MAPPING ECONOMIC ACTIVITIES

PROTOCOL DOCUMENT

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Version: 19 - 07 - 2018

INTRODUCTION

This work is based on the will to get a better and new kind of knowledge about the location and differentiation of economic activities in Brussels metropolitan area and other areas in Flanders. The visualization of the diversity of types and scales of economic activities can be considered as a useful set of information to be used in a urban development and economic policy making process.

The work, conceived as a pilot project, which could be extended and repeated in other areas, is based on an empirical research, done by a visual check of what is identifiable as economic or designed for an economic use directly on the site, aimed to identify, locate and classify all the different types of existing economic activities in the selected areas. This economic activities inventory is the only one existing for Brussels Capital and Flanders Regions based on field work.

As first we started mapping all the visible economic units in a small area located between Brussels capital region and Flanders. We then extended and replicated the mapping in several other areas around Brussels, and in five different case study areas in Flanders, in collaboration with KU Leuven and BIC.

In this paper the methodology and all the steps we followed are explained in the following order:

1. Methodology
2. Fieldwork
3. Economic units classification
4. Decision trees
5. Data digitization
6. Data visualization
7. Update

1 METHODOLOGY

The methodology is based on an empirical research and a learn by doing process, with the aim of identify and map what is actually used or meant to be used by economic activities. A learning by doing process is essentially about getting involved in an activity and, through the process of doing this activity, learning about it in order to answer at some questions like: how that activity works, what the activity makes you think about and how can you improve it, or what doing this activity enables you to do.

With the expression "Economic units" we refer to every place where people work or that is meant to be worked in. Shops, workshop warehouses, offices, schools and all other sites where people are actually working or where they can work are considered. Places like former corner shops, or former industrial buildings now converted and used by housing are not taken into consideration, because in the current conditions they are not able to host an economic activity regardless their past.

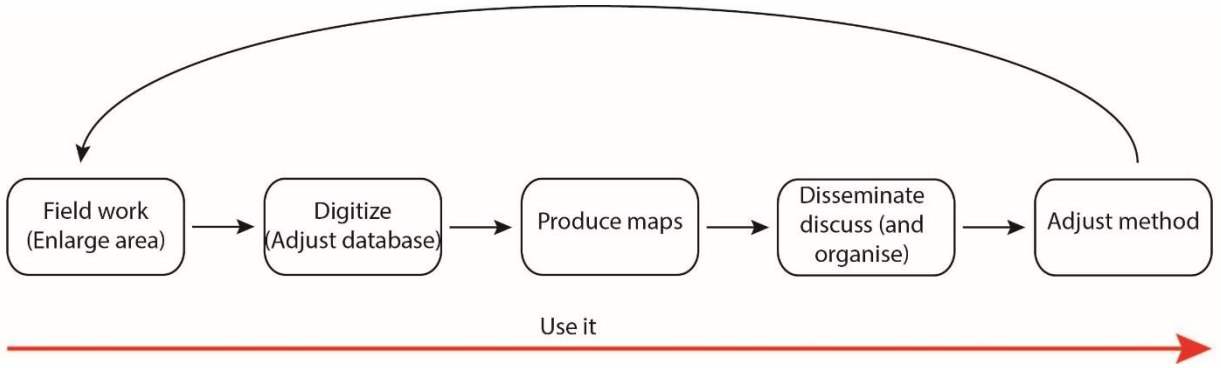


Fig. 1: Project phases and cycle

Fig.1 show the different project phases, organized as follow: A fieldwork phase for data collection, followed by the digitization of this data using a MSAccess database and a GIS software (ArcMap). The data visualization and map production is obtained while elaborating the data in a GIS software (ArcMap). Results and map dissemination is carried out through meetings, workshops, presentations and while sharing the database with whom may be interested in it. The dissemination phase is fundamental to improve the overall quality of the project, thanks to comments, feedbacks and suggestions. It is important to point out how the methodology has been adjusted accordingly to several discussion and feedbacks obtained while sharing the results. Despite this field work and data digitization never stopped, allowing us to cover almost 190 sq.km only in the Brussels case study area

2 FIELDWORK

The Field work phase consist in covering a specific area while going street by street looking for economic units to map . Considered our experience and in order to cover the biggest amount of surface in the shortest time, we can state that the most efficient way of doing this is while cycling inside a given perimeter.

The preparation of same basic materials is necessary for the execution of this phase. The combination between a base map and a table for data collection has been used since the start of this project. The used base map (Fig.2) is obtained while combining the NGI topovector map of Belgium, which shows green areas, infrastructures, buildings, water bodies, streets, etc., with the Brussels and/or Flanders parcels cadastral map (2016 version).

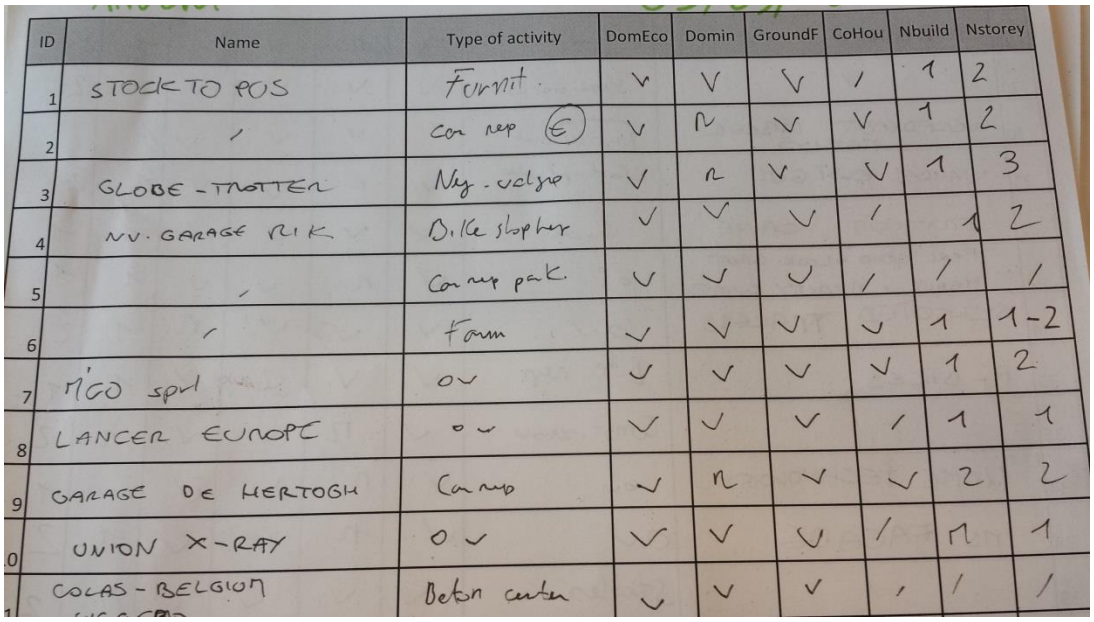
Fig. 2: Fieldwork map

All the visible data collected during the fieldwork are organized in a table (Fig. 3), and for each parcel and economic unit are:

