adopted and its build-out measurement of 40 employees/acre becomes the corridor's goal.

6. Implementing Plans

Once plans are adopted, DSS snapshots can help implement them by evaluating the consistency of development proposals against plan goals. They can also gauge the magnitude of change that a development proposal would cause in an area. These implementation checks can be accomplished according to the following general sequence:

- *Acquire development proposal in GIS form.* In order to apply the DSS as a development evaluation tool, it will be necessary to obtain development proposals in GIS form. Given the widespread use of CAD in preparing development plans and the relatively easy conversion of CAD files to GIS format, it should be reasonable to request major development proposals in GIS format. To implement a requirement for digital development plans, jurisdictions would adopt the equivalent of the DSS indicator dictionary as a data specification for digital submittals. Jurisdictions could decide the extent of these data requirements based on which indicators they intend to apply to proposals.

- *Score base sketch development proposal.* The development proposal is scored with indicators and the results are compared to: 1) existing conditions to gauge the amount of change represented by the development; and 2) adopted goals to determine how much goal achievement the development would accomplish.

- *Iterate to acceptable proposal.* Again using the software's capability for feedback, stakeholders and decision-markers can iterate to an acceptable development scheme during the permitting process.

In the Figure 4 example, this step is shown with two versions of a development proposal, X and Y. Proposal X contains offices and Proposal Y includes offices plus retail. The employment density indicator reveals that Proposal Y's employment density is 20% greater than Proposal X, and is therefore preferred because it is more supportive of the adopted corridor goal.

A simplified description of this procedure is given in Figure 5 for the generic question of whether a proposal is good or bad for a community.

7. Implementing Plans

Periodically, DSS snapshots can be used to measure cumulative change and overall progress toward goals. This type of application would include the following steps:

- *Retrieve benchmark indicator scores.* Indicator scores from the previous benchmark year are used as the starting point, e.g. year 2000.

- *Incorporate built and natural environment changes.* The model's database is updated with constructed changes in the built environment, and resulting changes in the natural environment, that have occurred during the reporting period, e.g. 2000-2005.

- *Update indicator scores.* An updated "existing conditions" sketch is scored to establish new measurements for the new benchmark year, e.g. 2005. The changes in indicator scores between 2000 and 2005 become the amount of goal achievement for the period.

In the Figure 4 example, cumulative changes over several years are measured, revealing a density increase from 12 to 31 employees/acre, which is substantial partial achievement of the goal of 40 employees/acre. However, despite this areawide progress, indicator mapping shows a continuing weakness in employment density in the eastern portion of the corridor where additional attention needs to be focused in order to fully achieve the plan.

Figure 5

IS A PROPOSED PROJECT GOOD OR BAD FOR MY COMMUNITY?

1. Determine which indicators are relevant to project issues.

2. Measure existing conditions in the proposed project vicinity without the project. Calculate indicator scores for a reasonable impact area around the proposed project site, or for an already-established local boundary that encompasses the project site.

3. Measure build-out scores for the existing official land-use plan for the area without the project. Build-out indicator scores are the equivalent of plan goals. If an official plan doesn't apply to the area, measure a set of tentative objectives and goals.

4. Measure the area with the project included (modify #2 to include project).

5. Gauge the type, direction, and magnitude of change in indicator scores between the baseline area (#2) and the area with the project (#4). Which indicator scores change, in what direction, and by how much?

6. Gauge the consistency of the project scores (#4) with the area's goals (#3). Does the project move indicator scores in the direction of the area's goals and if so, which indicators and by how much?

8. Special Purpose Applications

In addition to the generic planning process described above, DSS snapshots can be applied to any special purpose study where the software indicators are relevant to the study's subject matter. Examples include annexations, environmental impact reports, capital improvement planning, and facility siting. Any kind of comparative evaluation or trade-off analysis that is land-based could conceivably be simulated in DSS providing that its indicators are relevant to the issues at hand.