# Adding a Land Use Class Dimension to Correct, Improve, and Enlarge Employment Data in the American Community Survey.

### ECONOMIC LAND USE DIMENSIONS

This poster advocates the inclusion of employment-related land use classes in the American Community Survey (ACS), to correct, improve, and enlarge its worker data. Economic land use classes describe the general physical activities performed by business establishments. Land use classes are only one element of the "land use" inputs needed by transportation models. However, they are key to transportation planning as trip generation factors, and to urban planning as descriptions of existing and planned development patterns. The absence of land use class distinctions seriously restricts the planning applications of Census employment data.

Three dimensions of economic land use are presented in Figure 1:

- land use classes
- industrial classes
- facilities.

Facilities

Figure 1. Dimensions of Economic Land Use

<u>Dimension</u>
<u>Description</u>

Land use class

General physical activities

Office, commercial, institutional, industrial

Industrial class

Goods and services produced

Plastics manufacturing, gasoline stations

Building and development types Factory, warehouse, shopping center, office park

Land use class identifies the general physical activity performed by an establishment.

Examples include office, commercial, institutional, industrial, etc. These may be subdivided into more specific activities, e.g. medical office, highway commercial, light industrial, etc.

Industrial class relates to the purposes of establishments, i.e. the specific goods or services they produce. Both Census 2000 and ACS use such classes, called industry codes. Between 1990 and 2000 the Standard Industrial Classification (SIC) system was replaced by the North American Industry Classification System (NAICS), resulting in data discontinuities, as well as some industry misclassification in both Census 2000 and ACS.

Facilities include the buildings and the land that accommodate establishments.

Census 2000 and ACS do not identify kinds of workplace facilities, (but some industrial classes do imply types of nonresidential buildings). This contrasts with the extensive data collection by the Census Bureau on living quarters, including number of housing units in structure, and group quarters type, distinctions that are equivalent to residential land use classes.

### ADDING LAND USE CLASSES TO EXISTING WORKER DATA

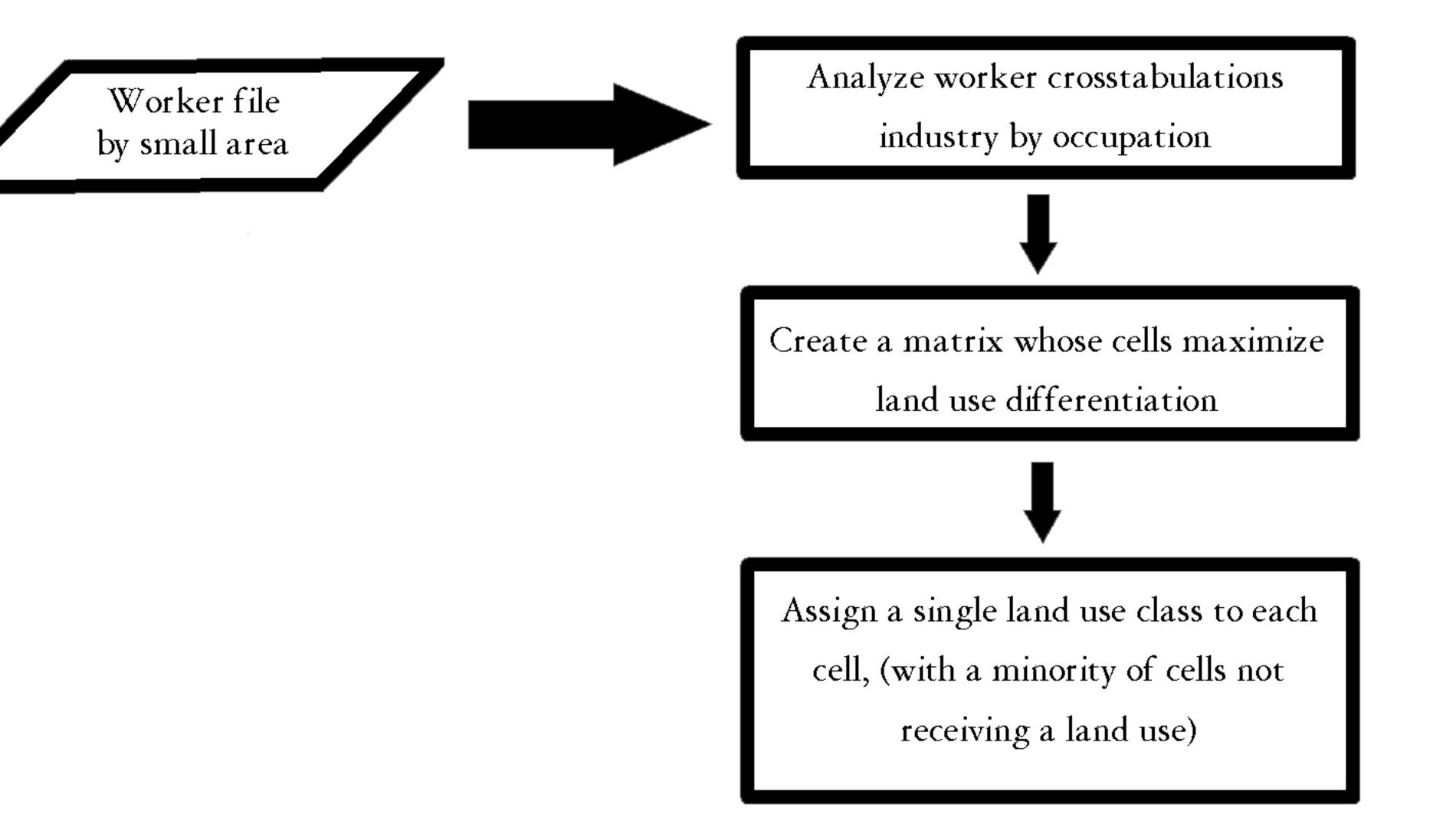
The absence of land use classes in Census employment data restricts its use in planning applications. Neither Census 2000 nor ACS has questions about land use. However, worker data by land use class can be produced by post-processing, in effect "asking questions of the data."