- Company name (If the name is not visible leave the field empty)
- Activity description: Short description of what is visible (i.e.: Shop, restaurant, office, etc.). If is not possible to describe the activity based on what is visible on the field, integrate afterwards the data with desktop research.
- Dominant economic use of the parcel: One parcel can accommodate several companies active in different economic sectors, but despite this is important to define which use is predominant. For this reason the dominant economic use is represented by the one that is more present in terms of total area (based on a visual

estimate) or in number of economic units related to a specific category (i.e.: If on a parcel with 10 economic units, 4 are active in logistic and transport this represent the dominant economic use of the parcel). A ✔ indicate that a specific unit is the dominant one. Tab.1 contains all the possible economic uses, subdivided in 34 different categories.

- Dominant use of the parcel:
  Economy, Housing, Private green and housing, Private green, Nature, Forest, Infrastructure, Agriculture, Recreation, Public park.
- Ground floor use: Yes (✔), if the unit is located on the ground floor
  No (/), if the unit is not located on the ground floor
  Unknown, if is not possible to define the unit location
- Combined with housing: Yes (✔), If there is the presence of housing on the parcel
  No (/), If there is no presence of housing on the parcel
- Number of buildings: 0, 1, 2 or more
- Number of storeys: 0, 1, 2, 3, 4, 5 or more. This number represents the number of storeys of the highest building on the parcel and not the total number of storeys of all buildings.



ID	Name	Type of activity	DomEco	Domin	GroundF	CoHou	Nbuild	Nstorey
1	STOCK TO POS	Furnit.	✓	✓	✓	/	1	2
2	/	Con rep (€)	✓	✓	✓	✓	1	2
3	GLOBE-TROTTER	Nig. valyse	✓	✓	✓	✓	1	3
4	NV. GARAGE RIK	Bike shop	✓	✓	✓	/	1	2
5	/	Camp pak.	✓	✓	✓	/	/	/
6	/	Farm	✓	✓	✓	✓	1	1-2
7	MGO sprl	ov	✓	✓	✓	✓	1	2
8	LANCER EUROPE	ov	✓	✓	✓	/	1	1
9	GARAGE DE HERTOGH	Camp	✓	✓	✓	✓	2	2
0	UNION X-RAY	ov	✓	✓	✓	/	1	1
1	COLAS-BELGIUM	Beton centr	✓	✓	✓	/	/	/

Fig. 3: Fieldwork table

3 ECONOMIC UNITS CLASSIFICATION

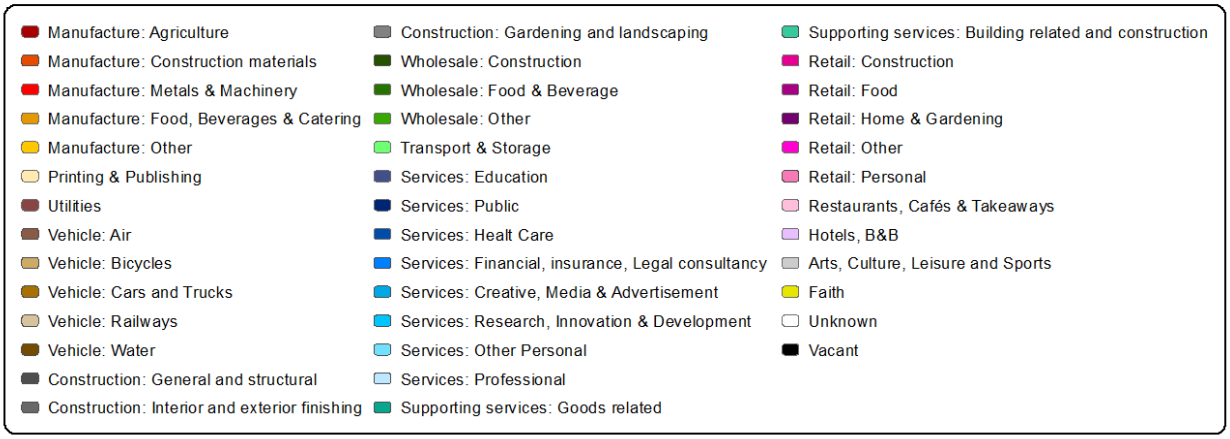
In this chapter an explanation about the economic units classification used in this project is provided. The aim of this classification is to define some categories able to contain all the different types of existing economic activities, gathering them according to the activity type or the operational field. It must be pointed out that our classification is not trying to describe in detail all the different types of activities, for this there are already some more complex and sometimes not completely clear databases. What we try to describe are urban interactions between economic units and among them and the environment where those are located. For this reason all possible economic uses are subdivided in a total of 34 different categories representing with a good but not too deep level of the detail all the economy main sectors (Tab.1)

Code	Description	Explanation
E	Vacant	Vacant buildings or unit, unused or abandoned.
OU	Unknown	Buildings or parts of them for whom the current or former use is not recognizable from fieldwork or desktop research.
VA	Vehicles: air	The activity of the unit is related to airplanes manufacturing, assemblage, maintenance, use, and airline companies.
VB	Vehicles: bicycles	The activity of the unit is related to bicycles manufacturing, assemblage, maintenance, use, rent and shops.
VC	Vehicles: cars & trucks	The activity of the unit is related to car and trucks manufacturing, assemblage, maintenance, use, trading, parts suppling, rent and shops. Gas stations, car washes and commercial car parking are included.
VR	Vehicles; railways	The activity of the unit is related to trains manufacturing, assemblage, maintenance, use, trading and parts suppling.
VW	Vehicles: water	The activity of the unit is related to boats manufacturing, assemblage, maintenance, use, trading, storage and parts suppling.
SE	Servicies: education	The activity of the unit is to educate or train people, including kindergarten, crèche, children day care.
SHC	Servicies: health care	The activity of the unit is to provide health care for humans and animals, meaning hospitals, doctors, pharmacy, veterinarian, hearing center, social security, disabled people day care, retirement homes
UT	Utilities	The activity of the unit is to provide or maintain infrastructure for electricity, water and gas supply, sewer systems, waste treatment and recycling
F	Faith	The activity of the unit is related to religious services and religion worship places
ACS	Arts, culture, leisure and sports	The activity of the unit is related to arts, culture, sports and leisure, including parish and youth centers, gambling and betting centers, night clubs and casinos
MPP	Printing & publishing	The activity of the unit is to print or publish, including photocopy shops

RH	Hotels and B&B	The activity of the unit is to provide lodging and related meals and entertainment for paying guests
RB	Restaurants, cafés & takeaways	The activity of the unit is to serve food and drinks for paying guests, including take away
RC	Retail: construction	The activity of the unit is to sell goods for personal/private consumption or use: brico and working tools
RF	Retail: food	The activity of the unit is to sell goods for personal/private consumption or use: food and beverage (i.e.: supermarkets, groceries stores, bakeries, convenience stores, butcheries, deli etc.)
RG	Retail: home & gardening	The activity of the unit is to sell goods for personal/private consumption or use: furniture and bathroom furniture, floors and tiles, windows, doors, stairs, mattresses, curtains, sun blinds, gardening materials and plants.
RO	Retail: other	The activity of the unit is to sell goods for personal/private consumption or use goods: not included in the previous categories (i.e shops selling:. phones, laptop and electronic devices, toys, home appliances, newspapers, flowers, household products e
RP	Retail: person related	The activity of the unit is to sell goods for personal/private consumption or use personal goods (i.e. shoes, clothes, sport equipment, glasses, hair and beauty products, jewelries etc.)
CGA	Construction: gardening and landscaping	The activity of the unit is directly involved in gardening, landscaping and swimming pools construction or installation on site
CIE	Construction: interior and exterior finishing	The activity of the unit is directly involved in interior and exterior finishing works on site (i.e.: Roofing, cladding, installation of walls, illumination, furniture, doors and windows, painting, technical installations)
CGS	Construction: structural and general	The activity of the unit is directly involved in construction on site, structural works (i.e.: roads, bridges, sewers, structural parts of buildings etc.) and earth works.
MAG	Manufacture: agriculture	The activity of the unit is to cultivate plants, vegetables and animals. Only farms buildings, their relative areas and greenhouses are considered.
MCO	Manufacture: construction materials	The activity of the unit is to produce or manufacture construction materials (i.e: Concrete, sands and gravels, precast concrete etc.)
MFC	Manufacture: food, beverages & catering	The activity of the unit is to produce or manufacture food and beverage products. Catering companies are included
MMM	Manufacture: metals & machinery	The activity of the unit is to assemble, construct, create tools and machineries or parts. The activities related to the treatment and process of metals materials and their surfaces are included.
MO	Manufacture: other	The activity of the unit is to produce or manufacture goods (i.e.: chemical products, textiles, rubber products, paints, packaging, glues, 3D printing)
WC	Wholesale: construction materials	The activity of the unit is to sell, supply, import and export construction materials and products for professional use or consumption.
WF	Wholesale: food & beverage	The activity of the unit is to sell, supply, import and export food and beverage for professional use or consumption.

WO	Wholesale: other	The activity of the unit is to sell, supply, import and export other goods for professional use or consumption (i.e.: beauty products, electronic parts and materials, toys, audio and video components etc. .
WTS	Transport & storage	The activity of the unit is to transport, deliver or store goods
SPU	Services: public	The activity of the unit is to provide a public service (i.e.: public offices of every level of government, from the municipal to the state one, public libraries, police stations, fire departments, European Union (EU) offices, buildings and spaces used fo
SFL	Services: financial, insurance and legal consultancy	The activity of the unit is to provide a financial, insurance or legal service, including auditing, trust funds, investors, tax consultancy, management consultancy and business consultancy
SPC	Services: creative, media & advertisement	The activity of the unit is involved in architecture, design, marketing and advertising, photography, media, fashion, including event organizers
SRD	Services: research, innovation & development	The activity of the unit is to provide scientific research, R&D, technical testing and analysis or laboratories.
SOP	Services: other personal	The activity of the unit is to provide services for persons and families (i.e.; Hairdressers, barbers, beauty centers, laundries, cleaning companies for private households, driving schools etc.)
SSC	Supporting services: Building related and construction	The activity of the unit is to provide a construction related service or services for buildings (i.e.: Maintenance and cleaning of buildings, security services, rent of construction machines and tools)
SSG	Supporting services: Goods related	The activity of the unit is to provide a goods related services (i.e.; Cleaning and industrial washing, maintenance services, packaging, rent of audio and video equipment etc.)
SPR	Services: Professional	The activity of the unit is to provide professional (consultancy) services to persons and companies (i.e.: real estates, employment and HR agencies, translation and interpretation services, trade unions, call centers, Information technology and computer s

Tab. 1 Activities classification



Fig, 4 Activities classification legend

4 DECISION TREES

A set of questions organized in a decision tree in necessary to understand the logic behind the identification of an economic unit and the activity code attribution. Fig.5 show the first part of the decision tree in which we moved from the identification of an economic space into the activity coding. To identify an economic space questions like "Does it look like people are working in the building / on the parcel?" or "Is the building / parcel clearly intended to have an economic use?" clearly explain what already mention in the methodology chapter, that is the will to identify all the places where people work or that are meant to be worked in. In the second question "Are there other signs that suggest people are working there?", with the expression other signs we refer to: Company signs, name plates (Especially for doctors, lawyers, offices, etc.), company labels on doors and bells that are clearly visible. The second part of the decision tree (Fig. 6) is focused on the attribution of an economic activity code (Tab. 1) to every single economic unit, based on fieldwork data and desktop research if necessary.