Land use classes can be assigned to individual workers via imputation. This has been done for the Detroit-Ann Arbor metro area, using a Census Bureau 1990 special tabulation. Figure 2 illustrates the procedure, which first produces an industry by occupation land use class matrix, and then assigns the plurality land use to all the workers in each industry in each small area.

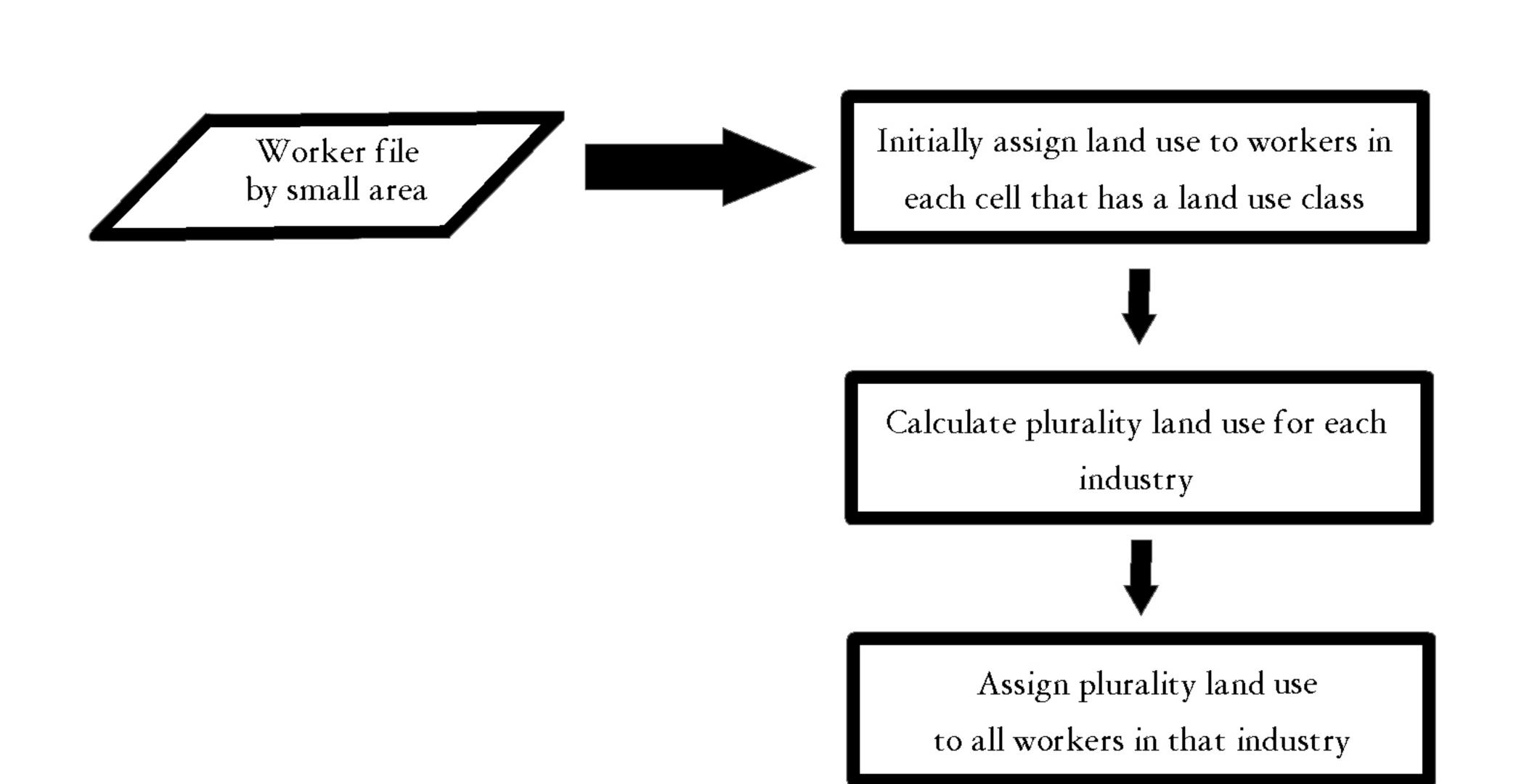
# Figure 2

Assigning Land Use Classes to Census Worker Data by Place of Work

Phase I Create an industry by occupation land use matrix