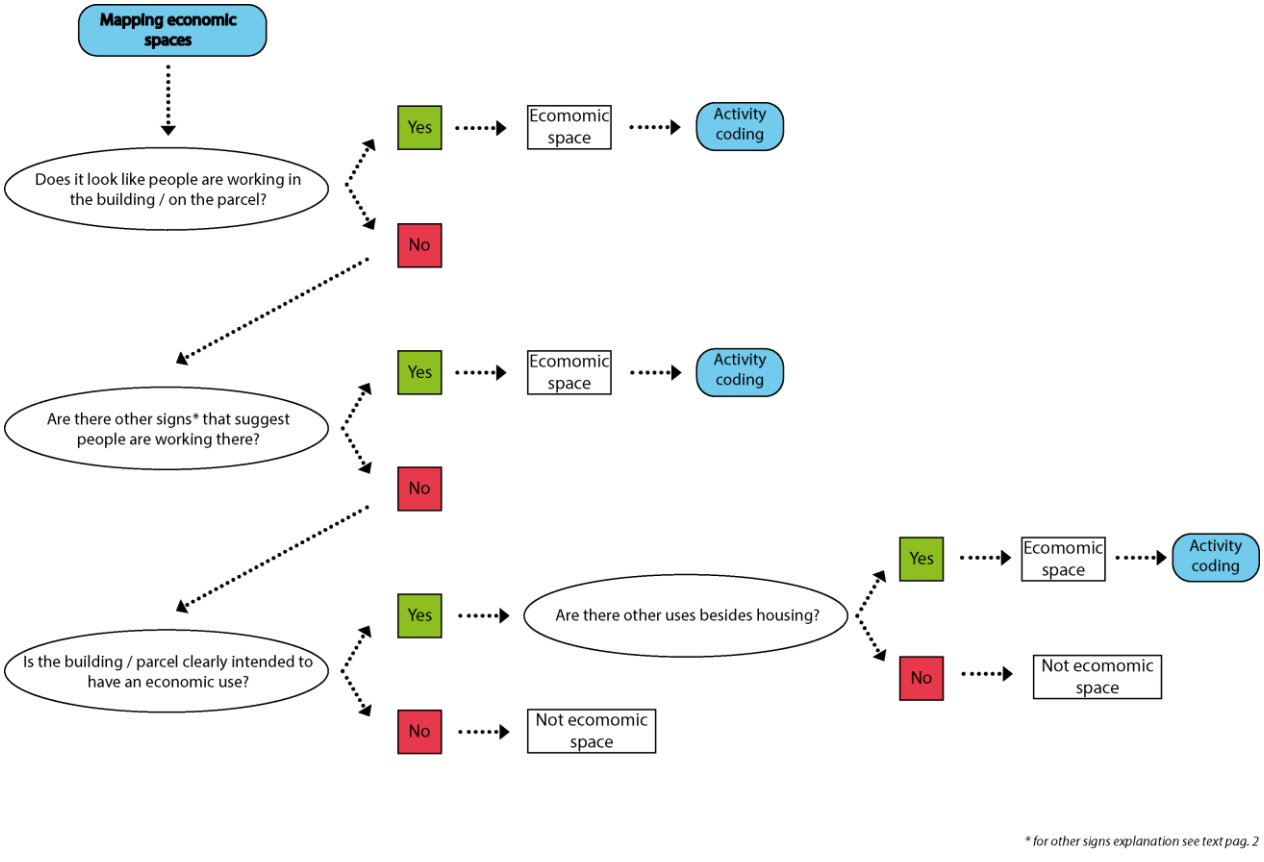
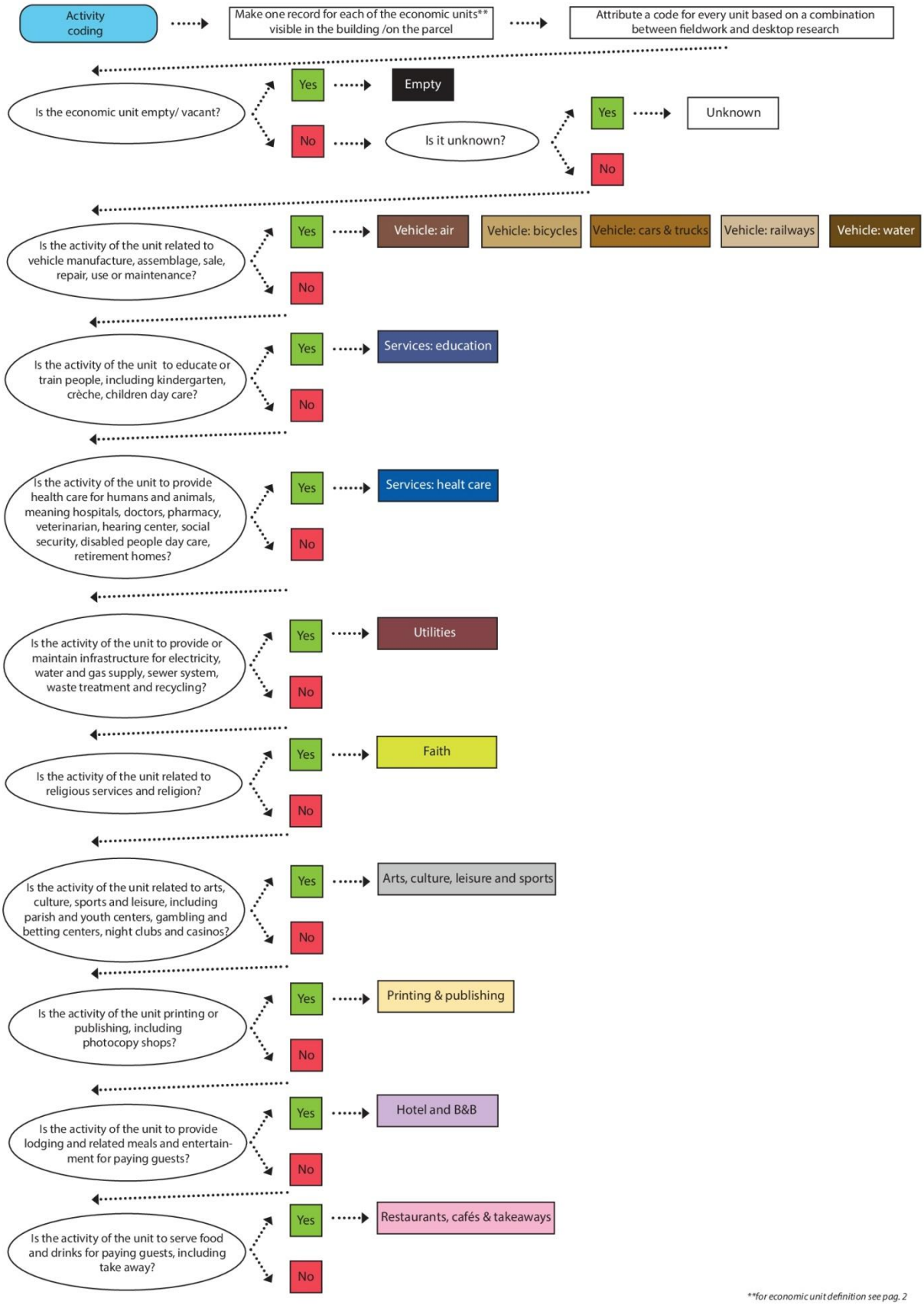
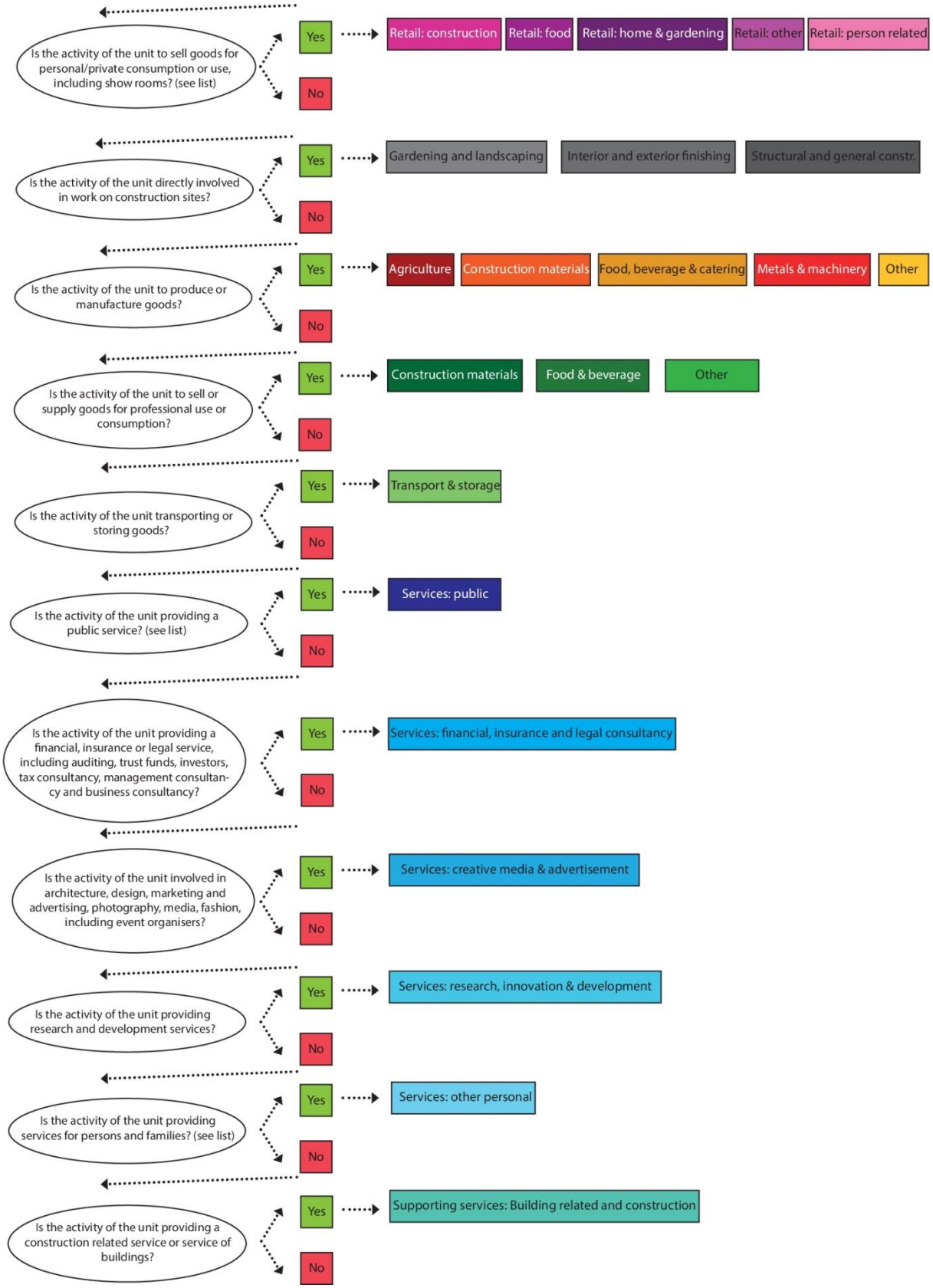


Fig 5: Decision tree – Economic spaces



***for economic unit definition see pag. 2*


Is the activity of the unit to sell goods for personal/private consumption or use, including show rooms? (see list)
Yes
No
Retail: construction
Retail: food
Retail: home & gardening
Retail: other
Retail: person related
Is the activity of the unit directly involved in work on construction sites?
Yes
No
Gardening and landscaping
Interior and exterior finishing
Structural and general constr.
Is the activity of the unit to produce or manufacture goods?
Yes
No
Agriculture
Construction materials
Food, beverage & catering
Metals & machinery
Other
Is the activity of the unit to sell or supply goods for professional use or consumption?
Yes
No
Construction materials
Food & beverage
Other
Is the activity of the unit transporting or storing goods?
Yes
No
Transport & storage
Is the activity of the unit providing a public service? (see list)
Yes
No
Services: public
Is the activity of the unit providing a financial, insurance or legal service, including auditing, trust funds, investors, tax consultancy, management consultancy and business consultancy?
Yes
No
Services: financial, insurance and legal consultancy
Is the activity of the unit involved in architecture, design, marketing and advertising, photography, media, fashion, including event organisers?
Yes
No
Services: creative media & advertisement
Is the activity of the unit providing research and development services?
Yes
No
Services: research, innovation & development
Is the activity of the unit providing services for persons and families? (see list)
Yes
No
Services: other personal
Is the activity of the unit providing a construction related service or service of buildings?
Yes
No
Supporting services: Building related and construction