Phase II Assign land use classes to workers



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### CORRECTING ERRONEOUS INDUSTRIAL CLASSES

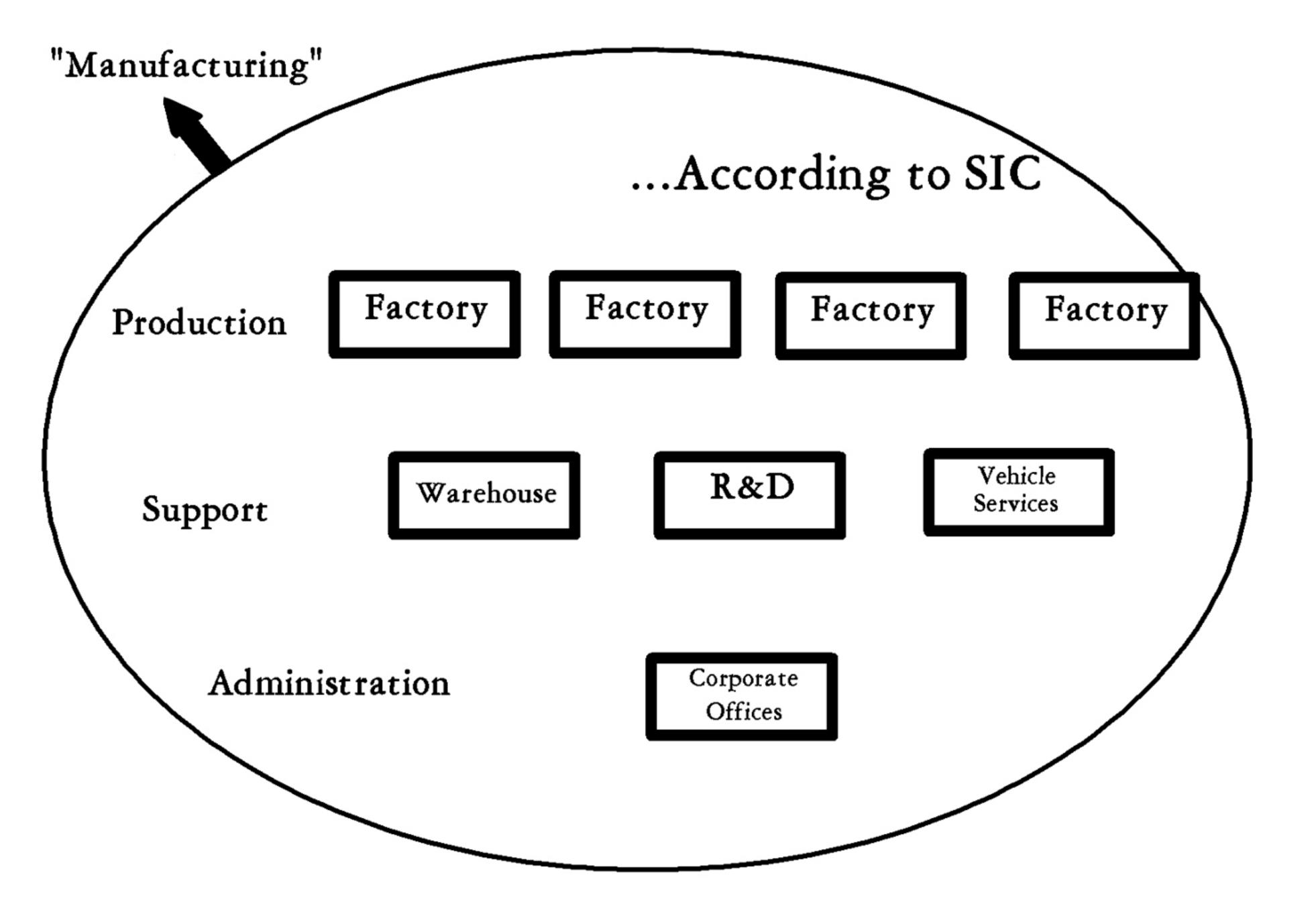
A major difference between SIC and NAICS involves what SIC called auxiliary establishments, i.e. corporate offices, R+D facilities, warehouses, etc., that served the production establishments of a corporation. Figure 3 illustrates the difference, using the example of a manufacturing company. Under NAICS, workers need to be given an industrial class that describes the work done in each auxiliary.