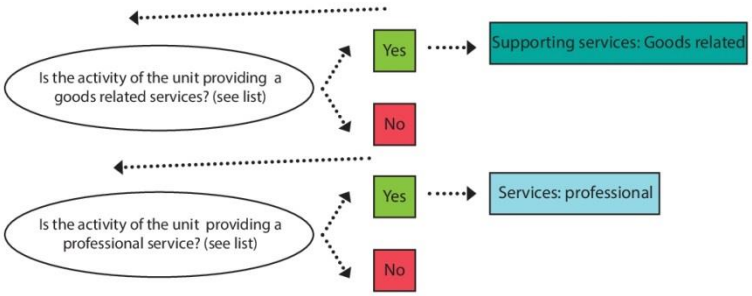


Fig. 6: Decision tree – coding

5 DATA DIGITIZATION

The aim of this phase is to process and if necessary integrate fieldwork data. All the collected economic units data are stored in a MSAccess database, structured as shown in Fig. 7.

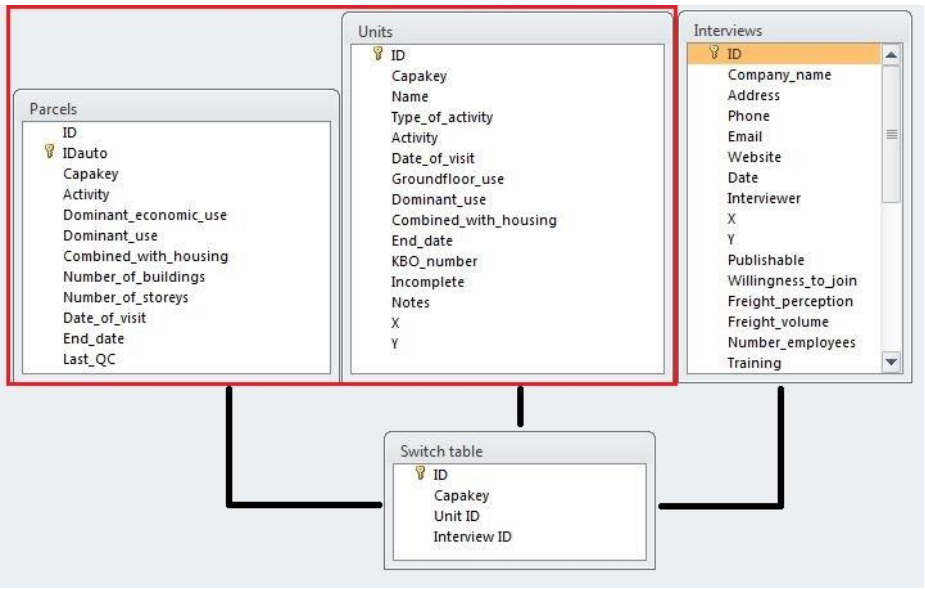


Fig. 7: Database structure

Data obtained from fieldwork are organized in two tables. Firstly the parcels one in which all the data about parcels uses, number and storeys of buildings are located, and secondly the economic units table, where all the other field work data, integrated by some desktop research are stored.

The common field between the two tables, which allow the creation of a univocal relation between one parcel and the economic units in/on it is the "Capakey". This consists of an alphanumeric code made by a combination of alphabetic and numeric characters which is unique for every single cadastral parcel. This code is derived from the GDI-Vlaanderen cadastral map for Flanders, and from the UrbIS cadastral map for Brussels capital region (2016 version).

Another table containing the interviews Department Omgeving did in Buda inside the Buda+ project is part of the database, but is not used to process fieldwork data.

Data input it is done using a form (Fig. 8) which allows us to fill the two tables while using only one user interface. The form is structure in two parts, one for parcels and the other one for economic units. All the form fields are here explained in detail.

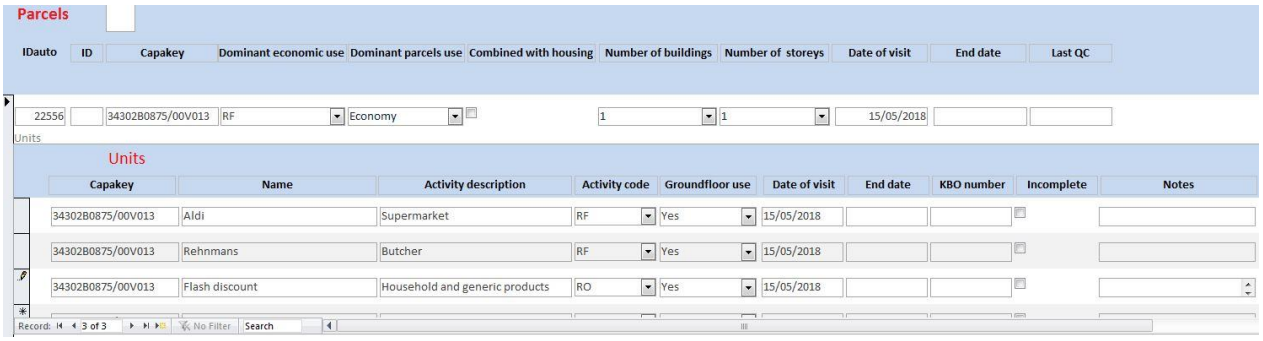


Fig. 8: Form view

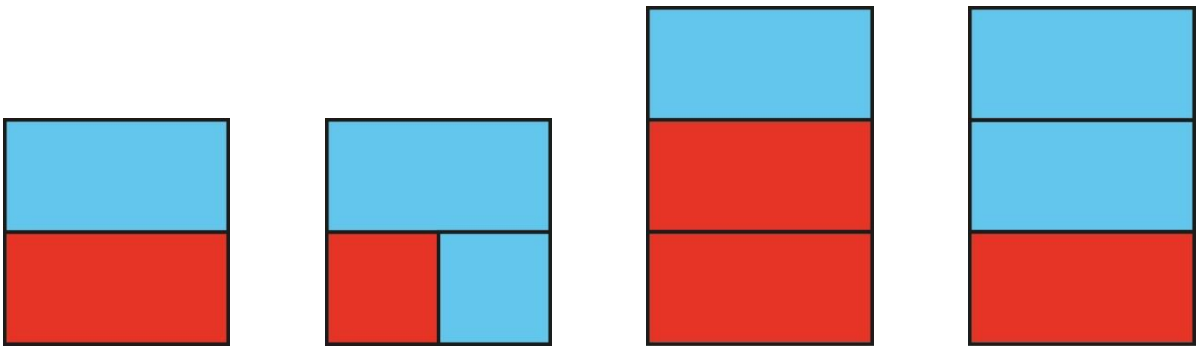
Parcels form

IDauto and ID: Automatic generated fields used to add a unique number for each record.

Capakey: Parcels Capakey obtained from 2016 cadastral map using GIS

Dominant economic use: As explained in chapter n.2 is the dominant economic use of the parcel, and is represented by one activity code (Tab.1)

Dominant parcel use: A drop down menu contains all the different parcels uses. If it is not possible to attribute a dominant use to a specific parcel based on fieldwork data, an using an aerial view or an orthophoto is possible. The distinction between an economic or residential (Housing) as dominant use in a parcel is not always easy, especially in urban environment, for this reason a couple of possible examples are here analysed more in detail.



(a) (b) (c) (d)

Fig: 9: Dominant use examples

In figure number nine red color represent an economic use and light blue represent housing. The first example (a) represent a situation in which both housing and economy are using the same number of storeys or area, in this case economy is considered as the dominant parcel use (i.e.: Shop or offices at ground floor level and one level of housing above). (b) Is a clear example of an house office, an hairdresser or a shop that uses just a

portion of the ground floor with housing above. In this case housing in the dominant use of the parcels. The third example (c) describes a situation in which economy uses more of both storeys and area in a parcels, in this case it represents the dominant use. As last (d) shows an opposite situation, in which housing is predominant over economy.

Combined with housing: Check the box only if there is housing on the parcel

Number of buildings: A drop down menu contains all the different options

Number of storeys: A drop down menu contains all the different options

Date of visit: Data obtained from fieldwork

All the other fields are usually not used for data input

Units form

In this form one record for each economic unit is created (Fig. 8). Create just one record for empties and one record for unknown economic units per parcel, regardless their total number.

Capakey: Parcels capakey, automatically filled field

Name: Economic unit name when available.

Activity description: Short description of the unit activity, based on field work data and integrated with desktop research. For units marked as unknown on the field, a specific desktop research is possible. Using the website (www.realo.be) is possible to obtain an address for all the cadastral parcels of Belgium. This address when googled could lead to information about companies registered there. If this information are coherent with what is visible on the field, an activity code attribution is possible. If the information is too vague or not coherent, the unit is classified as unknown.

Activity code: In this field an activity code is defined for every economic unit based on the activity description information. For code attribution, in Chapter 3 and 4 a list of all the possible activities codes and the decision trees to follow are available.

Ground floor use: As previously explained, choose from the drop down menu, Yes if the unit is located on the ground floor, No if the unit is not located on the ground floor and Unknown if is not possible to define the unit location

Date of visit: Data obtained from fieldwork

Incomplete: Check the box if the data about an economic unit are not complete.

Notes: Field used for additional economic units or parcels information.

6 DATA VISUALIZATION

The visualization of economic units data is obtained while importing in ArcMap (GIS) the tables contained in the MSAccess database. The dominant economic use map (Fig. 10) is obtained while exporting the "parcels" table from MSAccess and linking it to the cadastral shapefiles in Arcmap.

To import the MsAccess database in GIS, first save a copy of it in the 2002-2003 MsAccess version and then open the folder in which the file is located using ArcCatalog. A "join" between the cadastral parcels layer and the parcels table, based on the common field "Capakey" (Fig.9), is necessary for data visualization.. The visualization of "Activity" field where the dominant economic use codes are located and organized, as shown in fig.4, allows the creation of the so called "Dominant economic use map" (Fig. 10). Many other data visualizations are possible, like vacant spaces, ground floor uses, activities combined with housing, etc. depending on the type of selected data.