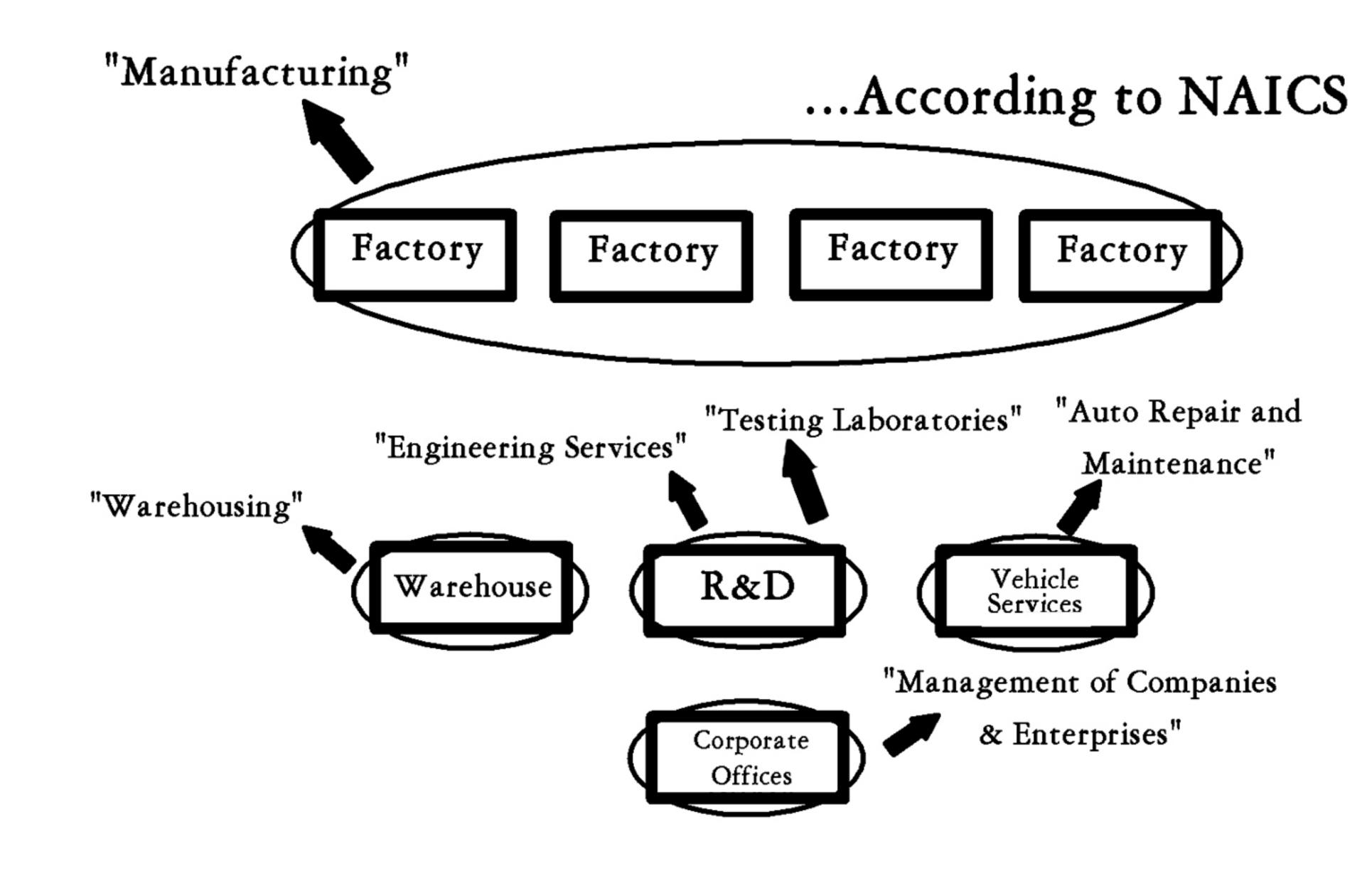
However, the industry questions asked in Census 2000 -- the same as in 1990-were unable to elicit the desired responses. Most workers in auxiliaries appear to have
been given the industrial class of the corporation. For example, Census 2000 counted
only 70 thousand in "Management of companies and enterprises," one of the 18 NAICS
sectors. In contrast *County Business Patterns* for 2000 gives a national total of 2.87
million. The same questions are being used in ACS, so the misclassification continues.

Overall there are around four million workers subject to misclassification, and because
these workers are spatially concentrated, there are strong negative impacts on small-area
data. Until new industry questions can be added to ACS, these misclassifications will
need to be corrected after the fact. The techniques used to impute land use class have
promise for reassigning correct NAICS classes. However, it may prove necessary to use
Census Bureau establishment files as a back-up.

# Figure 3

A Manufacturing Company's Establishments...





### EMPLOYMENT DATA/TRIP GENERATION DATA HARMONIZATION

Because they use incompatible classification systems, Census employment data, and non-Census data on trip generation, cannot be interrelated in a satisfactory manner;