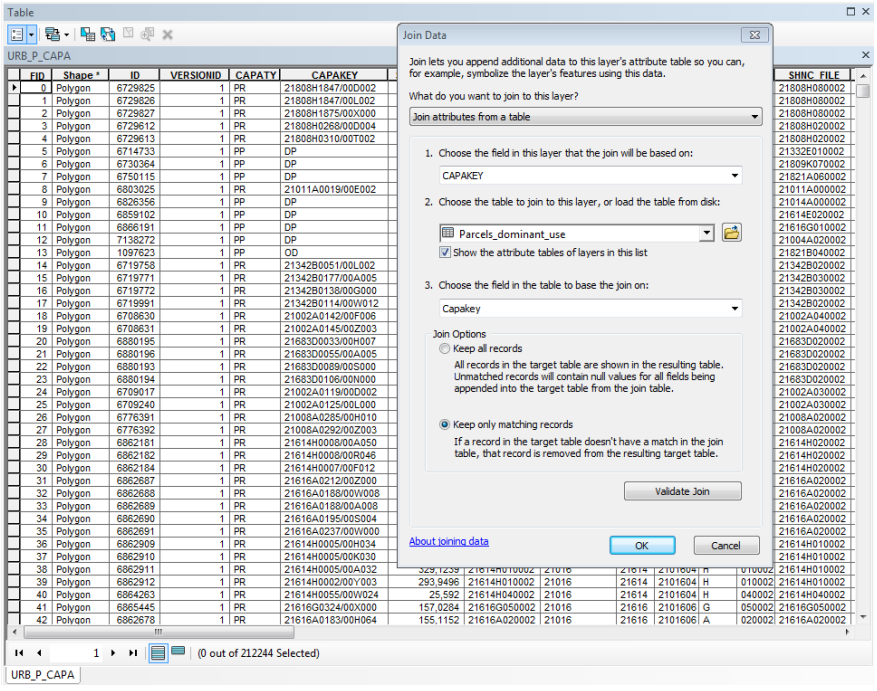


Fig. 9: Dominant use table join

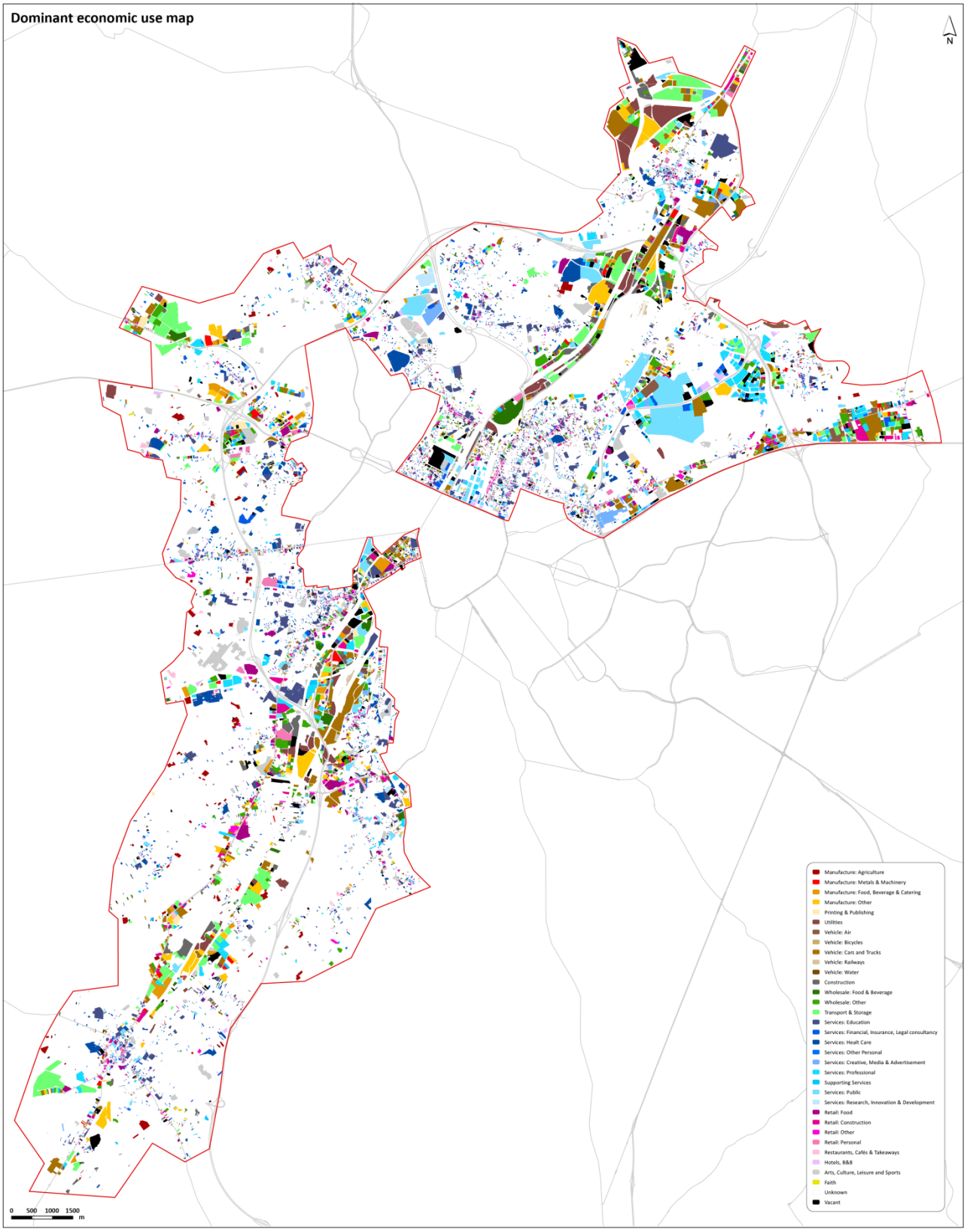


Fig. 10: Dominant economic use map – Brussels metropolitan area case (version March 2018)

7 UPDATE

For the database update we defined and tested a first methodology in Buda, as part of the BUDA+ project. The idea is to update just specific areas and not the entire database, which would be very time consuming and hardly feasible considered the amount of area already mapped.

The basic idea is to define an area to update and check and integrate if necessary the data about companies inside that specific perimeter without redoing the entire mapping. In this case a preparatory desktop phase is necessary, in order to prepare the fieldwork materials, while defining a possible route between mapped companies to follow. A map of the area able to show companies and parcels, combined with a table containing data about companies from the database and blank records for updates (companies that are not there anymore, new companies, companies with different name, etc.) seemed a good option we already tested and we will test again soon.

ECONOMIC UNITS IDENTIFICATION

For economic units identification in addition to the definition given in chapter number one, a four phase approach is here explained. The aim of this phase is to identify different economic units, also inside the same company.

Field work: It is possible to identify different economic units based on: different companies names, mix of companies, empty or unknown economic units, different parts of a same company that are not proportional to the rest of the site or not directly part of the process happening there (i.e.: Groups headquarters offices or groups R&D laboratories)

Parcels: One company could be located on different parcels, each one with a different use. The description of the different parcels uses could lead to a more detailed company description.

Desktop research: From a research based on the unit name is it possible to obtain different results. For example two separate economic units (i.e: an office and a production area) could be group together if they belong to the same company and they are part of the same process. This could also reveal other parts of a company present on a specific site like R&D, import-export etc. for which the creation on a different economic units is necessary

Activity coding: The attribution of one specific code to each unit could lead to a loss of information about the type of activities done by the company. In this case is necessary to split the activity in two separate economic units and attribute a different code to each one of those. This has to be done only when the difference between the two different is relevant and they are not proportional. For example in the case of a company active in the production and installation of doors and windows, the creation of two different economic units is necessary when the production part is the main company activity and it is predominant on the installation one.