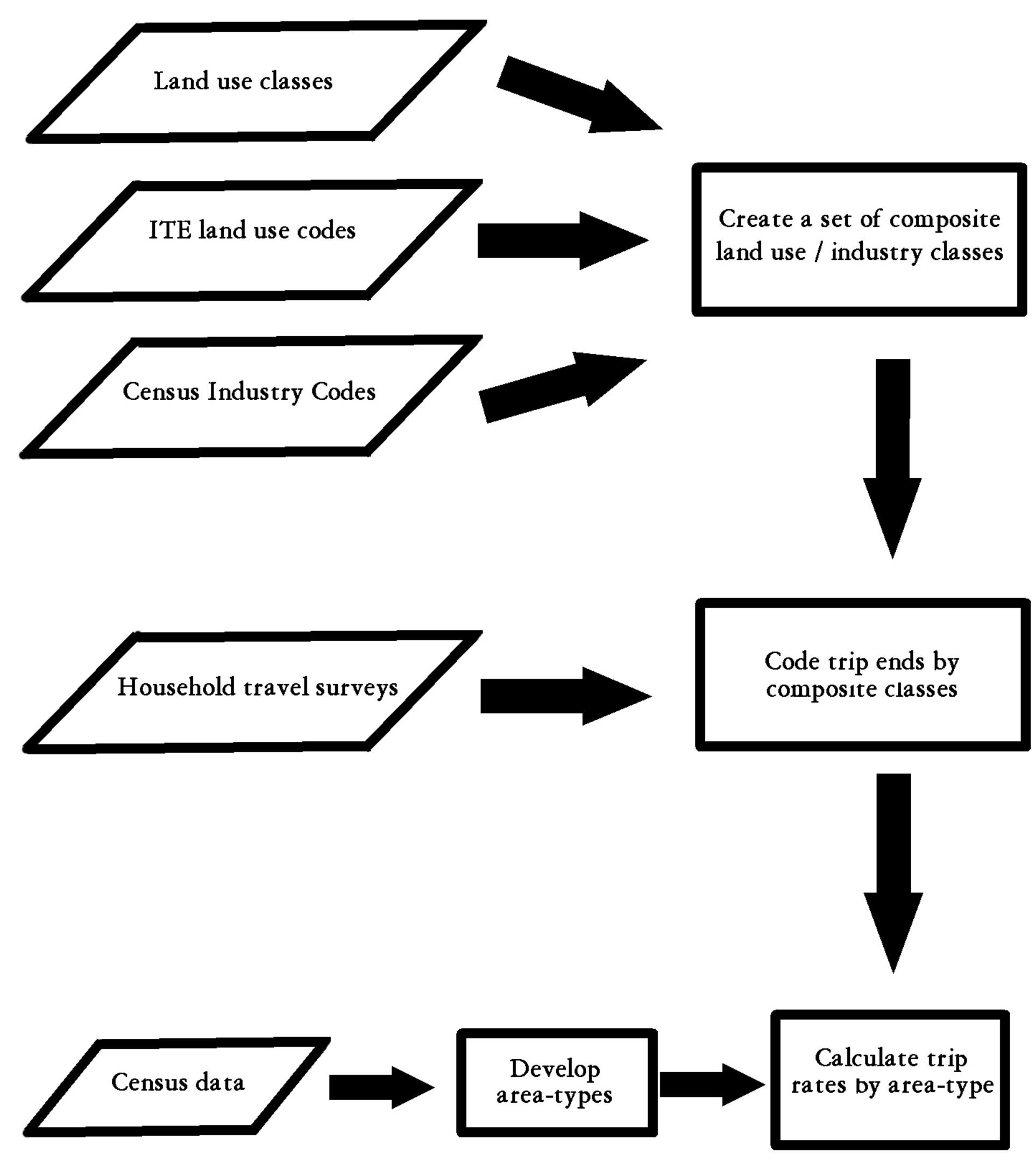
- Census employment data is by 265 industry codes;
- The Institute of Traffic Engineers (ITE) Trip Generation manual contains 112 "land uses," some of which are industrial classes, while others are building or development types
- Household travel surveys typically use a few classes, which can be land uses or industries or facilities, to code kind of trip end.

Figure 4 illustrates a generalized three-step process that produces compatible classes and data. Trip rate data, compiled from each travel survey, would accumulate to form a national set of trip generation rates by mode, purpose, and area-type.

### Figure 4

Creating Composite Land Use/ Industry Classes, to Apply

in Household Travel Surveys



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